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AND

FISHERY INDUSTRIES

OF THE

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BY

GEORGE BROWN GOODE
ASSISTANT SECRETARY OF THE SMITHSONIAN INSTITUTION
AND A STAFF OF ASSOCIATES

SECTION V

HISTORY AND METHODS OF THE FISHERIES

IN TWO VOLUMES, WITH AN ATLAS OF TWO HUNDRED AND FIFTY-FIVE PLATES

VOLUME II

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ASSOCIATE AUTHORS.

Joel A. Allen	Museum of Comparative Zoology, Cambridge.
Tarleton H. Bean	U. S. National Museum, Washington.
James Temple. Brown	U. S. National Museum, Washington.
A. Howard Clark	U. S. National Museum, Washington.
Captain Joseph W. Collins	Gloucester, Massachusetts.
R. Edward Earll	U. S. Fish Commission, Washington.
Henry W. Elliott	Cleveland, Ohio.
Ernest Ingersoll	New Haven, Connecticut.
David S. Jordan	Indiana University, Bloomington, Indiana.
Ludwig Kumlien	Milwaukee, Wisconsin.
Marshall McDonald	U. S. Fish Commission, Washington.
Frederick Mather	N. Y. Fish Commission, Cold Spring, New York.
Barnet Phillips	Brooklyn, New York.
Richard Rathbun	U. S. National Museum, Washington.
John A. Ryder	U. S. Fish Commission, Washington.
Charles W. Smiley	U. S. Fish Commission, Washington.
Silas Stearns	Pensacola, Florida.
Frederick W. True	U. S. National Museum, Washington.
William A. Wilcox	Gloucester, Massachusetts.

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PART XV.

THE WHALE-FISHERY.

1.—HISTORY AND PRESENT CONDITION OF THE FISHERY

By A. Howard Clark.

1. GENERAL REVIEW.

The whaling fleet.—The American whale-fishery in 1880 employed one hundred and seventy-one vessels, aggregating 38,633.38 tons, and valued with outfits at $2,891,650. Additional capital, aggregating $1,733,000, was invested in wharves, store-houses, and oil refineries. The number of men employed on the vessels was 4,198 and in shore whaling about 250. The largest vessel was the steam bark Belvidere, 440.12 tons, and the smallest one employed in ocean whaling was the schooner Union, 66.22 tons. Most of the schooners and the smaller vessels of other classes were employed in Atlantic Ocean whaling, while the largest and best equipped craft were in the Pacific and Arctic fleets. The distribution was as follows: Five vessels in Hudson Bay, one hundred and eleven in the North and South Atlantic, twenty-five in Bering Sea and the Arctic Ocean, twenty-two in the Pacific Ocean, and eight hauled up at home ports.

The greater number of vessels belonged in Massachusetts, one hundred and twenty-three hailing from New Bedford, twenty from Provincetown, seven from Edgartown, six from Boston, two from Westport, two from Marion, and one from Dartmouth. New London, Conn., owned five vessels and five hailed from San Francisco, Cal. The interest of San Francisco in the whale-fishery cannot be measured by the number of vessels owned there, for almost the entire North Pacific and Arctic fleets are accustomed to make that place a fitting port and the headquarters for reshipment of oil and bone to the Atlantic sea-board.

The Provincetown fleet was composed almost entirely of schooners employed in Atlantic Ocean whaling. The whaling-grounds of Hudson Bay and Davis Strait are favorite resorts for New London whalemen, while New Bedford vessels are scattered over all the seas.

Besides the vessel fishery there is a boat or shore whaling industry, which at times is quite profitable. The principal stations are on the California coast and are manned mostly by Portuguese. On the coasts of Washington Territory and Alaska whales are taken by the Indians and Eskimos. The only points on the Atlantic coast where boat-whaling is carried on are at Provincetown and one or two places in North Carolina; at Provincetown the business in some years is of considerable importance, as in 1880, when 48 whales were taken, yielding 29,925 gallons of oil, and 8,750 pounds of bone. The principal species taken at the Atlantic stations is the fin-back

whale, and on the California coast the gray whale. Neither of these species yields bone of great value and both furnish but a limited quantity of oil. Humpback, sulphur-bottom, and right whales are occasionally captured at the California and Alaskan stations, but seldom on the Atlantic coast.

THE PRODUCTS.—The products of the fishery in 1880 were valued at $2,323,943, and included 37,614 barrels of sperm oil and 34,626 barrels of whale oil; 458,400 pounds of whalebone, worth $907,049, and $5,465 worth of ambergris and walrus ivory. The Pacific-Arctic grounds were the most productive, yielding oil and bone worth $1,249,990. From Atlantic Ocean grounds oil and bone were taken worth $908,771.

The principal products of the whale-fishery are oil and bone, the former obtained from the blubber and the latter from the jaws of the animal. The minor products are ambergris from sperm whales and guano and glue made from bones and other refuse matter. Oil as it comes from the animal is classed as sperm oil and whale oil, the former being derived exclusively from sperm whales, and the latter from the right whale and other varieties, as also from blackfish and porpoise. Walrus oil, taken by the northern fleet, is also generally classed as whale oil. Sperm oil is worth about double the value of other whale oil. Northern whale oil is slightly higher than southern oil and blackfish higher than either. From sperm oil is made refined oils for lubricating, and spermaceti used chiefly for candles. The jaws of blackfish and porpoise yield a very superior oil, employed for lubricating watches and clocks.

Crude or unrefined sperm oil is little used, though about half the entire production of ordinary whale oil is used in a crude state in the manufacture of cordage.

The oil is prepared at the refineries and sent to market under various trade names, as *Spring-make natural*, *Spring-make bleached*, *Natural winter*, *Bleached winter*, and *Double-bleached winter*. These names indicate the grades of oil and the processes of refining. The results of refining sperm oil are three or more grades of oil and two qualities of spermaceti. From whale oil are produced several grades of oil, whale-foots, which is a tallow-like substance, and oil soap used by scourers.

The refining of whale oils is carried on almost exclusively at New Bedford, which port is practically the headquarters of the American whaling industry. When the business was extensive there were several large refineries in active operation, but for some years past three establishments have been enough to care for the entire production.* The process of refining varies according to the kind of oil, yet in some essentials the methods are alike for all.

When landed from the vessels the oil is in wooden casks, varying in size from a few gallons to a hogshead or more in capacity. If not sold at once to the refiners it is stored on the wharves or in sheds, being covered with seaweed and boards to protect the barrels from leakage by exposure to the sun. It sometimes remains in this condition for many months or even years.

At the refinery the oil is drained into vats and the casks rinsed out with hot oil, recoopered, and made ready for another cruise, or sold to be sent to Africa for shipping palm oil.

In the refining process the oil is first heated, when pieces of blubber and foreign matter settle, and the clear oil is again put in casks to be packed in ice pits and subjected to the freezing process, which partially congeals or granulates it. The next step in the refining is to strain the oil through woolen cloths to separate the foots, and it is then put in cotton bags, and submitted to heavy pressure, which further separates the oil from the solid matter, leaving in the bags, if sperm oil, spermaceti, which is further heated and refined, or in the case of whale oil leaving whale-foots, extensively used by tanners for softening leather. The various grades of oil are obtained by further heating and pressing, and by the admixture of chemicals to clarify or bleach it.

* Refineries have recently (1885) been established at San Francisco, Cal.

Sperm oil is used chiefly as a lubricator, for which purpose it is unsurpassed. Whale oil is employed in many industries, but chiefly by tanners in the preparation of leathers. Blackfish oil is specially good in preparing morocco. Whale oil, mixed with black lead and paraffine oil, is used for lubricating car axles and wheels.

Spermaceti is used in medicine, in laundries, and for other minor purposes, but is used chiefly for the manufacture of candles; a patent candle of superior quality is made from paraffine and spermaceti mixed.

Whalebone requires comparatively little preparation to fit it for use by whip-makers, dress-makers, and numerous other tradesmen. It is received from the vessels in bundles of slabs varying from a foot to 15 feet in length. These slabs are scraped, steamed, cut, and split into suitable sizes for use.

The whalebone workers of the United States recognize five varieties of bone; (1) Arctic, from the Bowhead or Polar whale; this is the largest bone, and is used principally in the manufacture of whips and dress bone; (2) Northwest, which is the heaviest bone, and is used for whips and canes; (3) South Sea, which is fine and short, used for whips and dress bone; (4) Humpback, short and black, specially suitable for corsets; (5) Finback, short and coarse, used for corsets. Some slabs of bone have longitudinal streaks of white or light yellow. The white portion is of greater value than the black, and is thought by the workers to be caused by disease.

Ambergris, when pure, is worth more than its weight in gold. It is used in the preparation of fine perfumery, having the property of thoroughly and permanently uniting the ingredients. It is found in the intestines of the sperm whale, and is a very uncertain article. Many whalers have cruised the seas for years and never found an ounce, while fortunate ones have secured a hundred pounds or more of the precious substance in a single year. It is supposed to be a product of a disease in the animal similar to indigestion. This theory of its origin is supported by the fact that particles of cuttle-fish, the chief food of the sperm whale, are often found in the ambergris, and the location of the substance in the intestines also supports this theory. In 1858 a New Bedford vessel secured 600 pounds of ambergris, worth $10,500; in 1878 the Adeline Gibbs, of New Bedford, brought home 136 pounds that sold for $23,000. The total quantity received from the American whaling fleet from 1836 to 1880 was 1,667⅞ pounds.

A full discussion of ambergris and the manner of obtaining it, is given in the section of this report treating of the Preparation of Fishery Products.

DECLINE OF THE FISHERY.—Starbuck, in 1877, thus discussed the causes of the decline of the whale-fishery:

"On the 1st of January, 1877, the entire fleet was reduced to 112 ships and barks, and 51 brigs and schooners, having a total capacity of 37,828 tons.*

"It will be well to see to what causes this decline is attributable. Many circumstances have operated to bring this about. The alternate stimulus and rebuff which the fishery received as a short supply and good prices led to additions to the fleet and an overstock and decline in values, were natural, and in themselves probably formed no positive impediment. The increase in population would have caused an increase in consumption beyond the power of the fishery to supply, for even at the necessarily high prices people would have had light. But other things occurred. The expense of procuring oil was yearly increasing, when the oil-wells of Pennsylvania were opened, and a source of illumination opened at once plentiful, cheap, and good. Its dangerous qualities at first greatly checked its general use, but these removed, it entered into active, relentless competition with whale oil, and it proved the more powerful of the antagonistic forces.

* The lowest ebb was reached on the 1st of January, 1875, when the fleet consisted of 119 ships and barks, and 44 brigs and schooners, with a capacity of 37,733 tons.

"The length of voyages increased from two years for a cargo of sperm and from nine to fifteen months for a cargo of whale oil to four years to fill the latter, while the former was practically abandoned as a separate business* after it became necessary to make voyages of four, five, and even six years, and then seldom return with a full cargo. As a matter of necessity the fitting of ships became far more expensive, a rivalry in the furnishing adding perhaps considerably to the outlay. Vessels were obliged to refit each season at the various islands in the Pacific, usually at the port of Honolulu when passing in its vicinity, and the bills drawn upon the owners on these occasions were so enormous as to call forth loud and frequent complaints; and in later years the only available western fishery was in the North Pacific and Arctic Oceans, where disasters were the rule and immunity from them the exception, thereby incurring, when the vessels were not lost, heavy bill for repairs, besides the ordinary ones of refitting.

"Again, during the later days of whaling, more particularly immediately after the discovery of the gold mines in California, desertions from the ships were numerous and often causeless, generally in such numbers as to seriously cripple the efficiency of the ship. In this way large numbers of voyages were broken up and hundreds of thousands of dollars were sunk by the owners. During a portion of the time many ships were fired by their refractory and mutinous crews, some of them completely destroyed, others damaged in amounts varying from a few hundred to several thousand dollars. Crews would apparently ship simply as a cheap manner of reaching the gold mines, and a ship's company often embraced among its number desperadoes from various nations, fit for any rascality which might best serve them to attain their end. They took no interest in the voyage, nor cared aught for the profit or loss that might accrue to the owners. In order to recruit, it became necessary, particularly during the ten years next succeeding the opening of the gold mines, to offer heavy advance-wages, and too often these were paid to a set of bounty-jumpers, as such men were termed in the Army during the late war, who only waited the time when the ship made another port to clandestinely dissolve connection with her and hold themselves in readiness for the next ship. Unquestionably there were times when men were forced to desert to save their lives from the impositions and severity of brutal captains, but such cases were undoubtedly very rare. Formerly the crews were composed almost wholly of Americans, but latterly they were largely made up of Portuguese shipped at the Azores, a mongrel set shipped anywhere along the western coast of South America, and Kanakas shipped at the Pacific islands. There were times, when the California fever was at its highest, that the desertions did not stop with the men, but officers and even captains seemed to vie with the crew in defrauding the men from whose hands they had received the property to hold in charge and increase in value.

"Another source of loss was, strangely enough, to be found in the course of the consular agents sent out by our Government to protect the interests of our whalemen. Many and bitter were the complaints at the extortionate charges and percentages demanded by many of these men.†

"As another important source of the decline in this business must be regarded the scarcity and shyness of whales. Prior to the year 1830 a ship with a capacity for 2,000 barrels would cruise in the Pacific Ocean and return in two years with a cargo of sperm-oil. The same ship might go to Delago or Woolwich Bay and fill with whale-oil in about fifteen months, or to the coast of

* Always excepting, of course, Atlantic whalers. Sperm-whaling in the Atlantic has always been pursued by the bulk of the Provincetown vessels and by quite a fleet of schooners and brigs from other ports. There is an occasional revival of this pursuit in larger vessels at intervals of a few years, at present some of the most successful voyages being made by ships and barks cruising for sperm whales in this ocean.

† In many cases justice (?) seems to have been meted more in accordance with the requirements of the income of our representatives than with those of abstract right, and it has happened that the case of an arbitrary, cruel captain against some unfortunately weak and impecunious sailor has been decided on the time-honored (among barbarians) maxims that "might makes right," and "the king can do no wrong."

Brazil and return in nine months full of the oil peculiar to the whales of those seas; but, as has been previously remarked, this has all changed, and the length of the voyage has become entirely disproportioned to the quantity of oil returned.

"Briefly, then, this is the case. Whaling as a business has declined: 1st, from the scarcity and shyness of whales, requiring longer and more expensive voyages; 2d, extravagance in fitting out and refitting; 3d, the character of the men engaged; 4th, the introduction of coal oils.

"Of late years sperm-whaling in the Atlantic Ocean has been revived with some success, but the persistency with which any field is followed up makes its yield at least but temporary. It may perhaps be a question worthy of serious consideration whether it is policy for the United States Government to introduce the use of coal oils into its light-house and similar departments, to replace the sperm oil now furnished from our whaling ports, and thus still further hasten the ultimate abandonment of a pursuit upon the resources of which it draws so heavily in the day of its trouble,* or whether this market—the only aid asked from the Government—may still continue at the expense of a few dollars more per year."†

2. WHALING-GROUNDS.‡

DISTRIBUTION OF WHALES.—A whale-ship leaving her home port mans her mast-head as soon as she leaves soundings, and from that time is in constant hope of seeing whales. There are certain portions of the ocean where whales abound, and many large tracts where vessels rarely make a stop; still it is not unusual even in the more barren spaces to hear from aloft the welcome cry "there she blows." Many of the grounds where vessels were formerly very successful are now entirely abandoned and others are but seldom visited. There are now no sperm whalers from the United States on the Indian Ocean or North Pacific grounds, and very few cruising in the West Pacific Ocean, but nearly all of the vessels at present engaged in this branch of the fishery resort to the grounds in the North and South Atlantic and the eastern part of the South Pacific Oceans.

At an early period in the development of the whale fishery there was little difficulty in securing a cargo in a short time. Whales were abundant near shore and in very many parts of the ocean. They were taken in great numbers by the Dutch and by the English at Spitzbergen and off the east coast of Greenland, upon grounds that have not been frequented for many years.§ Later they were abundant in Davis Strait, where they were pursued by a considerable fleet of vessels. They are still taken there in limited numbers by a fleet of about a dozen Scotch steamers. Toward the close of the last century began the discovery of prolific grounds for right whales in the South Atlantic, and of the famous South Pacific sperm and right whale grounds. In the present century important fields have been discovered in the North Pacific and Arctic Oceans,

* The London Mercantile Gazette, of October 22, 1852, said: "The number of American ships engaged in the Southern whale-fishery alone would of themselves be nearly sufficient to man any ordinary fleet of ships-of-war which that country might require to send to sea." Instances are not wanting, indeed, where whalemen have undertaken yeoman's service for their country. Thus, in November, 1846, Captain Simmons, of the Magnolia, and Capt. John S. Barker, of the Edward, both of New Bedford, hearing that the garrison at San José, Lower California, was in imminent danger, landed their crews and marched to its relief. Nor were their good services toward foreign governments in peace less honorable to the country than in war, for when the Government buildings at Honolulu were burning some years ago, and entire and disastrous destruction threatened, American whalemen rushed to the rescue and quenched the flames, already beyond the control of the natives. During the rebellion, of 5,956 naval officers, Massachusetts furnished 1,226, Maine 449, Connecticut 264, New Hampshire 175, Rhode Island 102, and Vermont 81.

† Report U. S. Commission of Fish and Fisheries for 1875–'76.

‡ Special acknowledgments are due Capt. H. W. Seabury, of New Bedford, Mass., and Capt. William M. Barnes, of Nashua, N. H., for information on this subject.

§ The east coast of Greenland has recently again become a cruising ground for the whalers of Norway and Scotland.

among which are the Japan, Northwest, and Okhotsk grounds, now well nigh abandoned. The Arctic grounds north of Bering Strait were first visited in 1848 by the Superior, under Captain Roys, and these grounds have since been by far the most important for the production of whalebone and a superior quality of whale oil.

RELATIVE IMPORTANCE OF VARIOUS GROUNDS.—The relative importance of the various oceans to the whale-fishery during recent years is shown by the following facts: Of the sperm oil taken by the American whaling fleet from 1870 to 1880, 55 per cent. was from the North and South Atlantic grounds; 33 per cent. from the Pacific; and 12 per cent. from the Indian Ocean. Of the whale oil taken during the same period, 58 per cent. was by the North Pacific fleet from the region north of the fiftieth parallel, including the Arctic, Okhotsk, and Bering Seas; 24 per cent. by vessels cruising in the North and South Atlantic; 10 per cent. from the Pacific grounds; 5 per cent. from the Indian Ocean; and 3 per cent. from Hudson Bay, Cumberland Inlet, and Davis Strait. Of the whalebone secured in the same time 88 per cent. was by the North Pacific fleet; 5 per cent. by the Hudson Bay and Cumberland Inlet fleet; 4 per cent. from the North and South Atlantic grounds; and 3 per cent. about equally divided between the Pacific and Indian Oceans. The number of voyages commenced by United States vessels from 1870 to 1880 was 810, which includes the Arctic whalers annually refitting at San Francisco and other ports. Of these voyages, 382 were to the North and South Atlantic, 254 to the Arctic, Okhotsk, and adjacent grounds, 98 to the Pacific, 45 to the Indian Ocean, and 31 to Hudson Bay and Cumberland Inlet.

(*a*) SPERM-WHALE GROUNDS.

GEOGRAPHICAL DISTRIBUTION OF SPERM WHALES.—The sperm whale is very widely distributed in the oceans of the temperate and the tropical zones. They have been taken as far south as 56° south latitude in the Atlantic and in the Pacific, and as far north as 56° 12′ in the North Pacific. Early authors mention them as numerous on the coast of Greenland, but Beale* says that they are seldom or never seen there by recent navigators. They are generally taken off soundings, though they are sometimes abundant in comparatively shallow water, especially along the edge of the ocean banks. Within the limits included between 30° north and 30° south latitude they are generally of smaller size than in higher latitudes. There are certain cruising-grounds especially frequented by vessels in search of sperm whales, and these will be described in order beginning with those in the Atlantic Ocean, proceeding then to the Pacific and Indian Ocean grounds.

The Atlantic grounds, from which more than half the entire production of sperm oil is taken, are visited by both large and small vessels, the latter cruising chiefly north of the equator and remaining out about nine months, while the former make voyages lasting one, two, or even three years, cruising over various parts of the North and South Atlantic and sending oil home from the Azores, St. Helena, and other convenient ports. Vessels visiting the Pacific and Indian Oceans are usually barks and ships, and fit out for long voyages.

NORTH ATLANTIC GROUNDS.—Profitable sperm whaling has been found in the Caribbean Sea, off Chagres, Blanquilla, and in other parts of the sea; in the Gulf of Mexico, particularly in latitude 28° to 29° north, longitude 89° to 90° west; in various parts of the West India seas, especially in the Mona Passage and off the coasts of Cuba, Porto Rico, and St. Domingo, north of the Bahama Islands, in latitude 28° to 29° north, longitude 79° west; on the "Charleston Ground," in latitude 29° to 32° north, longitude 74° to 77° west, and on the "Hatteras Grounds," extend-

* BEALE, THOMAS: Natural History of the Sperm Whale, London, 1836, p. 88. He says that sperm whales are found from 60° north to 60° south latitude.

ing along the edge of the Gulf Stream off Cape Hatteras.* Vessels cruise on the more southern of the above grounds during the winter months and early spring, and work north and east as the season advances. Their next resorts, after leaving the Charleston Ground, are in latitude 36° north, longitude 74° west; latitude 32° north, longitude 68° west; latitude 28° to 33° north, longitude 48° to 57° west, and from latitude 33° to 45° north, longitude 50° to the east of the Azores.†

Among the favorite resorts in the North Atlantic are the "Two Forties" and "Two Thirty-sixes," the former being in latitude 40° north, longitude 40° west, and the latter in latitude 36° north, longitude 36° west. Vessels cruise here throughout the summer and fall months and often into December. The whales taken are of all sizes. Ships of late years have cruised from latitude 43° to 46° north, longitude 25° to 32° west, also from latitude 48° to 50° north, longitude 21° to 24° west; and on the "Commodore Morris Grounds,"‡ in latitude 52° to 54° north, longitude 23° to 25° west. Sperm whales are often seen and taken near the Azores. Good cruising places, known as the "Western Grounds," are situated in latitude 28° to 37° north, longitude 40° to 52° west. Another resort is the "Steen Ground," in latitude 31° to 36° north, longitude 21° to 24° west, where vessels cruise from August to November. Sperm whales are sometimes found quite numerous along the southern coast of Portugal and Spain from Cape St. Vincent to the Straits of Gibraltar; also near the southern side of the island of Teneriffe; north and west of the Cape Verde Islands during the winter months; from latitude 10° to 14° north, longitude 35° to to 40° west in March, April, and May, and in latitude 5° to 7° north, longitude 18° to 20° west, during the winter season. Good whaling has also been found in the Gulf of Guinea near the Island Fernando Po; also on the "Cornell Ground," in latitude 5° to 9° north, longitude 22° to 27° west.§

SOUTH ATLANTIC GROUNDS.—On the west side of the South Atlantic, sperm whale grounds were formerly found on and near the Carabellas banks in latitude 17° to 19° south from the coast of Brazil to longitude 35° west; also in about latitude 23° south, longitude 39° to 42° west. The smaller class of vessels cruised on these grounds, capturing mostly large bull whales, while large

* "In 1837," says Captain Atwood, of Provincetown, "the 'Edward and Rienzi' was bought for blackfishing, and went on the ground south of the George's Bank and towards Cape Hatteras. No whaling vessels had ever been there before, and she found sperm whales abundant, and since that time the 'Hatteras Ground' and the 'Charleston Ground' farther south, have been favorite cruising places for the Provincetown fleet."

† On the northern edge of the Grand Banks and the Gulf Stream where the Labrador current meets the Stream, making an eddy and a strong current, sperm whales were reported in the months of September, October, and November. The geographical position of this spot, as given by Messrs. Swift & Allen, of New Bedford, is latitude 41° to 48° N., and longitude 45° to 50° W. Care should be taken to keep a medium temperature of water.—J. T. BROWN.

‡ This ground was first visited by the American fleet about the year 1859 and was then called the Camilla Ground, after the bark Camilla. It has been cruised upon by many of the best vessels of the sperm-whale fleet.

§ Captain Tripp, of the bark Pioneer, makes the following condensed report of a cruise for sperm whales in 1873 and 1874 mainly in the North Atlantic.

On July 12 he found sperm whales in latitude 38° 05′ N., longitude 67° 45′ W., and on the 30th killed a large whale in latitude 35° 45′ N., longitude 45° 50′ W. August 4 he again saw sperm whales in latitude 35° 27′ N., longitude 45° 16′ W. On the 27th took a large one in latitude 34° 37′ N., longitude 39° 41′, W., and found them on the 31st in latitude 34° 37′ N. and longitude 39° 41′ W. On September 12 he killed two whales in latitude 35° N. and longitude 39° 50′ W. He crossed the equator, but again worked to the northward and finished his cruise.

On March 29 he killed two whales in latitude 13° 58′ N., longitude 37° 28′ W., and another on April 28 in latitude 13° 20′ N. and longitude 44° 25′ W. Sperm whales were seen on the 1st, 2d, 3d, and 4th of May in the latitudes of 13° 36′, 13° 34′, 13° 28′, and 13° 22′, and in the longitudes of 44° 51′, 44° 34′, 44° 24′, and 44° 20′, respectively, but no catches were made; on the 5th he killed four whales in latitude 13° 28′, longitude 44° 28′; two on the 8th in latitude 13° 18′ and longitude 44° 49′; three on the 10th in latitude 13° 08′, longitude 44° 25′, and four on the 12th in latitude 13° 56′, and longitude 45° 22′. On the 13th sperm whales were seen in latitude 13° 08′ and longitude 45° 14′, but none were killed. From that time on he had "greasy luck." On the 19th he killed three whales in latitude 13° 06′, longitude 46° 25′. One was killed July 21 in latitude 34° and longitude 44° 12′; two on August 1 in latitude 34° 45′; one on the 10th in latitude 34° 13′, longitude 40° 17′; two on the 20th in latitude 31° 26′, longitude 50°, and one large one on the 25th in latitude 31° and longitude 50°. He cruised in this locality fourteen months and obtained 1,100 barrels of sperm oil.—J. T. BROWN.

vessels found good whaling on the "River La Plate Ground" extending from latitude 30° to 40° south, and from 30 to 250 miles off-shore. The season here was from September to May, and the whales taken were of all sizes. A few vessels continue to cruise on all these grounds, meeting with moderate success. Large whales have also been found quite plenty in latitude 45° to 47° south, longitude 55° to 60° west, where ships cruise from November to May.

Passing across to the east side of the ocean we find good whaling grounds along the coast of Africa, also around the islands of Ascension and St. Helena. The principal resorts are in latitudes 4° to 23° south, longitude 9° to 10° west; around St. Helena; latitude 34° south, longitude 0° to 7° west; also a few degrees east of the meridian in the same latitude; and on the "Carroll Ground" in latitude 32° south, longitude 7° east. The time for cruising on the more southern of the above grounds is from September to May, and farther north during the whole year.

South Pacific Grounds.—Sperm whales are often seen off Cape Horn, and it is the opinion of most whalers that they pass from one ocean to the other in their migrations. Captain Seabury writes that he has himself on two occasions taken large sperm whales within sight of land off this cape. The grounds in the Pacific have been exceedingly profitable. From the time of their discovery in 1788, by Nantucket whalemen in an English whale-ship, dates the great prosperity of the sperm-whale fishery which reached its climax in the year 1837.

One of the most important and extensive grounds in the South Pacific lies off the coast of Chili, extending from latitude 35° to 46° south, and from the coast 200 miles off shore. Within these limits there are some specially favorable spots, as around the island of Huafo, near the south end of Chiloe Island, off Mocha Island, and off the port of Talcahuano. Around the islands of Juan Fernandez and Masafuero, and from these islands to longitude 90° west, are good grounds. Ships cruise here and farther south from September to May, and sometimes throughout the year, finding mostly large whales.

Passing farther north we come next to the Archer Ground, which lies in latitude 17° to 20′ south, longitude 84° to 90° west, where ships cruise throughout the year, capturing large whales. From the Archer Ground, all along the coast to Panama Bay, in latitude 8° north, from the shore to 90° west longitude, many sperm whales have been taken. Along the coast from latitude 12° to 18° south, also from latitude 10° to 14° south, longitude 86° to 90° west, were formerly noted cruising places. The latter is called the "Callao Ground," and is still visited by a few ships that cruise throughout the year, taking medium sized bull whales, yielding from 40 to 60 barrels of oil each.

One of the most important grounds in the South Pacific extends from latitude 5° south to 2° north, and from the coast of Peru to longitude 93° west, embracing the Galapagos Islands. "Most of the whales found here," says Captain Seabury, "are cows and calves, though occasionally a large bull whale is captured. The large whale is quite often found 3 or 4 miles from the school of small ones. After striking one of a school the others sometimes stop around the fast whale, which is called 'bringing to' or 'brought to,' when each of the four boats may fasten to a whale. More frequently the rest start off after the first boat strikes and are pursued by the boats."

Many ships have cruised on the Offshore Ground, extending from latitude 3° 30′ to 5° 30′ south, and from longitude 100° to 120° west. The season here lasts during the whole year, and the whales taken are of all sizes, though the majority are young bulls. These whales go in schools, and the larger the size of whale the smaller is the number. This ground was discovered in the year 1818 by Capt. George W. Gardner in the ship Globe, of Nantucket. The whalers had been cruising along the coast of South America when Captain Gardner concluded to find new

fields, and in his search he cruised over the ground extending from latitude 5° to 10° south, and from longitude 105° to 125° west, where whales were found in great numbers. This new field was christened the "Offshore Ground," and continues to this day a favorite resort of Pacific whalers.

On a belt of ocean from latitude 2° north to 2° south and extending across the Pacific from the west coast of South America, large numbers of sperm whales have been taken, especially from longitude 110° to 130° west, and also around Jarvis Island and the King's Mill Group. The whales taken near the equator are generally of the smaller kind.

Vessels have cruised with some success around the Marquesas Islands, Low and Societies, Navigator's Islands, the Fiji group, and around New Zealand and Australia. The most noted part of the New Zealand Ground is 20 miles southeast and southwest from French Rock, which lies in about latitude 31° 30′ south, longitude 179° west. Other resorts included on the New Zealand Ground are on the Vasques Ground, in latitude 36° south, longitude 165° west; from latitude 36° to 38° south, longitude 164° to 166° west; around the Three Kings, in latitude 32° south, longitude 170° to 175° east; 40 to 80 miles off shore east-northeast from Monganui and east-southeast from Cape Bret; around Stewart's Island, the Snares, and Chatham Islands. Sperm whales have sometimes been found abundant all around New Zealand. Large schools of great sperm whales abounded here more than on any other whaling ground. Captain Seabury says that "several ships often get into a school of these whales at one time, each vessel taking one or more whales that yield 100 barrels of oil. The season for cruising at the extreme south is in the summer months, or from September to April, and on the northern ground vessels cruise throughout the year. Hurricanes are sometimes encountered off the Navigator's Islands and French Rock, so that only the best of vessels are sent there."

Sperm whales were once abundant all the way across from New Zealand to Australia, and around Tasmania; also along the shores of Australia, and near Wreck Reef, around New Ireland, the Solomon Islands, New Guinea, Kermadec Islands, New Caledonia, and New Georgia. Banker Bay, New Ireland, was a noted place.

North Pacific Grounds.—The most important ground in the North Pacific for many years was off the coast of Japan, first visited by whaling vessels in 1820. Around the Bonin Islands, in latitude 27° north, longitude 140° west, was also a noted ground. Vessels cruised all the way from latitude 28° to 32° north, and longitude 165° west to 165° east. The Japan Ground included the region from the coast of Japan southeast to Bonin Islands, across to 165° west longitude. The season was from May to November, during which time great quantities of oil were frequently taken. The whales were mostly large bulls, and many of them very old, as was shown by their teeth.

Capt. William M. Barnes, formerly of New Bedford, writes: "There is now (1881) not a single sperm whaler in the North Pacific Ocean, and in certain parts of it, as on the old Japan Ground, the Arctic cruisers in crossing have lately seen sperm whales in increasing numbers." During the winter season in the northern hemisphere the Arctic whalers occasionally spend a few months among the islands of the Western Pacific, but otherwise these large grounds are now seldom resorted to by whalemen. In many cases the sperm whalers find it difficult to fill their casks with sperm oil, and so assist in making up their cargo by spending a few months in "humpbacking."

Sperm-whaling was formerly carried on with good success around the Ladrone Islands, also in the Sooloo or Mindora Seas, and around the East India Islands, where ships continued to cruise until within about three years. The whales were generally very small, and mostly cows with calves. A great deal of calm weather and strong currents are found around these islands and seas.

We come now to the grounds on the eastern side of the North Pacific. In former years many ships cruised around Cape San Lucas, near the Gulf of California, and along the coast of Lower California from 10 to 50 miles off shore. Whales of large size were taken here in the winter months by vessels that had spent the summer on the Japan Ground. Around the Maria Islands, near San Blas, on the Mexican coast, whales were quite often found; also in the Bay of Panama from the coast to 90° west longitude, and farther west in the ocean from latitude 4° to 8° north, longitude 100° to 110° west. In the vicinity of Owhyhee and other parts of the Sandwich Islands vessels met with fair success.

INDIAN OCEAN GROUNDS.—The principal resorts of vessels in this ocean were off Port Dauphin and around Madagascar in the Mozambique Channel; around the islands of Mauritius and Bourbon and the island of Roderique; around the Amirante Group, and Seychelle and Comore Islands; off Zanzibar and along the east coast of Africa to the Red Sea; off the island Socotra; along the Arabian coast; around the Laccadive Islands and the island of Ceylon. Other resorts are along the west and south coasts of Australia, especially in the vicinity of Cape Leeuwin and off Shark's Bay, on the ground extending from latitude 20° to 23° south, longitude 107° to 110° east. From March to July ships cruise several degrees off shore to the west of Australia and from October to May near the land. The number of American whaling vessels visiting the Indian Ocean has been gradually diminishing for several years, and in 1880 not a single vessel from the United States went there for sperm oil. A fleet of about eleven sail of vessels, belonging at Tasmania, is engaged mostly in sperm whaling, and some years they meet with good success.

SPERM-WHALE GROUNDS IN 1840.—The principal grounds visited by sperm whalers about the time of the greatest prosperity in this fishery are thus described by Commander Wilkes, of the United States Exploring Expedition:

"The following embraces all the different grounds in the Pacific visited by our whalers:

"(1) The on-shore ground; that includes the whole extent of ocean along the coast of Chili and Peru from the island of Juan Fernandez to the Galapagos Islands.

"(2) The off-shore ground; being the space between latitude 5° and 10° south, longitude 90° and 120° west.

"(3) In the neighborhood of the Hawaiian Islands.

"(4) In the neighborhood of the Society Islands.

"(5) In the neighborhood of the Samoan Group.

"(6 In the neighborhood of the Fiji Group.

"(7) In the neighborhood of the King's Mill Group.

"(8) Along and to the south of the equator, from the coast of South America to the King's Mill Group.

"(9) Across the South Pacific, between the parallels of 21° and 27° south.

"(10) Across the North Pacific, between the parallels of 27° and 35° north.

"(11) In the neighborhood of the east coast of New Zealand.

"(12) In the middle ground between New Holland and New Zealand.

"(13) The coast of Japan, and between it and Bonin Islands.

"(14) The northwest coast of America.

"(15) Coast of California.

"These, it will be seen, embrace a large field, and it might be supposed that a ship could hardly miss finding the animals. Such, however, is not the case. A vessel may visit all these places, and yet return home a 'clean ship,' if she happened to be out of season. It appears from experience that whales, in their migrations congregate in the above-named places at certain times

of the year, and those who are acquainted with the business endeavor to be early on the cruising grounds. I shall now point out the times, according to the best information, at which the whales visit the several grounds, and, although not a whaler, I hope to give such information as may be useful to this class of my countrymen.

"For convenience of description, the cruising-grounds may be considered as included within four sections or belts.

"These belts are from 20 to 25 degrees of latitude in width.

"The first of which I speak is that between the equator and the northern tropic; the second, between the tropic and 50° north; the third, between the equator and the southern tropic and latitude 50° south.

"Within the tropics whales are almost always to be met with. There are, however, particular places within this zone where they chiefly congregate. Whales are found in the first belt on the north side of the equator, to the southward of the Sandwich Islands, and thence westward as far as the Mulgrave Islands, for the greater part of the year; but the only spot or space they are known to abound in at any particular season, within this belt is to the westward of the Galapagos; they pass and repass over the rest of this space in their migrations, and may generally be found near to or around the small islands.

"In the second belt they range from the coast of Japan to the northwest coast of America and California; this they frequent from May till November. In the month of July they are found off the Bonin Islands, and between them and the coast of Japan. They frequent the space lying to the northward of the Hawaiian Islands, and comprehended between the parallels of 28° and 35° north; and within the meridians of 145° and 156° west, from June to October; and resort to the northwest coast of America in August and September, and to that of California in November and January.

"The third belt comprises the ocean from the coast of South America to the King's Mill Group, including the Marquesas, Society, and Friendly Islands, the Samoan and Fiji Groups. Within these are spaces known as the on-shore and off-shore grounds. The latter the whalers frequent from November to February, and along this belt they are found until the months of July and August, by which time they reach the King's Mill and Fiji Groups. There are, however, stragglers to be met with in this space during all seasons.

"The fourth belt extends from the southern tropic to the latitude of 50° south. The most profitable time for cruising within it is in the months of March, April, and May, to the eastward of New Zealand. After that date, along and between the parallels of 22° and 28° south, from the coast of New Holland to that of South America. The portion of sea between New Holland and New Zealand is called the 'middle ground,' and is frequently found very profitable.

"From an examination of the particular localities in which whales are found most at certain seasons, and connecting these with my own observations on currents, I am induced to believe the places of their resort will point more correctly to the neutral points or spaces of no current, than any other data that we yet possess.

"These must necessarily become the rendezvous, or feeding-places, of these animals. The determination of these points will, therefore, throw additional light on the systems of currents in the ocean, by pointing out the neutral spaces. The chief resort of whales will be seen on the map at one view; and when these are connected with the currents shown to exist by the observations of the expedition and others, they will be found to correspond in a remarkable manner with the neutral spaces.

"I have myself paid much attention to acquiring information in relation to the position of these grounds from the masters of whale-ships, but have usually found their reports at variance

one with another, and they have sometimes differed as much as 5 degrees in assigning their limits. Their position, no doubt, varies much in different years; but even this will not explain all the discrepancies of the statements.

"If we examine the seasons of the appearance of whales at certain islands, they will generally be found to be between the beginning and the end of the summer of the climate, during which time animal life is most prolific, and the food of the whale consequently abounds near the particular group. I have frequently been told, and it is generally believed, that whales are partial to warmth, and frequent few places outside the tropics. This, if true, would be singular enough; but the main reason for their frequenting the summer seas at particular seasons is the procurement of food, which is there to be found in greater abundance; and there appears to be little doubt that in migrating these animals move with the currents until they find their food in plenty, and then continue in such locality until it is exhausted.

"A number of instances are known, * * * in which, at certain seasons, strong currents have been experienced in places where three months afterward they were found to have ceased altogether, or even to have changed their direction. I have now particular reference to the northwest coast.

"Having pointed out the different belts in the Pacific, I will now refer to the localities in the Atlantic and Indian Oceans where the sperm-whale fishery is most successful.

"These, in like manner, are found to correspond, and are connected with the obstructions of the submarine currents, or the places where, from opposing currents, they become lost.

"In the Atlantic Ocean: (1) Off the Azores or Western Islands; (2) off the Cape de Verdes; (3) north of Bahama Banks; (4) Gulf of Mexico; (5) Caribbean Sea; (6) to the eastward of the Windward Islands; (7) north coast of Brazil; (8) south coast of Brazil; (9) Carrol Ground, or a space of ocean lying between St. Helena and Africa.

"In the Indian Ocean: (1) Off the south end of Madagascar, and between it and Africa; (2) off the north end of Madagascar; (3) the coast of Arabia; (4) west coast of Java; (5) northwest coast of New Holland; (6) south coast of New Holland, and between it and Van Diemen's Land.

"The periods of time allotted to these fisheries coincide with the time at which it might be expected that the food of the whale would be most plentiful if brought by the polar streams.

"The Atlantic fishery is, for the most part, carried on in a smaller class of vessels than those used in the Pacific; the voyages are of less duration, and less capital is therefore required in this business than the other. In speaking of the cruising-grounds, I shall follow the order in which they are visited.

"The first in point of time is that near the Azores. This ground does not extend more than 200 miles from these islands, and lies principally to the southwest of them. Here whales are found during the summer months, and as late as October. These islands, it will be well to remark here, lie in the route of the great north polar stream, and form an obstruction to its passage; consequently the food is arrested in its progress, and is accumulated here.

"The next ground visited is off Cape Blanco and the Cape de Verdes, and it is also searched by the outward-bound ships of the Pacific fleet. The whalers of the Atlantic next pass to the north coast of Brazil, in the months of October, November, and December, and thence to the Brazil Bank, and off the mouths of the Rio de la Plata, where they fish in January and February; after this they seek Saint Helena and Carrol Ground, which lies from 50 to 200 miles south of that island, toward the Cape of Good Hope. On the latter ground they remain during the months of March, April, and May; and thence they pass to the westward along the South American coast, to the eastward of the Windward Islands; thence to the Bahama Banks, Cape Hatteras, and along the coast of the United States, home.

"The smaller class of whalers seldom extend their cruisings to the south of the line, but after they have visited the first two whaling-grounds they usually pass to the westward toward the island of Fernando de Noronha, and thence along the South American coast until they reach the Windward Islands. They frequent the Caribbean Sea in the months of January and February, and farther to the westward off the peninsula of Yucatan and Cuba in April; after which time they proceed through the Gulf of Mexico to cruise off the Bahama Banks and Cape Hatteras in May. Thence they pass northward, on either side of the Gulf Stream, to the eastern side of the Grand Banks.

"In the Indian Ocean, the south part of Madagascar, off Point Dauphin, is visited in March and April; in May, June, and July the ground off the southwest coast of Madagascar, in the Mozambique Channel, and upon both sides of that channel. The whalers usually recruit in Saint Augustine's Bay, where supplies are to be had in abundance, and both wood and water are easily procured. After this they usually spend some time off Cape Corrientes, with the cape and headlands on either side, and visit the Comoro Isles. Sperm whales are frequently found in numbers among these islands, and ships usually do well in their vicinity. The African coast, from Mozambique to Zanzibar, is good ground, and the latter is also a good port for repairing.

"Some ships extend their cruising during the northeast monsoon, from October to April, to the Arabian coast, but the African is generally preferred. The Chagos Archipelago at times affords some success, but it is very doubtful ground, and has not often been frequented. The proper season is during the southwest monsoon.

"The most profitable ground in the Indian Ocean is the west and northwest coast of New Holland, as far eastward as the islands of Timor, Lomboch, and Angier, and westward to the Keeling Islands, including the coast of Java.

* * * * * * * * * *

"It will be perceived how nearly these grounds coincide with the places wherein, according to the views already stated, the polar streams are obstructed by land or islands, so as either to interrupt their course or create such an impediment as to change it.

"The Sooloo Sea is the only place that remains to be noticed. American ships, however, have seldom gone thither, but English vessels are reported as having met with much success there."*

(*b*) RIGHT-WHALE GROUNDS.

GEOGRAPHICAL DISTRIBUTION OF RIGHT WHALES.—The right whale (*Eubalæna*) is found in various parts of the world as far north as latitude 61° 30′, at the mouth of Hudson Strait, and south to the Antarctic Ocean, though it is rare in the warmest latitudes. This whale, of which there are several species in the different oceans, must not be confounded with the bow-head, or polar whale, which is called right whale by many whalemen, though quite distinct from it and inhabiting much colder waters, the bow-head being an ice whale and the right a temperate whale. The principal right-whaling grounds east of America are in the South Atlantic, while in the Pacific Ocean they are of about equal importance both north and south of the tropics.

NORTH ATLANTIC GROUNDS.—The North Atlantic grounds for this species are few in number. They are taken during the summer months off the southern end of Greenland and to a limited extent in the lower part of Davis Strait, near Resolution Island. Along the eastern coast of the United States they are occasionally captured by shore whalemen, especially at the whaling stations in North Carolina. During the winter months whalers find them on the Hatteras

* Narrative of Wilkes's U. S. Exploring Expedition, vol. v.

Ground, in the Gulf of Mexico, and in the Caribbean Sea. A few small vessels have cruised with indifferent success for right whales along the west coast of Africa, in latitude 15° north, and in Center Bay, about latitude 23° north. At no particular place in the North Atlantic are they now abundant, though they were formerly taken in great numbers close to the New England shore, and eastward of the Newfoundland fishing-banks.

South Atlantic Grounds.—The most noted grounds for right whales at the commencement of the right-whale fishery in the last century were off the coasts of Brazil and of Patagonia, on what were called the "Brazil," or "Main," and "False Banks," and especially between the thirty-sixth and the fifty-fifth parallels from the coast to 30° west longitude. The most important spots were on and about the above banks and from latitude 38° to 45° south, and longitude 38° to 45° west. Right whales were also quite abundant in the vicinity of the Falkland Islands, which were first visited by our whalemen in 1774; near the Tristan Islands, between latitude 28° to 42° south, and from the meridian to 20° west longitude, was called the "Tristan Ground," and was a favorite cruising place. Good whaling was also found from latitude 34° to 43° south and longitude 24° to 28° west. Other important grounds were along the west coast of Africa from latitude 22° to 32° south, or to the Cape of Good Hope. Ships met with great success on the South Atlantic grounds for many years, and it was not an uncommon occurrence for vessels of from 1,500 to 2,500 barrels capacity to fill up and return home from the South Atlantic in one season, making the voyage in from seven to ten months.

The grounds more particularly visited at the present day in this ocean are around the Tristan Islands in latitude 36° to 38° south, longitude 10° to 25° west, from September to January; on the east coast of South America in latitude 30° to 35° south, from May to August; and from September to June along the coast of Patagonia in latitude 42° to 52° south. The whales caught are of the regular right-whale species, the bull when full grown yielding from 40 to 60 barrels of oil and the cow from 60 to 80 barrels, or about 60 barrels on an average. The whalebone averages about 300 pounds to 100 barrels oil in the bull, and 400 to 600 pounds to 100 barrels oil in the cow whale.

Indian Ocean and South Pacific grounds.—We now pass the Cape of Good Hope to the right-whale grounds in the Indian Ocean, all of which are at present entirely abandoned by the Americans. On many parts of the ocean lying between the parallels of 20° to 50° south, and from longitude 18° to 80° east, right whales were found abundant in former years, and a few ships continued to cruise there up to 1879, though most of the whales have been killed or driven from the ground. The most important places within these limits of latitude and longitude were at Delago Bay, in latitude 26° south, longitude 32° east; east of Cape of Good Hope, in latitude 35° to 38° south, longitude 30° to 35° east; around the Crozette Islands, in latitude 45° to 47° south, and longitude 49° to 52° east; in the vicinity of St. Paul's Island, in latitude 32° to 38° south, longitude 70° to 80° east; and near Kerguelen Island, in latitude 48° to 50° south, longitude 69° to 70° west.

The season for cruising in the Indian Ocean is the same as in the South Atlantic. The best months for whaling offshore are from September to May, and when inshore more whales are taken in the winter months, when they can be found around the islands, near the rocks, and among the kelp or seaweed. The whales in this ocean are smaller than those taken in the South Atlantic, averaging 40 barrels of oil and 240 pounds of bone for the bull, and for the cow whale 60 barrels of oil and 360 pounds of bone, or 600 pounds of bone to 100 barrels of oil.

In former years right whales were found quite plenty on the west and south coasts of Australia, especially at Cape Leeuwin, Geographe Bay, and King George Sound. They were also taken

around Van Diemen's Land, or Tasmania, which place, for the past ten years, has employed a fleet of eleven vessels, principally in the sperm-whale fishery in this vicinity. In the year 1872 nineteen vessels, measuring 4,917 tons, belonged at Tasmania, and produced 112 barrels of whale oil and 2,712 barrels of sperm oil.

The vicinity of New Zealand was once an important right-whaling ground, and is still occasionally visited by vessels, that meet with moderate success, taking both right and sperm whales. The grounds are both inshore and offshore; the most noted of those offshore, from October to March, are from latitude 38° to 48° south, and longitude 154° to 162° east. Commencing the season to the north, vessels work south with the whales. Around the Auckland Islands and in the vicinity of Stewart's Island, from the land to 100 miles offshore, are good cruising grounds; also from 36° to 45° south latitude, and 160° east to 160° west longitude.

Right whales were taken in abundance off the coast of Chili about forty years ago, and a few vessels still cruise in that vicinity, making mixed voyages for sperm and whale oil. The season is from September 1 to January 1, on the grounds from latitude 42° to 47° south, and longitude 75° to 80° west. After the beginning of the year vessels work along shore toward the north as far as latitude 35° south, occasionally anchoring in the bays and cruising back and forth between the thirty-fifth and the fortieth parallels until May. The most noted grounds are Conccpcion and St. Vincent bays, near the port of Talcahuana, where they formerly caught their whales and tried out their oil while at anchor, sometimes taking 1,000 barrels of oil in a month. Some vessels used to winter in these bays, though they were not very successful in the winter months.

North Pacific Grounds.—One of the principal cruising places for right whales in this ocean is that known as the "Northwest coast right-whale ground," or the "Kadiak ground," situated near an island of that name off the Aliaska peninsula, and extending from latitude 50° to 60° north, and longitude 130° to 160° west. The best portion of this ground lies between latitude 55° to 58° north, and longitude 140° to 152° east, and the most profitable cruising season is from April to October. The first whaling vessel to cruise here was the ship Ganges, of Nantucket, commanded by Capt. Barzillar Folger. This was in the year 1835, from which time until within a few years past the Kadiak was the most important ground north of the Japan ground. The whales taken on this ground average about 125 barrels of oil each, the male or bull making from 60 to 100 barrels, and the cow whale from 100 to 250 barrels. The bone will average about 1,000 pounds to 100 barrels of oil, and is much longer than the South Sea bone. A full-grown whale here has about two hundred slabs of bone, varying in length from 1 foot to 11 feet. Some of these whales, though apparently good when taken, prove to be "dry skins," making no oil, and many of them sink after being killed. The blubber varies in thickness on different parts of the body, being from 5 to 15 inches on a 100-barrel whale, and on a 200-barrel from 5 to 18 inches. The lips, from which oil is also taken, sometimes yield from 8 to 10 barrels.

Right whales are found and have been captured around the Fox Islands and in Bristol Bay north of the Aliaska peninsula. In Bering Sea, along the coast of Kamchatka, there is good right whaling; also at the entrance to Okhotsk Sea, and in the southern part of that sea during the months of April and May. They are also taken in the Japan and the Yellow Seas. "In former years," says Scammon, "the right whales were found on the coast of Oregon, and occasionly in large numbers; the few frequenting the coast of California are supposed to have been merely stragglers from their northern haunts. Some, indeed, have been taken (from February to April) as far south as the Bay of San Sebastian Viscaino, and about Cerros Island, both places being near the parallel of 29° north latitude." *

* Marine Mammalia, p. 66.

(c) BOWHEAD-WHALE GROUNDS.

GEOGRAPHICAL DISTRIBUTION OF BOWHEAD WHALES.—The bowhead or polar whale is the species formerly taken in great numbers by the Dutch and English whalers at Spitzbergen, Greenland, and Davis Strait. It is the whale captured by the American fleet in the Arctic Ocean, and is the most valuable of the right or whalebone whales both for the quantity and for the quality of its oil and for the length and the thickness of its baleen. In the English whale fishery it is not distinguished from the right whale, but is not the same as the species commonly known to American whalemen under that name. The American right whale lives in more temperate waters, while the polar or bowhead whale inhabits only the icy regions of the northern seas. The home of the bowhead is in most of the waters north of the sixtieth parallel of north latitude. It is found in lower latitudes on the Asiatic than on the Greenland side of America, being taken in the Okhotsk Sea as far south as the fifty-fourth parallel and in the Bering Sea as far south as the fifty-fifth parallel, which is the southern limit of the winter ice in that sea. In the Greenland Arctic the bowhead is not found south of Cape Farewell on the sixtieth parallel. The northern limit of this whale is undefined.

The capture of the bowhead whale began at Spitzbergen in the early part of the seventeenth century; it soon extended to the east coast of Greenland, and early in the eighteenth century they were taken in Davis Strait and adjoining waters. It was not until the year 1848 that the whalers pushed their way through Bering Strait and established the very profitable fishery for this species in the Pacific-Arctic.

The principal grounds visited by the whaling vessels of the United States in search of the bowhead are as follows:

ATLANTIC-ARCTIC GROUNDS.—Off Cape Farewell, at the southern end of Greenland, from June to August; also in Hudson Strait and Hudson Bay, especially in the vicinity of Southampton Island and near Cape Fullerton, that lies in about latitude 64° north, and longitude 86° west. The vessels are accustomed to work through the ice in Hudson Strait about the middle of July, arriving in the bay about August 1, and if intending to return home the same year they leave the bay by the 1st of September. Many of them go into winter quarters about September 15, and spend the winter in the ice, taking advantage of the early and the late appearance of the whales, as also occasionally capturing seals or walrus in the winter months.

In Davis Strait the vessels cruise near Northumberland Inlet in about latitude 65° north, and longitude 68° west. Cumberland Inlet has also been a favorite resort for whaling vessels of the smaller class, and they frequently winter there. Resolution Island, at the entrance to Cumberland Inlet, is a good ground for both bowhead and right whales during April and May.

The whales taken in these bays and inlets in former years would average about 120 barrels of oil each, the bull 100 barrels, and the cow 140 barrels; but of late years they have been smaller and scarcer. The yield of bone is usually about 1,300 pounds to 100 barrels of oil.

American vessels at present cruise no farther north than the sixty-fifth parallel, though the Scotch steam-whalers, that carry their blubber home to be boiled out, frequently take their whales as far north as the seventy-fifth parallel. The American vessels formerly went as far as Pond's Bay, in about latitude 73° north.

A further discussion of the movements of the Scotch whalers is given below under the head of Foreign Whale Fishery.

In the seventeenth and eighteenth and first part of the nineteenth centuries there were very profitable whaling grounds for the bowhead in the vicinity of Spitzbergen and off the east coast

of Greenland, where extensive fisheries were carried on by the European nations. These grounds were not visited by vessels of the United States until within the past thirty years, and then only in a few instances. The first American whaler sailing for Spitzbergen Sea was the ship Hannibal, Captain Royce, that left New London May 21, 1835, and returned March 21, 1836, with only twenty-eight barrels of whale oil. A second attempt was the voyage of the bark Tempest, Captain Allyn, that left New London May 21, 1857. Captain Allyn states that he had undertaken this voyage to the Spitzbergen regions by the advice of Hon. Thomas W. Williams, a successful whaling agent, who furnished him with Scoresby's journals and information obtained by correspondence with whaling agents in Scotland, setting forth the frequent appearance of whales in the region of ocean north of Russia. During the month of July these seas were cruised over by the Tempest, but, "although we sought diligently for whales," says Captain Allyn, "our search was totally unsuccessful, and on the 9th of August we concluded to proceed to a more congenial climate."* The vessel then cruised down through the North and South Atlantic Oceans, round Cape of Good Hope, on to New Zealand, and thence to the Okhotsk Sea, and after cruising with moderate success for two or three seasons in these waters returned to New London in 1861. In 1865 a third attempt was made to establish an American fishery in these seas, this time at Iceland by the bark Reindeer, of New York, principally for sulphur-bottom whales. The first year's work was unsuccessful, and the second season resulted in such little profit that the project was abandoned. These three voyages are the only ones, so far as known, that have been made by American whaling vessels to the oceans east of Greenland or north of Europe.

The Russians and Norwegians carry on profitable whale fisheries, mostly for the fin-back, at one or two points along the coasts of Norway and Finmark. One of these stations is on an island in Varangar Fiord, opposite Wadso, in Finmark. In recent years a few Norwegian vessels have visited Spitzbergen in search of whales, as in the season of 1873, when six vessels, with fifty-seven men, were frozen in the ice at the island, and seventeen of the men perished before assistance reached them.

Pacific-Arctic Grounds.—The fleet of whaling vessels cruising north of 50° north latitude in the waters between the Asiatic and the American coasts is called the North Pacific fleet. It has been the most important branch of the American right-whaling fleet since 1835, when the famous Kadiak ground, lying between latitude 50° and 60° north, was discovered. Here were taken only the right whale, but in 1843 the fleet pushed farther north, and began capturing bowheads on the Kamchatka coast. In 1848 a whaling vessel entered the Arctic in pursuit of these large animals and met with good success. In 1839 there were only two vessels in the North Pacific fleet. From that date to 1880 the total number of voyages made to these grounds by American vessels was 4,300, and the total catch of whale-oil (including oil of the right whale, bowhead, and walrus) was 3,994,397 barrels, or 60 per cent. of the total production of whale-oil by the American fleet in all oceans during the same period.

The North Pacific right and bowhead whale fishery has always been peculiarly an American enterprise, very few foreign vessels having participated in it. The principal grounds were discovered by American vessels between the years 1835 and 1848. The most important whaling grounds for the bowhead in this region are the Okhotsk Sea and the Arctic Ocean. The former is at present of little importance, but few vessels having visited it during the past five or ten years, nearly all of the fleet preferring the hazardous, though profitable, whaling in the Arctic. The

*The Old Sailor's Story, by Gurdon L. Allyn, 1879, p. 85.

bays in the Bering Sea are visited by the fleet on its way to the Arctic, and large numbers of whales are sometimes taken in these waters before the ice permits the vessels to pass through the Strait.

The North Pacific whale fishery was at its height in 1846, when 292 ships cruised in the region north of the fiftieth parallel, between the Asiatic and the American shores. In 1868 there were but 68 vessels in the fleet, of which number 41 were in the Arctic Ocean, 8 in the Okhotsk Sea, and 19 on the Kadiak ground. In the season of 1880 the fleet was reduced to 19 vessels, all of which cruised in the Arctic and captured a total of 265 whales.

"The principal herding places of the bowheads in the Okhotsk," says Scammon, "were at the extremities of this great sheet of water, the most northern being the Northeast Gulf (Gulf of Ghijigha), the most southern Tchanter Bay. The whales did not make their appearance in Northeast Gulf so soon as in the bay. Whalers endeavored, as soon as possible, to get to the head of Tchanter Bay, where they found the objects of pursuit in the intermediate water, between the ice and the shore, long before the main body of the congealed mass was broken up, and before the ships could get between the ice and the shore, even at high tide, the boats being sent forward weeks previous to the ships. Soon after the ships' arrival the whales avoided their pursuers by going under the main body of ice, situated in the middle of the bay, where they found breathing-holes among the floes. The boats cruised about the edge of the barrier, watching for them to emerge from their covert, which occasionally they did, when chase was instantly given. Frequently, in sailing along this ice-field, you could hear distinctly the sound of whales blowing among it, where no water was visible at the point whence the sound came. The first of the season, before the ice broke up and disappeared, when there were no whales about, the question was frequently asked, 'Where are the whales?' and as often answered, 'They are in the ice'; and, 'When do you think they will come out?' was answered by, 'When the ice leaves.' It has been established beyond question that this species pass from the Atlantic to the Pacific, or rather, if we may be allowed the expression, from the Atlantic Arctic to the Pacific Arctic, by the north; and, too, it is equally certain that numerous air-holes always exist in the ice that covers the Arctic waters, even in the coldest latitudes. These fissures are caused by the rise and fall of the tides, and contraction and expansion of the ice. Storms acting upon the water hundreds of miles distant also have their influence in rending asunder the icy fetters of those frozen seas. It appears to us not improbable that the bowhead has a feeding and breeding ground in a polar sea. And as they have never been seen during the winter months in any other quarter of the globe, except as before mentioned, it would appear that they must remain among the rough water and broken ice, at the southern edge of the winter barrier, or migrate to some remote sea unknown to man."*

The whaling vessels enter the Okhotsk as soon as the ice leaves, which is usually about the last of May, though sometimes it is as late as July. Having anchored the vessel in a convenient bay or inlet, the boats are sent out in search of the whales, and the animals, after being captured, are sometimes towed ashore and cut up there, the blubber being rafted off to the vessel. This mode is made necessary from the fact that the boats may be absent several days or even weeks, and be quite a distance from their vessel. The difficulties incident to whaling in the Okhotsk are told by Captain Scammon in his history of the whale-fishery. The whales found here during recent years have been much smaller than those taken at the beginning of the fishery, when the largest sometimes yielded 250 barrels of oil each, and the smallest about 80 barrels. The cow whales gave the most oil, averaging about 130 barrels, and the bulls about 90 barrels, the yield of bone being about 1,500 pounds to 100 barrels of oil. The season closes in the Okhotsk about the

* Scammon: Marine Mammalia, p. 59.

latter part of October, though vessels sometimes continue cruising throughout November at great risk from the ice, and they have occasionally wintered in the ice in order to take advantage of the late and early seasons.

Ships that cruise in the Arctic Ocean generally arrive in the Kamchatka and the Anadyr Seas about the beginning of May, and continue cruising south of Bering Strait until the ice permits them to pass through the Strait into the Arctic, which is usually about the first of June. Before entering the Strait a considerable number of whales are sometimes taken in the bays and gulfs along the Siberian coast and about St. Lawrence Island. Captain Barnes, in the bark Sea Breeze, of New Bedford, in the season of 1877, passed the Aleutian chain on May 4, and three days after came up to the ice in latitude 56° 30′ north. Until May 23 the ice was skirted toward the westward, and frequent ineffectual attempts were made to penetrate it. Land was sighted on the 24th, 250 miles west-southwest from Cape Navarin, and on that day the ice was entered. On June 18, whales were seen off Cape Chaplin. The whales usually pass through the Strait about the beginning of June, and are followed up by the vessels that cruise along the western side of the Arctic during the first part of the season, while waiting for the ice to open so that they may pass to the eastward to Point Barrow. This time of waiting usually lasts from the middle of June till the 1st of August, and is called the "summer season" or "between seasons." It is spent principally in capturing walrus which herd on the ice floes in immense numbers in the vicinity of Cape Serdze-Kamen. During specially favorable "summer seasons," as that of 1880, many whales are taken, and little time is spent in walrusing, but these weeks are usually quiet ones with the fleet, the killing of walrus being considered a pastime by the whalemen.

As soon as the ice will permit, at the beginning of August, the fleet follows up through the openings, capturing whales wherever they can be found. Most of the vessels reach Point Barrow by the middle of August, and begin to push farther to the eastward, creeping along the edge of the ice or entering the openings in search of their prey. Some of the vessels in the season of 1877 went as far east as Return Reef, and early in September they had all returned to Point Barrow. From this time until the ice begins to close up the fleet cruises back and forth westward of Point Barrow, reaching some seasons as high as the seventy-second parallel, which is about the most northern cruising ground in the Arctic. The period from the middle of August until about October 1, when the fleet leaves the ocean, is the real Arctic season, and an exciting one it is.

Ships quite often anchor along the shores in thick weather, as also to "cut in" the whales, or to "try out" the oil. Most of the ships leave the sea about the 1st of October, though sometimes they stay later, at the risk of being caught in the new ice. "The general breaking up of the ice in this region," says Captain Hooper, "commences in May or June in the vicinity of Bering Strait, and continues until the first part of September, after which time new ice begins to form, although the sea is not entirely closed for some weeks later. The heavy gales keep the larger floes in motion, and prevent them from uniting in one mass. After October 1 the water is so chilled that a general closing up of the sea is likely to occur at any time. Formerly the whale-ships did not remain in the Arctic later than the middle of September, but as whales grew scarce they prolonged their stay each year, until last year (1879) they did not leave until after the middle of October. This resulted in the loss of three vessels and two entire crews; a fourth vessel, the bark Helen Mar, Captain Bauldry, barely escaped, bringing with her the crew of the bark Mercury, one of the lost vessels. Her escape was effected by carrying all sail with a strong, fair wind, and forcing a passage through the new ice, which was so thick that at times her headway was entirely lost until a strong puff of wind started her again. In this way the vessel worked on a few miles each day, reaching Bering Strait about the 1st of November."*

* Corwin's Cruise, 1880.

(*d*) HUMPBACK-WHALE GROUNDS.

GEOGRAPHICAL DISTRIBUTION OF HUMPBACK WHALES.—Humpback whales (*Megaptera*) are found within the parallels of 60° north and 70° south latitude. They are seldom seen far from land, but are generally caught in mild climates, within certain bays and along coasts where the water is shallow.

The most noted places for taking them in the Atlantic Ocean are in the vicinity of the Island of Trinidad and in the Gulf of Para, from 10° to 11° north latitude, and 61° to 63° west longitude, also around Cape Verde Islands during the winter months, and on the coast of Africa from 3° north to 7° south latitude from June to October.

"Some of the Provincetown whalers," says Captain Atwood, "prosecute both the humpback and the sperm whale fishery. They sail from port about the middle or last of January and go direct to the West Indies, where they whale near the shores of these islands for humpbacks. Their whaling-ground for this species is from Tobago, latitude 11° 20′ north, longitude 60° 27′ west, thence northward around the shores of the islands as far as the Island of Mariegulante, in latitude 15° 52′ north, longitude 61° 18′ west. These vessels stop there until the latter part of April or early in May, when they leave for the Western, Charleston, or Hatteras grounds in pursuit of sperm whales, and usually return home in September. Another favorite ground is around the Cape Verde Islands, where these vessels cruise near the shore for the humpback during the winter months and then go north to the sperm whale grounds."

In 1879 humpback whales were abundant on the coast of Maine. One of the most successful whalers out of Provincetown that season was the Brilliant, an old pink-stern schooner of 17 tons, which hunted this species off Deer Isle, Maine. Up to October 1 she had taken four whales, yielding one hundred and fifty-five barrels. The Brilliant carried but one whale-boat, and tried out the oil on shore, towing in the whales as they were killed. Capt. J. W. Collins reports that on May 17, 1877, when in latitude 44° 16′ north, longitude 58° 59′ west, he noticed an unusual number of whales and porpoises. "There were more humpback whales than I had even before seen in that locality; appeared to be entirely fearless of the vessel; played around her all day, sometimes coming up alongside within 15 or 20 feet, their heads out of water 10 or 12 feet. At other times they would lie on top of the water and lash it into snowy foam with their long, flexible fins."

In the Pacific Ocean humpbacks are taken all along the coast of Ecuador and Colombia, from Guayaquil to the Bay of Panama and on reefs around the islands of the Friendly Group, also occasionally around the New Hebrides and the Fiji Group. They are also found in considerable abundance around the Rosemary Islands, on the northwest coast of Australia, and around Brampton Shoals. The best grounds on the South American coast are in the Gulf of Guayaquil, which lies in about latitude 3° south, and from here along the shore to the north as far as 3° north latitude, off the villages of Tacaroes and Esmaraldas, in Ecuador. Ships occasionally anchor and send out their boat for the whales, that must as a rule be killed in shoal water, as most of them sink and must be hauled up. The season for whaling on this coast is from February to August, beginning at Esmaraldas in February, and working along south until, in June, the whales appear at the Gulf of Guayaquil, and continue until August. The season on the Australian coast and around the Western Pacific group of islands begins about the 1st of June and continues into November and December.

Humpback whales are taken along the coast of California at the shore-whaling stations, especially at Monterey Bay. They are also seen and captured at Magdalena and Balenas Bays. In many bays and around islands in the Alaskan territory and the Aleutian Islands they are taken by the Indians and the Eskimos.

Captain Scammon records the following observations on this species of whale: "In the years 1852 and 1853 large numbers of humpbacks resorted to the Gulf of Guayaquil, coast of Peru, to calve, and the height of the season was during the months of July and August. The same may be said of the gulfs and bays situated near the corresponding latitudes north of the equator; still, instances are not infrequent when cows and their calves have been seen at all other seasons of the year about the same coast. In the Bay of Valle de Banderas, coast of Mexico (latitude 20° 30′), in the month of December, we saw numbers of humpbacks, with calves but a few days old. In May, 1855, at Magdalena Bay, coast of Lower California (about latitude 24° 30′), we found them in like numbers, some with very large calves, while others were very small. The season at Tongataboo (one of the Friendly Islands, latitude 21° south, longitude 174° west), according to Captain Beckerman, includes August and September. Here the females were usually large, yielding an average of 40 barrels of oil, including the entrail fat, which amounted to about 6 barrels. The largest whale taken at this point during the season of 1871 produced 73 barrels, and she was adjudged to be 75 feet in length." *

In the year 1872 humpback whaling was successfully prosecuted at Panama Bay; Harper's and Tonga Islands; Chesterfield Shoals; coast of Africa; West Indies; Crozet and Desolation Islands. The last two islands have been visited more especially for the capture of right whales and sea elephants, though humpback whales were taken here and in other parts of the Indian Ocean.

(*e*) FINBACK, SULPHUR-BOTTOM, AND OTHER WHALING GROUNDS.

SULPHUR-BOTTOM WHALES.—The finback and the sulphur-bottom whales are found in most parts of the different oceans and in some places are very numerous. The sulphur-bottom is the largest whale known, varying from 60 to 100 feet or more. It is, like the finback, exceedingly swift in its movements, and can be captured only by the whaling rocket or the bomb-gun. Captain Seabury states that "they sometimes follow the vessel for miles." There can hardly be said to be any special grounds where the sulphur-bottom is captured, comparatively few having ever been taken. On the coast of California the shore-whalemen have taken a few, and several were taken some years since by the schooner Page, of San Francisco, off the port of San Quentin, Lower California. An attempt was made about 1865 to establish a fishery for this species at Iceland. "Two or three small screw steamers," says Captain Seabury, "were sent there from England to whale in the bays, using for the capture a whale-gun and a large line to go through the bottom of the boat. They were quite successful in taking the whale, and followed up the business for two or three years, but the expense being greater than the income, it was abandoned. Beyond those taken by this expedition off Iceland, there have been but few sulphur-bottoms captured."

FINBACK WHALES.—This whale is taken principally by shore-whalemen, vessels preferring more profitable game, as the finback has but little blubber, no valuable bone, and withal is very difficult to capture. They are taken by the California boat-whalers, and for two years past have been captured in considerable number along the coast of New England, especially at Provincetown, where forty-eight were secured in the spring of 1880. The shore-whaling stations on the coasts of Norway and Finmark are for the capture of this species.

GRAY WHALE OR DEVIL-FISH.—The California gray whale, also called "devil-fish" and "mussel-digger," is found principally on the coast of California, in the bays and gulfs and along the shores, in shoal water. The most noted places are Magdalena Bay, in about latitude 25° north, and Scammon's Lagoon, in about latitude 30° north. They are also found and taken in the

* Marine Mammalia, p. 43.

Okhotsk Sea and the Arctic Ocean. They are not large, and yield on an average only about 30 barrels of a reddish oil. They are said to be the most dangerous to capture of all whales. The bomb-lance or the whaling rocket is generally used in the chase. On the Californian coast the best season for the capture of this species is from November to April or May, after which time they move north. They appear in October and November off the coast of Oregon on their return south. This whale is known only in northern latitudes, and is not found in the Atlantic Ocean. No great number has ever been taken. Captain Scammon, in 1872, estimated that the whole number captured or destroyed since 1846, when bay-whaling commenced, would not exceed 10,800.

DISTRIBUTION OF BLACKFISH AND PORPOISE.—There are several other species of cetacea, as the blackfish and the porpoise, that are widely distributed over the oceans, and are often taken by whaling vessels, though they are not special objects of pursuit. Those fisheries for these species are discussed in the next chapter. The white whale or beluga is found principally in the icy waters of the north, and several hundred of them are annually taken by the natives of the countries bordering those seas, as also by the Scotch whaling vessels visiting Davis Strait. These vessels in 1877 took 935 white whales, and in 1876 they captured 700. According to Scammon large numbers are captured by the natives of Alaska and of Eastern Siberia, where they ascend the rivers for several hundred miles. They are taken in the Gulf of Saint Lawrence, and also by the Norwegians at Spitzbergen. Nordenskiold* states that in 1871 vessels from Tromsoe alone caught 2,167 of this species in nets. Their value was estimated at about $15 each. Both the blubber, hide, and carcass are utilized, the latter by the guano factories in Norway. They are also taken in nets by the Russians and Samoyeds at Chabarova.

ROUTES TO GROUNDS; SUPPLY STATIONS.

ROUTES TO WHALING GROUNDS.—Vessels engaged in the Atlantic Ocean fishery are of two classes, those of small size on short cruises and those of large capacity that make longer voyages. The former cruise principally in the North Atlantic, and are always on the alert for whales, working on all the grounds in this ocean, but especially those near the Azores or on the Hatteras ground. They usually leave home in the spring and return in the fall, proceeding first to the more southern and working toward the more northern fields. Some of these small vessels, however, remain out for a year or even more, spending the winter months on the tropical grounds and often cruising in the South Atlantic, where they obtain a quantity of oil to be transshipped from St. Helena to the United States. They will work toward home, stopping in the principal equatorial and northern grounds. The second or larger class of vessels are gone from home for from two to three years, often cruising on all the grounds in both the North and the South Atlantic. They usually go first to the Western Islands and from there work south or north as the abundance or the scarcity of whales on the different grounds may suggest. They frequently resort to ports at the Azores or Cape Verde Islands, in the north Atlantic, and St. Helena, in the South Atlantic.

The Hudson Bay or Davis Strait fleet is composed of vessels of all sizes. They make voyages lasting from eight months to one or two years. Many of them have been accustomed to leave home in the spring and to proceed at once to the Straits in time to enter the bays and gulfs at the breaking up of the ice. They spend the summer in search of whales, and may return home in the early fall, or remain to winter in the ice in order to take advantage of the early movement of whales in spring. There are no refitting ports to which they can resort, so that if the vessel be of small carrying capacity she will generally prefer to winter at home rather than in the icy regions.

* Voyage of the Vega, vol. i.

The Pacific-Arctic fleet is accustomed to winter in San Francisco or at the Sandwich Islands, and upon the opening of spring to proceed at once to the north, there awaiting the opening of the ice to go through the Strait. They return to winter quarters in the late fall and transship their catches by rail or vessel to New Bedford. Vessels sailing from New Bedford for the Arctic leave home in the fall, in order to pass Cape Horn during the summer season. These vessels seldom stop on the various grounds in their pathway, but will not refuse a good chance to take a whale wherever they may be. They are frequently absent from home for several years, making annual cruises north from their refitting station.

Ships and barks that cruised in the Pacific Ocean in former years made their voyages in from thirty to forty-eight months, or an average of about forty months. At the present time such a vessel shipping products home seldom makes a voyage in less than three years, and sometimes they are gone five years. The usual course of sperm and right whale ships when sailing in the spring or summer is to look the ground over as far as the Western Islands, touch there and get recruits and ship oil, if they have any; then run down and sight the Cape Verde, and sometimes touch there for refreshments and ship men if needed, which is quite often done at the Azores or Western Islands. They then cross the equator in from 24° to 31° west longitude, and, if bound round Cape Horn, run along within a few degrees of the east coast of South America, generally to the west of the Falkland Islands, and, passing through the Straits of Le Maire or to the east of Staten Land, steer for Cape Horn, keeping as near to the cape as possible, to avoid the strong westerly gales and easterly current that is usually found off shore. After getting around the Horn each ship steers for its chosen ground. In coming home they take a more easterly course, after getting into the Atlantic Ocean, than the passage out, so as to strike the southeast trade wind in about longitude 28° or 30° west; then make a direct track for home.

If bound around the East Cape or Cape of Good Hope, after crossing the equator they keep by the wind in going through the southeast trades, and when in latitude 28° to 30° south, steer to the eastward and double the cape. If bound to New Zealand, they keep in the variable wind to the south of latitude 30° south, and pass around Van Dieman's Land. If bound into the Indian Ocean, after passing the cape they steer for their several grounds. If sailing late in the season, and bound direct for the Pacific or Indian Ocean, ships keep the same course, except that they go more to the south and avoid the Western Islands.

SUPPLY STATIONS.—The principal places in the North Atlantic visited by whaling vessels for supplies or for transshipment of oil are the Barbadoes, Bermuda Islands, Fayal at the Azores, and Port Praya at Cape Verde Islands. In the South Atlantic the most important places are Pernambuco, Rio de Janeiro, St. Catherine, and Montevideo, on the east coast of South America. On the African coast are St. Helena, Ambrozet, and Cape Town.

In the Indian Ocean, Mauritius, on the Isle de France, is about the only port whence oil is transshipped and about the only place for repairs, though there are other places, as Zanzibar, Seychelle Islands, Singapore, and some of the East India islands, that are visited by the vessels. On the west coast of New Holland, Shark's Bay, Geographe Bay, and King George's Sound; also, Hobart Town, on Van Dieman's Land, and Sydney, on the east coast of Australia, are supply stations for vessels cruising on adjacent grounds.

The principal places visited by whalemen in the South Pacific are Monganui and Bay of Islands, on the east coast of New Zealand, Feejee and Navigator's Island, Papeta, on the island of Otaheite, and Nookaheva, one of the Marquesas Islands; and on the west coast of South America the ports of San Carlos, Talcahuano, Valparaiso, Callao, Payta, and Tumbez. Only two ports are much used for transshipping oil; these are Talcahuano, in Chili, and Bay of Islands, in New

Zealand. These, with Payta and Tumbez, in Peru, are the principal ports visited by ships. The Galapagos Islands have some good harbors and are occasionally resorted to for the land turtles or terrapin that are abundant there. On some islands wood can be obtained, and on the south side of Chatham Island good water can be got with safety from November to May.

In the North Pacific the principal ports visited for the transshipment of oil are San Francisco, Panama, Hila, and Honolulu. Tacames, in Ecuador, Acapulco, on the west coast of Mexico, Yokohama, Hakadadi, Guam, one of the Ladrone Islands, Hong-Kong, and Manila have all been visiting stations. There are also many other places occasionally visited by the whaling fleet. For the convenience of the Arctic fleet a supply vessel is sent from San Francisco to meet the vessels at Bering Strait or in the Arctic and receive what oil they may wish to send home and supply them with fresh provisions.

3. EARLY HISTORY OF BOAT-WHALING IN NEW ENGLAND.

COAST OF MAINE.

We find no records to indicate that shore-whaling was ever extensively practiced on the coast of Maine, though dritt whales may have been frequently cast ashore and cared for by the shoremen. The following item, given by Hubbard in his history of New England, shows that the people of Maine, in early times, were not versed in the handling of whales: "In 1668 a sperm whale fifty-five feet long was taken at Winter Harbor, near Casco Bay. The like hath happened in other places of the country, where, for want of skill to improve it, much gain hath slipped out of the hands of the finders."

MASSACHUSETTS NORTH OF CAPE COD.

There is little in the early records to show what interest the people of Massachusetts, north of Cape Cod, had in shore whaling. It is probable that at Salem and vicinity this business was carried on in a small way during the eighteenth century. Mr. John Higginson, in 1700, writes that at Salem, "we have a considerable quantity of whale oil and bone for exportation."* He writes again in 1706 to a friend in Ipswich as if he were concerned with others in boat whaling. Drift whales were frequently found, and claimants notified to prove their rights before courts of admiralty in accordance with the laws of the colony. Boston papers of December 12, 1707, mention the capture by boats of a 40-foot whale near Noddle's Island. It is therefore inferred that whale boats and implements for capture were kept in readiness in the vicinity of Boston.

It is probable that, as in recent years, drift whales were taken at Cape Ann and other points farther north along the coast of Massachusetts, though we find no record to show a definite business done in boat whaling at places north of Cape Cod.

BOAT WHALING AT CAPE COD.

Starbuck has called attention to the fact that the abundance of whales was one of the main arguments for the early settlement of Cape Cod by the English, and has quoted some interesting accounts of the manner in which the aborigines hunted the whale two centuries and a half ago. In Richard Mather's Journal of his voyage to Massachusetts, in 1635, he records seeing on the end of the Bank of Newfoundland near to New England "mighty fishes rolling and tumbling in the waters, twice as long and as big as an ox" and "mighty whales, spewing up water in the air, like

* FELT: Annals of Salem, II, p. 225.

the smoke of a chimney, and making the sea about them white and hoary, as is said in Job, of such incredible bigness that I will never wonder that the body of Jonas could be in the belly of a whale."

As early as 1661, Sandwich, Barnstable, Yarmouth, and Eastham were included in a proposition regarding the distribution of drift whales, submitted by the general court of Plymouth Colony,* and in 1690, the people of Nantucket, finding that the people of Cape Cod had made greater proficiency in the art of catching whales than themselves, sent thither for an instructor.†

The Cape Cod whale fishery in the seventeenth century, and perhaps later, was prosecuted no doubt nearly exclusively from the shore, as was also done in Nantucket, and as to the present day the sperm-whale fishery is carried on about the Bermudas. A lookout was kept by watchmen on the shore, who gave signals when a whale appeared and indicated his movements from their lofty stations. One of these stations was on Great Island, at the mouth of Wellfleet Harbor, where, tradition says, there were at one time ten or twelve houses and the first tavern built in Wellfleet. Wellfleet was then included in the town of Eastham, and it was doubtless by the people of this settlement that the petition was presented in 1706, which states, "all or most of us are concerned in fitting out Boats to Catch and take Whales when ye season of ye year Serves; and whereas when we have taken any whale or whales, our Custom is to Cutt them up and to take away ye fatt and ye Bone of such Whales as are brought in and afterwards to let ye Rest of ye Boddy of ye Lean of whales Lye on shoar in lowe water to be washt away by ye sea, being of noe vallue nor worth any Thing to us," and begs that Thomas Houghton or his assigns be permitted to take away this waste.‡

Another of these stations was in what is now the town of Dennis, and is the present site of the hotel called the "Bay House." This tract was the joint property of Dennis and Yarmouth, and was reserved until March, 1877, when it was sold by the mutual vote of the two towns at the yearly town meeting.

Starbuck relates that in 1724 and 1726, in the prosecution of the wars between the Indians and the colonists, some of the friendly Indians from the county of Barnstable were enlisted with the express understanding that that they were to be discharged in time to take part in the fall and winter whale-fishery.§

This would indicate that the boat fishery was still at that time profitable and actively prosecuted.

In 1737, a paragraph in the Boston News Letter stated, a dozen whaling vessels were fitting in Provincetown, for Davis Strait, and that so many people were going that not over a dozen or fourteen men would be left. Eastham also had a vessel in Davis Strait this year, and the Davis Strait fleet from Massachusetts alone is estimated by Starbuck to have consisted of from fifty to sixty vessels. Four years later Barnstable had at least one whaling vessel which was captured by the Spanish, and in 1770 this port still had two whalers in the Arctic.

The size of the Arctic fleet of Massachusetts in 1737 would indicate that the shore-fishery was falling off in importance. Indeed a statement to this effect occurs in Felt's Annals of Salem, under date of 1748, where it is said, "whales formerly for many successive years set in alongshore by Cape Cod. There was good whaling in boats * * * . After some years they left this ground and passed farther off upon the banks at some distance from the shore. The whalers then used sloops with whale-boats aboard, and this fishery turned to good account. At present the whales take their course in deep water, whereupon a peace our whalers design to follow them."‖

* STARBUCK: in Rep. U. S. Fish. Com., Part IV, 1875–'76, p. 7.
† STARBUCK: *l. c.*, p. 17.
‡ Mass. Col. MSS. maritime, IV, pp. 72-73, quoted by Starbuck, *l. c.*, p. 30.
§ *l. c.*, p. 31.
‖ STARBUCK: *l. c.*, p. 33.

This corresponds also with statements gathered by Starbuck from various sources to the effect that the years 1737, 1738, and 1739 were very unfortunate ones for the people of Provincetown, Sandwich, and adjacent ports, insomuch that some of the inhabitants took into serious consideration a change of residence.

The people of Yarmouth preserve a tradition that the early whale fishery of that region had for its object the capture of humpbacks and right whales. As has been suggested, the number of humpbacks taken must have been very considerable, yet the right whales must also have been plenty in early days.

The Plymouth colonists, according to Thacher,* were inclined at first to settle on Cape Cod, because large whales of the best kind for oil and bone came daily alongside, and played about the ship, while the master (presumably of the "Mayflower") and his mate, and others experienced in fishing, preferred it to the Greenland fishery. In February, 1738, the Yarmouth whalemen had killed but one large whale during the season; the bone of that being from 8 to 9 feet long. This was of course a right whale, and the thing in the occurrence remarkable to the recorder was that a great many more had not been taken the same winter. In March, 1736, the boats of Provincetown took a large whale which produced 100 barrels of oil. Humpbacks rarely yield more than 50 barrels, and probably would not have been classed among the numerous "large whales" taken in those years. Another argument in favor of the supposed early abundance of the right whale in these waters, was that upon their becoming scarce, a large fleet was forthwith dispatched to Davis' Straits, where none but whalebone whales occur. The sperm-whale fishing of Cape Cod was not inaugurated until about 1826, or at least not in a permanent way, though Starbuck gives nine vessels from "Cape Cod" in 1789, eight of which cruised in the "Straits of Belleisle," six of which obtained about 50 barrels each of sperm oil, the other two about 80 barrels each.

In the early records of the Plymouth and Massachusetts Bay Colonies are numerous orders relating to drift whales, among which we find the following: "At a session of the general court, the first of the 8th month, 1645," it was ordered as one of the duties of the Auditor-General, "that he shall take notice and looke aft^r^ wafes, strayes, goods lost, shipwrecks, whales, &c., or any such things of y^e^ like nature, w^r^ y^e^ pticuler owner is not knowne; and y^e^ country may claime a priviledge in or comon right unto."† July 4, 1656, it was "ordered by the court that wheras the countrey hath receiued great dammage by a defect in the order about the barrell of oyle due for euery whale taken on drift or cast on shore as is expressed in the said order by leakquage of Caske or otherwise; the court haue ordered that for the future all such oyle as shalbee due and payable as aforsaid shalbee deliuered att Boston, viz, a full barrell of marchantable oyle for euery whale and the fraight therof discharged by those that deliuer it, the said oyle to bee deliuered att Boston to such as the Treasurer shall appoint from yeare to year and a receipt taken from such as to whome it is deliuered shalbee a discharge to those that deliuer it."‡ In 1661 it was "enacted by the Court and the Authoritie therof that whosoeuer taketh any whale on drift att sea without those bounds and limites alreddy sett and bring them on shore hee shall have the one halfe and the Countrey the other halfe; and the Countrey to allow Caske for theire *p*te of the oyle. That whosoeuer shall find any whale on shore on the Cape or elsewhere that is out of any Townese bounds and is on the Countreyes bounds or limittes shall allow the Countrey two hogsheads of oyle cleare and payed to the Countrey."§

On the 3d of June, 1662, it was resolved that "wheras there hath bine much controversye occationed for want of a full and cleare settlement of matter relateing into such whales as by Gods

* Quoted by Starbuck, *l. c.*, p. 5.
† Records of Massachusetts, II, p. 143.
‡ Plymouth Colony Records, XI, p. 208
§ *Ibid.*, XI. p. 66.

providence doe fall into any pte of this Jurisdiction. This Court doth therfore order for the prevention of any discontent or controversy for the future and for a finall Issue and settlement soe farr as in the Court lyeth about the same; that for all such whales as by Gods providence shalbee cast on shore on any pte of this gou^rment or shalbee by any ent vp att sea and brought on shore in the Gou^rment; there shalbee for every such fish one full hogshead of Marchantable oyle payed into the Countrey delivered att Boston by such townes or psons as are Interested in the lands where they fall or shall soe cutt vp any fish att sea; and incase that any fish bee soe considerably torne or wasted that a full quarter pte bee goue; then to pay but halfe a hogshead and for such Inconsiderable peeces of fish as are lesse then halfe they shall pay nothing; and for the resedew of such fish or the produce of them as remaines the Countreyes pte being discharged. It shalbee freely att the dispose of such Townes where it falls or for the Benifett of such as Cutt them vp; if taken on drift without such bounds as have bine formerly sett; the same being still continewed."*

On the 4th of November, 1690, it was—

"Ordered, that for the prevention of contests and suits by whale killers:—

"1. This Court doth order, that all whales killed or wounded by any man & left at sea, s^d whale killers that killed or wounded s^d whale shall presently repaire to some prudent person whome the Court shall appoint, and there give in the wounds of s^b whale, the time & place when & where killed or wounded; and s^d person so appointed shall presently comitt it to record, and his record shall be allowed good testimony in law.

"2. That all whales brought or cast on shore shall be viewed by the persons so appointed, or his deputy, before they are cut or any way defaced after come or brought on shore, and s^d viewer shall take a particular record of the wounds of s^d whale, & time & place where & when brought on shore; & his record shall be good testimony in law, and s^d viewer shall take care for securing s^d fish for the owner.

"3. That whatever person or persons shall cut up or defaee any whale fish, by cutting, stabbing, or launcing, after come on shore or at sea, if a drift, unless of necessity to towe it to shore, before it hath been viewed by the person appointed thereto, and a record taken by him, shall lose their right to s^d fish, & pay a fine of ten pounds to the county. And s^d viewers shall seize s^d fish for the owners use, on the effects thereof, and s^d viewer shall have power to make a deputy or deputies under his hand, and to have six shillings for [eaeh] whale so viewed & recorded of the owners thereof.

"4. That whosoever find, takes, or cuts up any drift whale found on the stream, a mile from the shore, not appearing to be killed by any man, shall be the† first sieze and secure them, paying an hogshead of oyle to y^e county for every such whale."

MARTHA'S VINEYARD.

The inhabitants of this island were early engaged in boat whaling. According to Starbuck the earliest mention of whales at this place occurs in November, 1652, when Thomas Daggett and William Weeks were appointed "whale cutters for this year." In the following April it was "Ordered by the town that the whale is to be cut out freely, four men at one time, and four at another, and so every whale, beginning at the east end of the town." In 1690 Mr. Sarson and William Vinson were appointed by "the proprietors of the whale" to oversee the cutting and sharing of all whales cast on shore within the bounds of Edgartown, "they to have as much for their care as one cutter."

* Ply. Col. Rec., xi, p. 134.

† *Ibid.*, vi, p. 252.

"In 1692," says Starbuck, "came the inevitable dispute of proprietorship. A whale was cast on shore at Edgartown by the proprietors, 'seized by Benjamin Smith and Mr. Joseph Norton in their behalf,' which was also claimed by 'John Steel, harpooner, on a whale design, as being killed by him.' It was settled by placing the whale in the custody of Richard Sarson, esq., and Mr. Benjamin Smith, as agents of the proprietors, to save by trying out and securing the oil; 'and that no distribution be made of the said whale, or effects, till after fifteen days are expired after the date hereof, that so such persons who may pretend an interest or claim, in the whale, may make their challenge; and in case such challenge appear sufficient to them, then they may deliver the said whale or oyl to the challenger; otherwise to give notice to the proprietors, who may do as the matter may require. By the inhabitants of Martha's Vineyard, in 1702–'3, there appear to have been several whales killed. The following entry occurs under that date in the court records: 'The marks of the whales killed by John Butler and Thomas Lothrop. One whale lanced near or over the shoulder blade, near the left shoulder blade only; another killed with an iron forward in the left side, marked W; and upon the right side marked with a pocket-knife T. L.; and the other had an iron hole over the right shoulder-blade, with two lance holes in the same side, one in the belly. These whales were all killed about the middle of February last past; all great whales, betwixt 6 and 7 and 8-foot bone, which are all gone from us. A true account given by John Butler from us, and recorded Per me, Thomas Trapp, clerk.'"

NANTUCKET.

The history of shore-whaling at Nantucket begins with the occupancy of that island by Europeans, about the year 1640, although prior to that time the Indians were doubtless accustomed to occasionally capture a whale. "The very earliest account of a capture," says Mr. C. S. Raleigh, "was in the year 1608, when a party of Indians killed a humpback whale which got stranded on a part of Nantucket, called Caton, in the inner harbor." "The first whaling expedition," says Macy, "was undertaken by some of the original purchasers of the island; the circumstances of which are handed down by tradition, and are as follows: A whale, of the kind called 'scragg,' came into the harbor and continued there three days. This excited the curiosity of the people, and led them to devise measures to prevent his return out of the harbor. They accordingly invented and caused to be wrought for them a harpoon, with which they attacked and killed the whale. This first success encouraged them to undertake whaling as a permanent business; whales being at that time numerous in the vicinity of the shores."*

The islanders were anxious to engage in the whaling industry and, according to Starbuck,† recorded a memorandum of a proposed agreement with one James Loper, in which it is said that the said James "doth Ingage to carrey on a Designe of Whale Catching on the Island of Nantucket that is to say James Ingages to be a third in all Respects, and som of the Town Ingages also to carrey on the other two thirds with him in like manner—the town doth also consent that first one company shall begin, and afterwards the rest of the freeholders or any of them have Liberty to set up another Company provided they make a tender to those freeholders that have no share in the first company and if any refuse the rest may go on themselves, and the town doth engage that no other Company shall be allowed hereafter; also, whoever kill any whales, of the Company or Companies aforesaid, they are to pay to the Town for every such whale five shillings and for the Incoragement of the said James Loper the Town doth grant him ten acres of Land in sume Convenant place that he may chuse in (Wood Land Except) and also liberty for the commonage of three cows and Twenty sheep and one horse with necessary wood and water for his

* MACY: Hist. Nantucket, p. 28. † Report U. S. Fish Com., 1875–'76.

use, on Conditions that he follow the trade of whalling on this Island two years in all seasons thereof beginning the first of March next Insuing; also he is to build upon his Land and when he leaves Inhabiting upon this Island then he is first to offer his Land to the Town at a valuable price and if the Town do not buy it he may sell it to whom he please; the commonage is granted only for the time of his staying here." "At the same meeting," continues Starbuck, "John Savidge had a grant made to him, upon condition that he took up his residence on the island for the space of three years, and also that he should 'follow his trade of a cooper upon the island, as the Town or whale Company have need to employ him.' Loper beyond a doubt never improved this opportunity offered him of immortalizing himself, but Savidge did, and a perverse world has, against his own will, handed down to posterity the name of Loper, who did not come, while it has rather ignored that of Savidge, who did remove to that island."

In the mean time the people of Cape Cod were becoming more proficient in whaling than those of Nantucket, so that the latter sent to the cape in 1690, and "employed a man by the name of Ichabod Paddock to instruct them in the manner of killing whales and extracting their oil."* From small beginnings the industry increased, and reached its greatest prosperity in 1726, when, says Macy, eighty-six were taken, "a greater number than was obtained in any one year, either before or since that date. The greatest number ever killed and brought to the shore in one day was eleven." Shore whaling at this period was the principal employment of the islanders. "The Indians even manifested a disposition for fishing of every kind, readily joined with the whites in this new pursuit, and willingly submitted to any station assigned them. By their assistance, the whites were enabled to fit out and man a far greater number of boats than they could have done of themselves. Nearly every boat was manned in part, many almost entirely, by natives; some of the most active of them were made steersmen, and some were allowed even to head the boats; thus encouraged, they soon became experienced whalemen, and capable of conducting any part of the business."

The following incident illustrates their bravery when in danger:

"It happened once, when there were about thirty boats about six miles from shore, that the wind came round to the northward and blew with great violence, attended with snow. The men all rowed hard, but made but little headway. In one of the boats were four Indians and two white men. An old Indian in the head of the boat, perceiving that the crew began to be disheartened, spake out loud in his own tongue, and said, '*Momadichchator auqua sarshkee sarnkee pinchee cynoo sememoochkee chaquanks wihchee pinchee cynoo;*' which in English is, 'Pull ahead with courage; do not be disheartened; we shall not be lost now; there are too many Englishmen to be lost now.' His speaking in this manner gave the crew new courage. They soon perceived that they made headway, and after long rowing they all got safe on shore."†

Whales were abundant close in shore for many years, so that a plentiful supply of oil was obtained without going out of sight of land. "The south side of the island," says Hector St. John, "was divided into four equal parts, and each part was assigned to a company of six, which, though thus separated, still carried on their business in common. In the middle of this distance they erected a mast, provided with a sufficient number of rounds, and near it they built a temporary hut where five of the associates lived, whilst the sixth, from his high station, carefully looked toward the sea, in order to observe the spouting of whales."‡

"The process of *saving* the whales," says Macy, "after they had been killed and towed ashore, was to use a *crab*, an instrument similar to a capstan, to heave and turn the blubber off as fast as

* MACY: *op. cit.*, p. 30. † Mass. Hist. Soc. Coll., iii p. 175.

‡ Letters from an American farmer; Hector St. John Crèvecœur; published 1782.

it was cut. The blubber was then put into their carts and carried to their try-houses, which, at that early period, were placed near to their dwelling-houses, where the oil was boiled out and fitted for market." *

Shore-whaling continued till about the middle of the eighteenth century, when whales became scarce and were pursued by vessels, when the boat-whaling, as a regular business, was, according to Macy, abandoned. "The first sperm-whale known to the islanders was found ashore on the southwest part of Nantucket. It caused considerable excitement, some demanding a part of the prize under one pretense, some under another, and all were anxious to behold so strange an animal. There were so many claimants of the prize, that it was difficult to determine to who it should belong. The natives claimed it because they found it; the whites, to whom the natives made known their discovery, claimed it by a right comprehended, as they affirmed, in the purchase of the island by the original patent. An officer of the crown made his claim, and pretended to seize the fish in the name of his majesty, as being property without any particular owner. After considerable discussion between these contending parties, it was finally settled that the white inhabitants, who first found the whale, should share the prize equally amongst themselves. The teeth, which were considered very valuable, had been extracted by a white man and an Indian, before any others had any knowledge of the whale. All difficulty being now settled, a company was formed, who commenced cutting the whale in pieces convenient for transportation to their try-works. The sperm procured from the head was thought to be of great value for medical purposes. It was used both as an internal and external application; and such was the credulity of the people, that they considered it a certain cure for all diseases; it was sought with avidity, and, for awhile, was esteemed to be worth its weight in silver. The whole quantity of oil obtained from this whale is not known." †

RHODE ISLAND AND CONNECTICUT.

In 1731 Rhode Island passed an act for the encouragement of the fisheries, giving "a bounty of five shillings for every barrel of whale oil, one penny a pound for bone, and five shillings a quintal for codfish, caught by Rhode Island vessels, and brought into this Colony." ‡

The fishery had been carried on to some extent in boats from the shore, and whales were taken in the waters of Narragansett Bay.

The first official document to be found connecting the State of Connecticut with the whale fishery is a resolve passed at a meeting of the general court held at Hartford, May 25, 1647, which says:

"Yf Mr. Whiting, wth any others shall make tryall and p^{r}secute a designe for the takeing of whale wthin these libertyes, and if vppon tryall wthin the terme of two yeares, they shall like to goe on, noe others shalbe sufferd to interrupt the, for the tearme of seauen yeares." §

It is probable that drift-whales were occasionally taken along the coast of Connecticut in early times, but we find no special reference to show that boat-whaling was ever engaged in by the inhabitants.

NEW YORK.

Long Island, with its long stretch of sandy beaches, was in early times a favorite resort for boat whalemen. It was the rival of Cape Cod, and the inhabitants on its eastern end found much profit in capturing whales, and shipping oil and bone to London. The following interesting account of shore-whaling along those shores is taken entire from Mr. Starbuck's ‖ report on the whale fishery.

* Hist. Nantucket, p. 31. † *Ibid.*, p. 32. ‡ ARNOLD: Hist. Rhode Island, ii, p. 103.
§ Conn. Col. Rec., i, p. 154. ‖ U. S. Fish Commissioner's Report, Part IV, 1875–'76.

"It is probably safe to assert that the first organized prosecution of the American whale-fishery was made along the shores of Long Island. The town of Southampton, which was settled in 1640 by an offshoot from the Massachusetts Colony at Lynn, was quick to appreciate the value of this source of revenue. In March, 1644, the town ordered the town divided into four wards of eleven persons to each ward, to attend to the drift-whales cast ashore. When such an event took place two persons from each ward (selected by lot) were to be employed to cut it up. 'And every Inhabitant with his child or servant that is above sixteen years of age shall have in the Division of the other part,' (*i. e.* what remained after the cutters deducted the double share they were, ex-officio, entitled to) 'an equall proportion provided that such person when yt falls into his ward a sufficient man to be imployed about yt.'* Among the names of those delegated to each ward are many whose descendants became prominent in the business as masters or owners of vessels—the Coopers, the Sayres, Mulfords, Peirsons, Hedges, Howells, Posts, and others. A few years later the number of 'squadrons' was increased to six.

"In February, 1645, the town ordered that if any whale was cast ashore within the limits of the town no man should take or carry away any part thereof without order from a magistrate, under penalty of twenty shillings. Whoever should find any whale or part of a whale, upon giving notice to a magistrate, should have allowed him five shillings, or if the portion found should not be worth five shillings the finder should have the whole. 'And yt is further ordered that yf any shall finde a whale or any peece thereof upon the Lord's day then the aforesaid shillings shall not be due or payable.'† 'This last clanse,' says Howell, 'appears to be a very shrewd thrust at "mooning" on the beach on Sundays.'

"It was customary a few years later to fit out expeditions of several boats each for whaling along the coast, the parties engaged camping out on shore during the night. These expeditions were usually gone about one or two weeks.‡ Indians were usually employed by the English, the whites furnishing all the necessary implements, and the Indians receiving a stipulated proportion of oil in payment.

"At Easthampton on the 6th of November, 1651, 'It was Ordered that Rodman Mulford shall call out ye Town by succession to loke out for whale.'§ Easthampton, however, like every other town where whales were obtainable, seems to have had its little unpleasantnesses on the subject, for in 1653 the town 'Ordered that the share of whale now in controversie between the Widow Talmage and Thomas Talmage' (alas for the old-time Chesterfieldian gallantry) 'shall be divided among them as the lot is.'‖ In the early deeds of the town the Indian grantors were to be allowed the fins and tails of all drift-whales; and in the deed of Montauk Island and Point, the Indians and whites were to be equal sharers in these prizes.¶ In 1672 the towns of Easthampton, Southampton, and Southwold presented a memorial to the court at Whitehall 'setting forth that they have spent much time and paines, and the greatest part of their estates, in settling the trade of whale-fishing in the adjacent seas, *having endeavoured it above these twenty yeares*, but could not bring it to any perfection till within these 2 or 3 yeares last past. And it now being a hopefull trade at New Yorke, in America, the Governor and the Dutch there do require ye Petitioners to come under their patent, and lay very heavy taxes upon them beyond any of his Ma^ties^ subjects in New England, and will not permit the petitioners to have any deputys in Court,** but being chiefe, do impose what Laws they please upon them, and insulting very much over the Petitioners

* Howell: Hist. of Southampton, p. 179. † *Ibid.*, p. 184. ‡ *Ibid.*, p. 183.
§ Bicentennial Address at Easthampton, 1850, by Henry P. Hedges, p. 8. ‖ *Ibid.*, p. 8. ¶ *Ibid.*
** In this petition is an early assertion of the twinship of taxation and representation, for which Massachusetts and her offshoots were ever strenuous.

threaten to cut down their timber which is but little they have to Casks for oyle, altho' the Petrs purchased their landes of the Lord Sterling's deputy, above 30 yeares since, and have till now under the Government and Patent of Mr. Winthrop, belonging to Conitycut Patent, which lyeth far more convenient for ye Petitioners assistance in the aforesaid Trade.' They desire, therefore, either to continue under the Connecticut government, or to be made a free corporation. This petition was referred to the 'Council on Foreign Plantations.'

"This would make the commencement of this industry date back not far from the year 1650. In December, 1652, the directors of Dutch West India Company write to Director General Peter Stuyvesant, of New York: 'In regard to the whale-fishery we understand that it might be taken in hand during some part of the year. If this could be done with advantage, it would be a very desirable matter, and make the trade there flourish and animate many people to try their good luck in that branch.' In April (4th), 1656, the council of New York 'received the request of Hans Jongh, soldier and tanner, asking for a ton of train-oil or *some of the fat of the whale lately captured.*'"

In 1669 Mr. Maverick writes from New York to Colonel Nichols, as follows:

"On ye East end of Long Island there were twelve or thirteen whales taken before ye end of March, and what since wee heare not; here are dayly some seen in the very harbour, sometimes within Nutt Island. Out of the Pinnace, the other week, they struck two, but lost both, the iron broke in one, the other broke the warpe. The Governour hath encouraged some to follow this designe. Two shollops made for itt, but as yett wee doe not heare of any they have gotten."*

"In 1672," continues Starbuck, "the town of Southampton passed an order for the regulation of whaling, which, in the latter part of the year, received the following confirmation from Governor Lovelace: 'Whereas there was an ordinance made at a Towne-Meeting in South Hampton upon the Second Day of May las relating to the Regulation of the Whale ffishing and Employment of the Indyans therein, whercin particularly it is mentioned. That whosoever shall Hire an Indyan to go a-Whaling, shall not give him for his Hire above one Trucking Cloath Coat, for each whale, hee and his Company shall Kill, or halfe the Blubber, without the Whale Bone under a Penalty therein exprest: Upon Considerac'on had thereupon, I have thought good to Allow of the said Order, And do hereby Confirm the same, until some inconvenience therein shall bee made appeare, And do also Order that the like Rule shall bee followed at East Hampton and other Places if they shall finde it practicable amongst them.

"'Given under my hand in New Yorke, the 28th of Novemb'r, 1672.'

"Upon the same day that the people of Southamption passed the foregoing order, Governor Lovelace also issued and order citing that in consequence of great abuse to his Royal Highness in the matter of drift-whales upon Long Island, he had thought fit to appoint Mr. Wm. Osborne and Mr. John Smith, of Hempstead, to make strict inquiries of Indians and English in regard to the matter.†

"It was early found to be essential that all important contracts and agreements, especially 'betweeu the English and Indians, relating to the killing of whales should be entered upon the town books, and signed by the parties in presence of the clerk and certified by him. Boat-whaling was so generally practiced, and was considered of so much importance by the whole community, that every man of sufficient ability in the town was obliged to take his turn in watching for whales from some elevated position on the beach, and to sound the alarm on one being seen near the coast.'‡ In April (2d), 1668, an agreement was entered on the records of Easthamp-

* Doc. of Col. Hist. New York, III p. 183. † N. Y. Col., MSS., General Entries iv, p. 123, Francis Lovelace.
‡ Howell: Hist. Southampton.

ton, binding certain Indians of Montauket in the sum of £10 sterling to go to sea, whaling, on account of Jacobus Skallenger and others, of Easthampton, beginning on the 1st of November and ending on the 1st of the ensuing April, they engaging 'to attend dilligently with all opportunitie for ye killing of whales or other fish, for ye sum of three shillings a day for every Indian; ye sayd Jacobus Skallenger and partners to furnish all necessarie craft and tackling convenient for ye designe.' The laws governing these whaling-companies were based on justice rather than selfishness. Among the provisions was one passed January 4, 1669, whereby a member of one company finding a dead whale killed by the other company was obliged to notify the latter. A prudent proviso in the order was that the person bringing the tidings should be well rewarded. If the whale was found at sea, the killers and finders were to be equal sharers. If irons were found in the whale, they were to be restored to the owners.* In 1672, John Cooper desired leave to employ some 'strange Indians' to assist him in whaling, which leave was granted;† but these Indian allies required tender handling, and were quite apt to ignore their contracts when a fair excuse could be found, especially if their hands had already closed over the financial consideration. Two or three petitions relating to cases of this kind are on file at New York. One of them is from 'Jacob Skallenger, Stephen Hand, James Loper and other adjoined with them in the Whale Designe at Easthampton,' and was presented in 1675. It sets forth that they had associated together for the purpose of whaling, and agreed to hire twelve Indians and man two boats. Having seen the natives yearly employed both by neighbors and those in surrounding towns, they thought there could be no objection to their doing likewise. Accordingly, they agreed in June with twelve Indians to whale for them during the following season. 'But it fell out soe that foure of the said Indians (competent & experienced men) belonged to Shelter-Island whoe with the rest received of your petic̃on^rs in pt. of their hire or wages 25*s.* a peece in hand at the time of the contract, as the Indian Custome is and without which they would not engage themselves to goe to Sea as aforesaid for your Petic̃on^rs.' Soon after this there came an order from the governor requiring, in consequence of the troubles between the English and the aborigines, that all Indians should remain in their own quarters during the wiuter. 'And some of the towne of Easthampton wanteing Indians to make up theire crue for whaleing they take advantage of your hon^rs s^d Ordre thereby to hinder your petic̃on^rs of the said foure Shelter-Island Indians. One of ye Overseers being of the Company that would soe hinder your petic̃on^rs. And Mr. Barker warned yo^r petic̃on^rs not to entertaine the said foure Indians without licence from your hon^r. And although some of your peti-c̃oners opposites in this matter of great weight to them seek to prevent yo^r petic̃on^rs from haveing those foure Indians under pretence of zeal in fulfilling y^r hon^rs order, yet it is more then apparent that they endeavor to break yo^r petic̃on^rs Company in y^t maner that soe they themselves may have opportunity out of the other eight Easthampton Indians to supply theire owne wants.' After representing the loss liable to accrue to them from the failure of their design and the inability to hire Easthampton Indians, on account of their being already engaged by other companies, they ask relief in the premises,‡ which Governor Andross, in an order dated November 18, 1675, grants them, by allowing them to employ the aforesaid Shelter-Island Indians.§

"Another ease is that of the widow of one Cooper, who in 1677 petitions Andross to compel some Indians who had been hired and paid their advance by her late husband to fulfill to her the contract made with him, they having been hiring out to other parties since his decease.‖

* This code was very similar to that afterward adopted in the Massachusetts Bay.

† N. Y., Col. MSS.; General Entries, iv, p. 235.

‡ N. Y. Col. MSS., xxv, Sir Ed. Andross, p. 41.

§ Warrants, Orders, Passes, &c., 1674–1679, p. 161.

‖ N. Y. Col. MSS., xxvi, p. 153.

"The trade in oil from Long Island early gravitated to Boston and Connecticut, and this was always a source of much uneasiness to the authorities at New York. The people inhabiting Easthampton, Southampton, and vicinity, settling under a patent with different guarantees from those allowed under the Duke of York, had little in sympathy with that government, and always turned toward Connecticut as their natural ally and Massachusetts as their foster mother. Scarcely had what they looked upon as the tyrannies of the New York governors reduced them to a sort of subjection when they were assailed by a fresh enemy. A sudden turn of the wheel of fortune brought them, in 1673, a second time under the control of the Dutch. During this interregnum, which lasted from July, 1673, to November, 1674, they were summoned, by their then conquerors, to send delegates to an assembly to be convened by the temporary rulers. In reply the inhabitants of Easthampton, Southampton, Southold, Seatoocook, and Huntington returned a memorial setting forth that up to 1664 they had lived quietly and prosperously under the government of Connecticut. Now, however, the Dutch had by force assumed control, and, understanding them to be well disposed, the people of those parts proffer a series of ten requests. The ninth is the particular one of interest in this connection, and is the only one not granted. In it they ask, 'That there be ffree liberty granted ye 5 townes aforesd for ye procuring from any of ye united Collonies (without molestation on either side:) warpes, irons, or any other necessaries ffor ye comfortable carring on the whale design.' To this reply is made that it 'cannot in this conjunction of time be allowed.' 'Why,' says Howell,* "the Council of Governor Colve chose thus to snub the English in these five towns in the matter of providing a few whale-irons and necessary tackle for capturing the whales that happened along the coast, is inconceivable;" but it must be remembered that the English and Dutch had long been rivals in this pursuit, even carrying their rivalry to the extreme of personal conflicts. The Dutch assumed to be, and practically were, the factors of Europe in this business at this period, and would naturally be slow to encourage any proficiency in whaling by a people upon whom they probably realized that their lease of authority would be brief. Hence, although they were willing to grant them every other right in common with those of their own nationality, maritime jealousy made this one request impracticable. How the people of Long Island enjoyed this state of affairs is easy to infer from their petition of 1672. The oppressions alike of New York governors and Dutch conquerors could not fail to increase the alienation that difference of habits, associations, interests, and rights had implanted within them. Among other arbitrary laws was one compelling them to carry all the oil they desired to export to New York to be cleared, a measure which produced so much dissatisfaction and inconvenience that it was beyond a doubt "more honored in the breach than in the observance." At times some captain, more scrupulous than the rest, would obey the letter of the law or procure a remission of it. Thus, in April, 1678, Benjamin Alford, of Boston, in New England, merchant, petitioned Governor Brockholds for permission to clear with a considerable quantity of oil that he had bought at Southampton directly from that port to London, he paying all duties required by law. This he desires to do in order to avoid the hazard of the voyage to New York and the extra danger of leakage thereby incurred. He was accordingly allowed to clear as he desired.†

* Hist. of Southampton, p. 62.

† N. Y. Col. MSS., xxvii, pp. 65, 66. Accompanying the order is a blank clearance reading as follows: "Permitt & suffer the good ——— of ——— A. B. Commander, bound for the Port of London in Old England to passe from the Harbo^{r} at the North-Sea near South^{ton} at the East End of Long Isl. with her loading of Whale Oyl & Whalebone without any manner of Lett Hindrance or Molestacon, shee having heene cleared by order from the Custom house here & given security accordingly. Given under my hand in N. Y. this 20th day of April in the 30th yeare of his Ma^{ties} raigne A^{o} Domini 1678.

"To all his Ma^{ties} Offic^{rs} whom this may Concerne."

"In 1684 an act for the 'Encouragement of Trade and Navigation' within the province of New York was passed, laying a duty of 10 per cent. on all oil and bone exported from New York to any other port or place except directly to England, Jamaica, Barbadoes, or some other of the Caribbean Islands.

"In May, 1688, the Duke of York instructs his agent, John Leven, to inquire into the number of whales killed during the past six years within the province of New York, the produce of oil and bone, and 'about his share.'* To this Leven makes reply that there has been no record kept, and that the oil and bone were shared by the companies killing the fish. To Leven's statement, Andross, who is in England defending his colonial government, asserts that all those whales tha were driven ashore were killed and claimed by the whalers or Indians.†

"In August, 1688, we find the first record of an intention to obtain sperm oil. Among the records in the State archives at Boston is a petition from Timotheus Vanderuen, commander of the brigantine Happy Return, of New Yorke, to Governor Andross, praying for 'Licence and Permission, with one Equipage Consisting in twelve mariners, twelve whalemen and six Diuers—from this Port, upon a fishing design about the Bohames Islands, And Cap florida, for sperma Coeti whales and Raeks: And so to returne for this Port.'‡ Whether this voyage was ever undertaken or not we have no means of knowing, but the petition is conclusive evidence that there were men in the country familiar even then with some of the haunts of the sperm-whale and with his capture.

"Francis Nicholson, writing from Fort James, December, 1688, says: 'Our whalers have had pretty good luck, killing about Graves End three large whales. On the Easte End aboute five or six small ones.'§ During this same year the town of Easthampton being short of money, debtors were compelled to pay their obligations in produce, and in order to have some system of exchange the trustees of the town 'being Legally met March 6, 1688–9 it was agreed that this year's Towne rate should be held to be good pay if it be paid as Follows:

	£.	s.	d.
Dry merchantable hides att	0	0	6
Indian Corn	0	3	0
Whale Bone 3 feet long and upwards	0	0	8.'

NOTE.—It is estimated by George R. Howells, from papers on file in the office of the secretary of state of New York, that the boat-whalemen of Southampton in 1687 took 2,148 barrels of oil.

"In July, 1708, Lord Cornbury writes again to the board of trade regarding New York affairs.‖ In his letter he says: 'The quantity of Train Oyl made in Long Island is very uncertain, some years they have much more fish than others, for example last year they made four thousand Barrils of Oyl, and this last Season they have not made above Six hundred: About the middle of October they begin to look out for fish, the Season lasts all November, December, January, February, and part of March; a Yearling will make about forty Barils of Oyl, a Stunt or Whale two years old will make sometimes fifty, sometimes sixty Barrils of Oyl, and the largest whale that I have heard of in these Parts, yielded one hundred and ten barrels of Oyl, and twelve hundred Weight of Bone.'

"In 1709 the fishery had attained such value on Long Island that some parties attempted to reduce it, so far as possible, to a monopoly, and grants of land previously made by Governor Fletcher and others, in a reckless and somewhat questionable manner were improved for personal benefit. Earl Bellomont, in commenting on these irregular practices, writes to the lords of trade, under date of July 2 of that year,¶ citing, among others, one Colonel Smith, who, he states,

* N. Y. Col. Records, iii. p. 282. † *Ibid.*, p. 311. ‡ Mass. Col. MSS., Usurpation, vi, p. 126.
§ *Ibid.*, iv, p. 303. ‖ N. Y. Col. Rec., v, p. 60. ¶ *Ibid.*, iv, p. 535.

'has got the beach on the sea shore for fourty miles together, after an odd manner as I have been told by some of the inhabitants * * * having forced the town of Southampton to take a poore £10 for the greatest part of the said beach, which is not a valuable consideration in law, for Colonel Smith himself own'd to me that that beach was very profitable to him for whale fishing, and that one year he cleared £500, by whales taken there.'

"In 1716, Samuel Mulford, of Easthampton, in a petition to the King, gave a sketch of the progress of this industry in that vicinity.* In the recital of the grievances of his neighbors and himself, he writes that 'the inhabitants of the said Township and parts adjacent did from the first Establishment of the said Colony of New York enjoy the Privilege & Benefit of fishing for whale & applying ye same to their own use as their undoubted right and property.'† By his petition it appears further that in 1664 Governor Nicolls and council directed that drift-whales should pay a duty of every sixteenth gallon of oil to the government, 'exempting the whales that were killed at Sea by persons who went on that design from any duty or imposition.' Governor Dongan also claimed duty on drift-whales, and he also exempted those killed at sea. 'There was no pretence,' under Dongan, 'to seize such whales or to exact anything from the fishermen on that account, being their ancient right and property. Thus the inhabitants had the right of fishing preserved to them, and the Crown the benefit of all drift Whales, and everything seemed well established between the Crown and the People, who continued chearfully, and with success, to carry on the said fishing trade.' This state of affairs continued until 1696, when Lord Cornbury (afterward Earl of Clarendon) became governor. It was then announced by those in authority that the whale was a 'Royal Fish,' and belonged to the Crown; consequently all whalers must be licensed 'for that purpose which he was sure to make them pay for, and also contribute good part of the fruit of their labour; no less that a neat 14th part of the Oyle and Bone, when cut up, and to bring the same to New York an 100 miles distant from their habitation, an exaction so grievous, that few people did ever comply for it.'‡ The result of this policy was to discourage the fishery, and its importance was sensibly decreased. In 1711 the New York authorities issued a writ to the sheriffs directing them to seize all whales. This demand created much disturbance, but the people, knowing no remedy, submitted with what grace they could to what they felt was a grievous wrong, and an infringement upon their rights under the patent under which their settlement was founded. Since that time, Mulford continues, a formal prosecution had been commenced against him for hiring Indians to assist him in whaling. He concludes his petition with the assertion that, unless some relief was afforded, the fishery must be ruined, since 'the person concerned will not be brought to the hardship of waiting out at sea many months, & the difficulty of bringing into New York the fish, and at last paying so great a share of their profit.'

"Mulford, during the latter part of his life, was continually at loggerheads with the government at New York. A sturdy representative of that Puritan opposition to injustice and wrong with which the early settlers of Eastern Long Island were so thoroughly imbued, the declining years of his life were continual eras of contention against the tyrannies and exactions of governors, whose only interest seemed to be to suck the life-blood from the bodies of these unfortunate flies caught in their spider's-net, and cast the useless remains remorselessly away. He was one of the

*N. Y. Col. Rec., v, p. 474.

These are undoubtedly what the authorities were pleased to term "Massachusetts notions."

‡ It was these outrageously unjust laws that brought the government into the notorious disrepute it attained with its outlying dependencies from 1675 to 1720. In March, 1698, the council of Lord Cornbury declared certain drift-whales the property of the Crown (which apparently meant a minimum amount to the King and a maximum share to the governor), "when the subject can make no just claim of having killed them." One Richard Floyd having offered a reward to any parties bringing him information of such whales, the council ordered an inquiry into the matter in order to prevent such practices in the future. (Council Minutes, viii, p. 6.)

remonstrants against the annexation of the eastern towns to the New York government, and from 1700 to 1720 was the delegate from these towns to the assembly. In 1715 the opposition of the government to his constituency reached the point of a personal conflict with him. In a speech delivered in the assembly in this year he boldly and unsparingly denounced the authorities as tyrannical, extravagant, and dishonest. He cited numerous instances of injustices from officers of the customs to the traders of and to his section. While grain was selling in Boston at 6*s.* per bushel, and only commanding one-half of that in New York, his people were compelled by existing laws to lose this difference in value. While the government was complaining of poverty and the lack of disposition on the part of the people to furnish means for its subsistence, the governor had received, says Mulford, during the past three years, three times the combined income of the governors of Massachusetts, Rhode Island, and Connecticut. In 1716 the assembly ordered this speech to be put into the hands of the speaker, but Mulford, without hesitation, caused it to be published and circulated.* From this time forth the war upon him was, so far as the government was concerned, a series of persecutions, but Mulford undauntedly braved them all and in the end was triumphant. Quite a number of letters passed between the governor and himself, and between them both and the lords of trade in London. As an earnest of the feeling his opposition had stirred up, the governor commenced a suit against him in the supreme court, the judges of which owed their appointment to the executive. Shortly after this, Governor Hunter, in a communication to the lords of trade regarding the state of affairs in the province, writes that he is informed that Mulford, who 'has continually flown in face of government,' and always disputed with the Crown the right of whaling, has gone to London to urge his case.† He states that 'that poor, troublesome old man' is the only mutineer in a province otherwise quiet (an assertion that evidenced either a reckless disregard for truth, or a want of knowledge of affairs inexcusably culpable); that the case he pleads has been brought before the supreme court and decided against him, and Mulford is the only man who disputes the Crown's right, and the good governor charitably recommends their lordships to 'bluff him.'‡ Still later, Hunter states that it was the custom long before his arrival to take out whaling licenses. Many came voluntarily and did so. If whaling is 'decayed,' it was not for want of whalemen, for the number increases yearly; 'but the truth of the matter is, that the Town of Boston is the Port of Trade of the People inhabiting that end of Long Island of late years, so that the exportation from hence of that commodity must in the Books be less than formerly.' The perquisites arising from the sale of these licenses were of no account in themselves, but yielding in this matter would only open a gap for the disputation of every perquisite of the government.§

* A copy of this speech is bound in an old volume of the Boston News-Letter, in the library of the Boston Athenæum.

† In the address of H. P. Hedges at the Bi-Centennial celebration at Easthampton, in 1850, he says, when Mulford finally repaired to London to present the case to the King, he was obliged to conceal his intention. Leaving Southampton secretly, he landed at Newport, walked to Boston, and from thence embarked for London. Arrived there, he "presented his memorial, which it is said attracted much attention, and was read by him in the House of Commons." He returned home in triumph, having obtained the desired end. At this time he was seventy-one years old. "Songs and rejoicings," says J. Lyon Gardiner (*vide* Hedge's Address, p. 21), "took place among the whalemen of Suffolk County upon his arrival, on account of his having succeeded in getting the King's share given up." It is related of him (*Ibid.*, p. 68) that while at the court of St. James, being somewhat verdant, he was much annoyed by pickpockets. As a palliative, he had a tailor sew several fish-hooks on the inside of his pockets, and soon after one of the fraternity was caught. This incident being published at the time won for him an extensive notoriety. He was representative from East Hampton from 1715 to 1720, and died in 1725, aged eighty years.

‡ N. Y. Col. Rec., v, 480. This assertion must be inexcusably inaccurate, for it was unquestionably on the ground of his sturdy defense of their rights that the people of Easthampton so steadily returned him to the assembly.

§ N. Y. Col. Rec., v, p. 484. This admission of Hunter's of the smallness of the revenue is indisputable evidence of his incompetence, and of the truth of Mulford's assertion of the ultimate ruin of the whale-fishery under such restrictions.

"To this the lords of trade reply:* 'You may intimate in your letter to our Secretary of 22d November last that the Whale fishery is reserved to the Crown by your Patents: as we can find no such thing in your Commission, you will explain what you mean by it.' Mulford is now in London, and desires dispatch in the decision in regard to this matter, pending which the lords desire to know whether dues have been paid by any one; if so, what amount has been paid, and to what purpose this revenue has been applied. They close their letter with the following sentence, which would hardly seem open to any danger of misconstruction: '*Upon this occasion we must observe to you, that we hope you will give all due incouragement to that Trade.*' Evidently the case of Mulford *vs.* Hunter looks badly for the governor. Still, Hunter is loth to yield readily, and the discussion is further prolonged.

"It is now 1718. Governor Hunter, in his answer to the inquiries of their lordships, says Commission was issued giving power 'Cognoscendi de Flotsam, Jetsom, Lagon, Deodandis, &c.,' follows 'et de Piscibus Regalibus Sturgeonibus, Balenis Cœtis Porpetüs Delphinis Reggis, &c.' In regard to the income, he again writes that it is inconsiderable; that only the danger of being accused of giving up the Crown's right would have led him to write about it. In amount, it was not £20 per annum (corroboratory of Mulford's assertion of its decline), and as the fish had left this coast, he should not further trouble them about it. Up to the present time all but Mulford had paid and continued to pay. The subject appears to have been finally referred to the attorney-general, and the governor says (1719), waiting his opinion, he has surceased all demands till it comes. The question must have been left in a state of considerable mistiness, however, for in 1720 Governor Burnett informs the lords, in a letter which indicates a satisfied feeling of compromise between official dignity and the requirements of the trade, that he remits the 5 per centum on the whale fishery, but asserts the King's rights by still requiring licenses, though in 'so doing he neglects his own profit,' 'and this,' he adds, 'has a good effect on the country.' Under his administration the act for the encouragement of the whale fishery was renewed." †

4. BOAT WHALING IN THE PRESENT CENTURY.

Within the present century shore whaling has been prosecuted to some extent at various points on the Atlantic coast, from Maine to South Carolina. The business has been profitable at Provincetown, Mass., and at Beaufort, N. C. At the former place during the spring of 1880, forty-eight whales, valued at $14,037, were captured; at the latter place the average annual catch is four whales, valued at $4,500. The total value of the shore whaling on the entire coast in 1880 reached about $18,000, which is far above the average year's work. We are indebted to Mr. Earll for facts about this fishery at Maine, and the southern North Carolina coast, and to Captain Atwood for an account of the business at Provincetown.

COAST OF MAINE.

Shore-whaling in the vicinity of Tremont began about 1840. Mr. Benjamin Beaver and a small crew of men caught three or more whales annually for about twenty years, but gave up the business in 1860. No more whales were taken from this time till the spring of 1880, when one was taken and brought into Bass Harbor, and yielded 1,200 gallons of oil, but no bone of value.

* N. Y. Col. Rec., v, p. 510.

† ALEXANDER STARBUCK: Hist. Am. Whale Fishery, in U. S. Fish Com. Report, 1875–'76.

Capt. J. Bickford, a native of Winter Harbor, is reported by Mr. C. P. Guptil to have cruised off the coast in 1845 in schooner Huzza, and to have captured eight whales, one of which was a finback, the rest humpback whales. This schooner made only one season's work, but in 1870 Captain Bickford again tried his luck in a vessel from Prospect Harbor and captured one finback whale.

Mr. Earll states that according to Capt. George A. Clark and Captain Bickford whaling was extensively carried on from Prospect Harbor for many years. The fishing began about 1810, when Stephen Clark and Mr. L. Hiller, of Rochester, Mass., came to the region, and built try-works on the shore, having their lookout station on the top of an adjoining hill. The whales usually followed the menhaden to the shore, arriving about the first of June and remaining till September. When one was seen the boats, armed with harpoons and lances, immediately put out from the land and gave chase. If they succeeded in killing the whale, it was towed to the flats of the harbor at high water, where it was secured and left to be cut up at low tide. Ten years later they began using small vessels in the fishery, and by this means were enabled to go farther from land. The fishery was at its height about 1835 to 1840, when an average of six or seven whales was taken yearly. The largest number taken in any one season was ten. The average yield of oil was 25 to 30 barrels for each whale. The business was discontinued about 1860, since which date but one or two whales have been taken.

COAST OF MASSACHUSETTS.

In the early part of the present century whales were abundant along this coast, and Provincetown whalers in small boats frequently captured a large number in a season. The Gloucester Telegraph of November 6, 1850, says: "A right whale was taken at Provincetown last Thursday by a party in three boats. It is estimated to yield 60 barrels of oil."

In the Barnstable Patriot of November 12, 1861, is the following item:

"*Whale.*—On Saturday morning the spout of a whale which was discovered playing around off Nauset in the midst of a fleet of some 200 mackerel fishermen was suddenly cut short by a Nantucket fisherman, the Sam Chase making fast to him. This is the fifth whale taken by Sam Chase since July 25, and will make about 25 barrels. The five will have made 125 barrels, worth $1,500."

Whales have from time to time been stranded on the beaches about Cape Ann; several have also been found by fishing vessels and towed into Gloucester Harbor. In July, 1833, one 50 feet long, and measuring 10 feet through, was towed into the harbor and tried out on Eastern Point. The Cape Ann Advertiser of October 21, 1870, records the capture off Eastern Point of a whale 45 feet in length. In the spring of 1880 finback whales were unusually abundant in Ipswich and Massachusetts Bays, so that fishermen in their dories were in some cases alarmed for their own safety, as the whales were darting about in pursuit of schools of herring. Six of this species of whale were found dead floating in the bay and towed into Gloucester harbor. They had been killed by Provincetown whalers. Three of them were tried out at Gloucester; the remainder were allowed to drift to sea again.

Captain Atwood writes the following account of the shore-whaling at Provincetown in 1880: "Early in March there came into our bay and harbor immense quantities of herring and shrimp. They were followed by a great number of finback whales, that remained here most of the time in greater or less numbers until about the middle of May, when they all left the coast. During the time they were here many of them were killed with bomb-lances. They sank when killed, and

remained on the bottom some two or three days, when they floated on the surface, and as they were liable to come up in the night or during rugged weather, when the whalemen were not on hand to take care of them, many drifted out to sea, and were lost or picked up by Gloucester fishing vessels and towed to that port. A few were brought to Provincetown by these vessels, with whom the proceeds for the oil were divided. There were brought in and landed at Jonathan Cook's oil works on Long Point 38 whales, from which the blubber was stripped and the oil extracted. Two other whales brought in were sold to parties who took them away for exhibition, one to Boston and the other to New York.

"Early in June immense quantities of sand-eels (*Ammodytes*) came in our harbor and bay and remained several days. About the 10th of June there appeared plenty of whales feeding on the sand-eels. They were again attacked by our men, when a number of them were killed in a few days, and ten were saved and landed at the oil works. Probably as many more that were not killed outright received their death wound, went out of the bay, soon after died, and were lost.

"The forty-eight whales delivered at the oil works yielded about 950 barrels of oil, that sold at an average price of 40 cents per gallon.

"When the first whales were killed it was supposed the whalebone in their mouths was worthless, and it was not saved; but subsequently some was saved and sold at 15 cents per pound. The average quantity of bone in each whale is about 250 pounds. Probably the bone of thirty-five whales has been saved, making an aggregate of 8,750.

"No whales have come in of late; our men are still anxiously looking for another school, hoping they will come again and give them another benefit.

"Total for the season's work:

48 whales, 29,925 gallons of oil, at 40 cents	$11,970 00
1 whale, sold for exhibit in Boston	350 00
1 whale, sold for exhibit in New York	405 00
8,750 pounds of whalebone from thirty-five whales, at 15 cents	1,312 50
	14,037 50

"Besides the whales saved and taken to Provincetown, many of those lost by our whalers were towed into other places; others have drifted on shore at different points. We hear of four being towed into Gloucester, three into Boston, one to Newburyport, one to Cape Porpoise, one Portland, one Mount Desert; two drifted ashore at Scituate, two at Barnstable, one at Brewster, one at Orleans, two at Wellfleet, one on the back of Cape Cod; one was stripped of its blubber at sea by a fishing vessel, that sold it in Boston. The entire catch from March to July was probably one hundred whales, of which number nearly all were killed by Provincetown whalers. Three of these whales were humpbacks; the rest were of the finback species."

In the fall of 1880 a finback whale about 50 feet long was killed in Cape Cod Bay, and towed to Boston, where it was sold to an enterprising Yankee, who, after realizing quite a profit by exhibiting it in Boston, conceived the idea of transporting it to Chicago for exhibition. It was accordingly carefully cleaned and loaded upon a large platform car. Salt and ice were freely used for its preservation. It reached Chicago, and was shown to the public as one of the wonders of the deep. The enterprising exhibitor made several thousand dollars by this venture.

The following graphic description of whaling in Massachusetts Bay in 1881 was written for a Boston newspaper:

"The denizens of Cape Cod have always been an amphibious population, largely taking their living from, and making their fortunes upon, the waters of the oceans of the world. Especially is this the case with the people of the lower half of the 'Right Arm,' who are fishers indeed, the

majority of them taking to the water, like young ducks, immediately after their advent into a sandy world, and becoming experts in the navigation of its depths and the capture of its treasures even before their school days have fully passed.

"Provincetown occupies the extremity—the curling finger—of this cape, and its situation is in every way peculiar. With the exception of a narrow strip or neck of sand heaps which unites it to the main cape, it is surrounded by water—the salt water of the Atlantic—which rolls unchecked between its outer shores and those of Europe. Its outer coast line, beginning at a point opposite the narrow neck alluded to, sweeps around in a grand circle almost the entire circuit of the compass, its outlines nearly resembling those of a gigantic capital O, as that letter is usually found in manuscript. The inclosed water of this circle is the harbor of Provincetown, and the town is built along the inner shore, at the bottom of the basin. Outside is the Race, Wood End, and sundry interesting points of light-house, life-saving station, all of vast moment to mariners and ship-owners. Inside is one of the singular harbors of the world, deep enough and spacious enough to shelter a fleet of hundreds of the largest ships of the world at one time, and with peculiarities belonging to itself sufficient to make it famous wherever these ships may sail.

"If there are any kinds of fish, or any methods of taking them, which are not familiar to the waters or the people of Provincetown, their description is now in order. From the fry and minnow for pickerel bait up to the 100-barrel right whale, Provincetown waters have witnessed the capture of all kinds, and have frequently contributed specimens over which savants have puzzled and wondered. The beaches of her shores have received as loot mighty carcases of whales and black-fish; shoals of porgies at one time, which all the teams of all the region could hardly remove soon enough, so immense was the deposit, while fish-weirs (one of them took 700 barrels of mackerel a few mornings since), try-works, and the implements and appliances of various fisheries mark the scene in all directions.

"Now, it has been no unusual thing, at any time since the establishment of this exaggerated fish-net yclept Provincetown, for a whale of some variety to be occasionally stranded upon her beaches, or captured by her cruisers or boatmen. But it is only within the past three years that the systematic pursuit of a leviathan within her waters has been established; in other words, that the home whale-fishery has been a feature of her business operations. A whale in the harbor of Provincetown, especially at certain seasons, is almost as common a presence as that of a turtle in a mill-pond; but they are usually representatives of a class disliked and scorned by old-school whalemen, and not remunerative to their capturers, unless the latter be men of enthusiasm and desperate enterprise. So that, although there are plenty of veteran whalers in the region, it has been left to the young Provincetowners of the present generation to inaugurate and establish an enterprise which has already shown good results. One young captain, with his crew, last year took upward of 250 barrels of oil off Provincetown, and is scoring fair results the present season, though the conditions have, so far, been very unfavorable. Some of his whales he captured in the harbor; but mainly his game was chased and killed in the water outside and near by.

"The variety of whale mostly found in Massachusetts Bay waters is the finback, a long, clean, perfectly formed creature, growing sometimes to 75 or 80 feet in length, but usually from 45 to 55 feet. He is the most complete model of craft for speed and easy working in the water that can be imagined, and his tail in motion the most perfect development of the screw motor; and, indeed, the finback moves through the water when occasion offers as the most rapid express train never does on its tracks on land. It is timid and non-resistant, and it is principally on account of its great speed and its habit of immediate fight when stricken that the old whalemen detest it. Your veteran has no relish for being drawn to the bottom, boat and all, by an aquatic race-horse possessing the traveling qualities of a meteor.

"Therefore, as hinted above, the youngsters who are perpetually learning new 'kinks' and confounding their progenitors, have stepped into a new order of things. They begin with an exact reversal of the old-time processes, which were to harpoon the whale, and then lance him to death. The Provincetowner first lances his prey, and immediately after harpoons it, for reasons and in pursuance of methods shortly to be given.

"The finbacks come in numbers early in the spring, following the bait which is their food—herrings, sand eels, mackerel, and the like, and where this bait is found in reasonable quantities the whales will surely be found. When feeding this whale stretches wide open his jaws, moves forward among the bait on the surface with velocity until he has pocketed or scooped (in his mouth) a quantity (some barrels), when he snaps together his front doors and swallows the catch, having no teeth, nor need of any. It is at this feeding season that he is easiest approached and fastened to. When not feeding he is usually lazily sleeping, or disporting, and, indeed, the gambols of this variety of whale seem to form a very necessary part of his existence, to which he pays much attention. The antics of a calf in a pasture, or a young puppy in a back yard, are hardly more diverting or singular than are those of a pair of whales in their festive moments. They will stand on their heads and flourish their tails in the air; then stand upon their tails and snap their jaws in the air. They whirl and roll and swash about, sometimes tearing the water into shreds, and again darting about, exhausting every possibility of whale enjoyment. They are as full of curiosity as a deer, or as are many of the fish varieties, and this they evidence frequently by playing about the boats which have come out to capture them, reconnoitering and viewing these boats from all sides, and sinking a few feet below the surface, following their every motion, while they occasionally appear at the surface for an outside observation.

"When touched or struck their immediate impulse is to dash off like a rocket, and this impulse they obey to perfection. To test their marvelous facility of speed, a harpoon was thrown into one off the Race (the extremity of Cape Cod), when he started off across the bay in the direction of Boston, and in forty minutes had dragged the boat and its contents of crew and implements within full view of Minot's Ledge light-house. All the line was paid out by the boat's crew and they were finally obliged to slip for their lives.

"A common fishing schooner is now fitted out for this whale-catching business, carrying a whale-boat of the ancient approved construction, with sufficient men to man the boat and leave some one or two on board to follow in the vessel when the boat is actually engaged. The captain usually handles the lance and harpoon, and pulls a spare oar when not thus engaged. Besides himself, four oarsmen and a boat-steerer comprise the crew of the boat of the successful captain alluded to above.

"The bomb-lance is a most destructive weapon. The gun from which the lance is fired is of very thick metal, and the breech is made heavy with lead to neutralize the recoil, which is heavy with this kind of arm. The length of barrel is about 17 inches. The lance itself is of iron, with a chamber 6 or 7 inches in length along the lower center, and solid between the chamber and point, the latter tapering, and filed or ground to three edges. About the base of the lance are india-rubber wings, folded when the lance is inserted in the gun, and acting as wad to make the lance fit the barrel easily, and just rest upon the powder charge of the gun. When fired these rubber wings expand, and, like the paper feathers of a boy's dart, preserve the poise of the weapon. The chamber of the lance is filled with powder, like a bomb-shell, and a one-second, or thereabout, fuse is attached, so that, when the weapon is discharged into the body of a whale, it explodes within, inflicting terrible wounds. Care must be taken not to discharge the lance at too short range, as in that case it will pass through and through the whale's carcase without exploding, and entail no

serious injury. About 30 feet distance is the range usually sought for. This implement, in the hands of a cool and skillful sailor, works 'like a charm,' and great is its destruction of the life of leviathan. To illustrate this, and also the whole matter, an actual day's work of the captain foresaid will now be detailed:

"The present year the season has been very backward; east and cold winds and rough weather have prevailed, and the bait was at least two weeks later than usual in the bay. On account of these and other unfavorable circumstances the whale catch in Provincetown neighborhood has thus far been small. At 2 o'clock on a morning in May of last year the crew of the schooner was aroused by the captain, the vessel then lying near the wharves in Provincetown Harbor. She was got under way, and the spouting or 'blowing' of a whale could be plainly heard from her deck. At once the chase began, the experienced captain working in the dark, at times with prospects of success, but without its attainment as the hours passed. That there was more than one whale in the harbor was evident, and one of them was a humpback, a prize, indeed, and much more valuable than a finback, yielding twice as much of oil for the same size of creature. As dawn streaked and day opened, one after another various other craft in the harbor became awakened to what was going on, and numerous boats' crews put off from the shore to join in a chase and possible capture, with the details of which they were perfectly familiar, and the tactics of which were their common practice.

"The first rays of the sun fell upon an exciting scene. There were a humpback whale and a finback coursing about the harbor, the latter fully 65 feet in length. The chasing boats and vessels represented a great variety of craft, and a still greater variety of crews and individuals engaged. There were tall, short, crooked, lank, old, and young boat-steerers; fat men puffing at paddles, and lean men tugging at long oars. Excitement, emulation, and competition roused all these men to prodigious efforts, and, in their anxiety and enthusiasm, they manifested the most singular traits and cut the oddest pranks. The finback led them a desperate chase, now here, now there, until hours had slipped away, and he was not caught, although the very *élite* of Cape Cod skill in whale capture, aided by experienced veterans of the northern and Pacific fleets, had lent a hand. Away over on the east side of the harbor the humpback was finally stricken, a bomb-lance entering his huge body, shattering his backbone in the explosion, and the monster died instantly. A vigorous and triumphant yell announced the capture, but the finback escaped. The schooner then proceeded outside, and followed the shore towards the Race.

"From the time of leaving the harbor until noon not a whale was sighted. The waters of a pond inshore were apparently no more free of the creatures than was Cape Cod Bay at that time. About noon it fell flat calm, and the schooner drifted lazily. But as the early afternoon advanced the cry of 'Blows!' awoke every man to the knowledge that an immediate change in the status might be at hand. The sun was burning hot, and the face of the bay like a mirror. In less time after the first cry than it takes to tell the incident no less than fifteen 'blows' were counted, and whales were in abundance on every hand.

"The boat, which had been towing astern, was at once occupied, and the advance, which promised the fairest success, was made without delay. The spouting columns appeared at regular intervals, and soon the boat was in close proximity. Headway was stopped, the oarsmen exchanged their oars for stumpy paddles, like those with which an Indian manages his canoe, and every one of them took his seat upon the gunwale of the boat, paddle in hand, ready for orders. The captain took his stand forward, gun in hand, ready to discharge the lance at the first favorable opportunity. The whales (there were a pair of them, male and female, as it proved) were sportive, and at once began a reconnaissance of the boat. They would sink about 10 feet below

the surface, roll partly upon one side, and cast an eye upward, as if speculating upon the apparition, and occasionally come up, blow, and roll lazily under again. Their every motion could be plainly seen while they were under water, and their movements anticipated. The captain singled out the female, the largest and best animal, and thenceforth all attention was paid to her movements. At last she came slowly to the surface, just moved her immense tail with the necessary motion to change her direction, and started directly across the bow of the boat, under the very nose of the captain. A straightforward bow shot was what he had been waiting for, and in an instant the gun was at his shoulder. Up to this moment the men had all been guided by expressive wavings of the captain's hand; and his every motion was watched as men watch for a drop to fall during an execution. As the gigantic finback passed—she proved to be upwards of 65 feet in length—she rolled slightly to one side, and threw up the flipper nearest the captain as a man would throw up the elbow of his bent arm to a level with the shoulder. Quick as thought the captain fired, the lance struck the huge carcass just under the flipper and entirely disappeared, and the empty gun was flung along the bottom of the boat.

"Instantly the captain was standing on the bow deck, harpoon in hand. The whale was motionless, apparently with absolute astonishment. In this moment of quiet, which could not be prolonged, the boat slightly advanced, the captain's both hands arose high in the air, the harpoon descended directly downward, and the whale was transfixed, the iron entering her body near the tail. The lance had seemingly hardly left the gun at greater speed than the initial movement of that whale when consciousness was aroused. The whale line attached to the harpoon was coiled with characteristic care in two tubs nearly amidships, led aft around the loggerhead in the stern deck, and then forward through a notch in the extreme bow, out of which it was kept from slipping by a pin passed through the two upper parts of the crotch. Instantly every man was standing along this line, grasping it with hat in hand to preserve it from the intense friction. The loggerhead was kept constantly wet, and a man stood over it, hatchet in hand, to cut upon the first 'foul,' or other indication of extreme danger. And now appeared the wisdom of the movements. The lance had entered the vitals of the whale, inflicting, it was well known, a terrible internal wound upon its explosion. Had this not been the case, and only the harpoon held the whale, she would have finished the race incontinently by obliging the crew to slip the line, or be drawn under water. As it was, she must soon come up for further action. To appreciate the situation that ensued, you should have seen that boat go through the water; that is, you should have been seated upon one of her thwarts or along her bottom. The whale moved forward and also downward, and the water was then many fathoms deep. The downward movement, of course, depressed the bow of the boat, and the immediate danger was from being drawn under by motion too swift to allow the cutting of the surface. At once a great trough was made in the smooth sea by the flying craft, the boat occupying the cavity, and from both her sides a sloping bank of water, inclining outward and upward, seemed builded about her. To one sitting upon a thwart and looking outward, the surface of the bay seemed just opposite the line of his eyes, so great was the depression of the trough.

"Now, then, a sheer of the whale and the boat would take water at once over the side. The forward movement became too swift, the bow too much depressed. Fathom after fathom was allowed to slip around the loggerhead, until 50, 60, 80, 100 fathoms had been paid out, and three or four minutes had elapsed. The whale had been struck off the Race, and had started across the bay in the direction of Plymouth.

"At the end of the time indicated the line began to slack and the whale to move upward from the bottom of the bay. Still, however, she tore onward. As fast as could be the line was hauled

upon, and all possible taken in. And now the whale is upon the surface, and great jets of almost pure blood, red and arterial, rise in the air and fall backward upon her head and shoulders. That tells the story. The boat rushes forward, and now seems to be floating in blood, so thick have the waters become with it, and the smell arising is deadly sickening and almost suffocating to the inexperienced.

"Down again the creature goes, to remain about the same time as at first. The speed hardly diminishes. Up again she comes, and now the noise of her spouting is as of huge pipes obstructed, and soon great clots of blood and substance fall as before upon the surface of the water. Every muscle in every man is as tense as whalebone, and every nerve like steel. Each says to himself, Will the end never come?

"A breeze is rising on the eastern board, but its outer edge is still far from the schooner. The two men left on board the latter have headed her in chase of the boat, but she is soon hull-down in the view of the boat's crew. No matter. There are successive risings of the whale at more frequent intervals, and now it is largely water that she spouts, and the wonder is if she has any more blood left in her carcass. Usually when a finback is killed the body sinks at once, and does not rise again for forty-eight hours; and every lance is stamped with its owner's initials, that carcasses found may be identified. Other varieties of whale, having more blubber, do not sink, at least not so readily.

"An idea strikes the captain. 'This whale,' he says, 'has lost so much blood that I do not believe she will sink, and I will try an experiment.' He means that he will not haul up to the animal by the harpoon line and dispatch her with another lance; but that he will follow her till she dies of exhaustion and her present wound.

"Suddenly the whale turns square about, and starts back toward the Race. There is some confusion, a slacking and jerking of the line, and all at once the harpoon slips, and whale and boat are parted. And now the men growl and lower at the captain, for allowing their hard-earned prize thus to escape. But he knows that a short time must decide the contest and that the whale must soon die.

"She is followed by her frequent spoutings of black blood and matter, and, her speed slacking, the chase draws upon her. She stops. Will the captain give her another lance? The proposal is useless, for her death flurry is begun, and it will soon be seen whether the experiment of the captain is to result favorably.

"And now she leaps full length out of the water, and falls prone upon it with a crash like a falling building. The surface is streaked and torn with foam mingled with blood. She stands now upon her head, now upon her tail; like lightning she darts hither and thither. She sinks and rises, spouts and half rolls over. Every man is in position to keep clear of her, if in her frenzy she blindly comes their way. 'For God's sake, captain, look out!' shouts one; 'here she comes!' The warning is justified; she is coming full head toward the boat. But momently she staggers, ceases effort; her motion slows; she rolls three-quarters over, and lies dead in the middle of Massachusetts Bay.

"The schooner is out of sight. From 3 o'clock until 5 she has been battling for life, and leading her capturers such a chase as the world cannot equal under other conditions. The breeze—a stiff caster—has arrived. The whale must be towed home, but it is a serious matter with oars and only the boat. Happily she has shut her mouth in dying, and will tow easier in consequence. The captain's experiment has worked well, and this was about the only finback captured in these waters that season without sinking.

"But the breeze brings the schooner, after a somewhat blind chase. Provincetown Harbor is reached next morning, and the whale landed at the try-works. There is no room here for further detail or description. The captain is at this very moment cruising for whales off Grand Menan, with a better Provincetown schooner than he had last year. But he has taken 90 barrels in Massachusetts Bay the present season."

COAST OF RHODE ISLAND AND NEW YORK.

Whales have frequently been taken by vessels soon after starting on their voyages from New Bedford and other ports, and sometimes schools of whales are seen close inshore. Of late years no organized effort has been made to engage in shore whaling, though during the last century the coast of Long Island was a favorite place for this fishery.

The following clippings mention the capture of a right whale at Newport, and the appearance of a school of whales at the entrance of Long Island Sound:

"The whale, which for several days had been sporting in our river, was captured on Monday last in fine style by a boat's crew of young men from Newport. Mr. Oliver Potter laid the boat alongside as the whale came up, and Mr. Thomas White fastened the harpoon into her side. After running the boat some distance she was lanced and carried into Newport. The whale is of the right sort, about 44 feet long, and rated at 70 barrels of oil. A number of gentlemen of this town have made arrangements to gratify the curiosity of those who may wish to see this creature of the deep, and it will be exhibited for several days in a convenient place at Fox Point."

"A Connecticut paper, dated August 16, 1873, states that the skipper of the sloop Annie, of Saybrook, Conn., reports a large school of whales in close proximity to home. Monday, while midway between Southeast Point, Block Island, and Montauk, a school of whales, numbering probably thirty-five, was seen from the Annie's deck, gamboling near the Block Island shore, whence they had been lured, it is supposed, by the prospect of a good feeding-ground. In the school very few finbacks or humpbacked whales were to be seen. The majority were large whales, some of them being not less than 70 feet in length. Boatmen report it as a common occurrence to see two or three finbacks in company in the race, but the appearance of so many large whales is a new experience."

COAST OF NEW JERSEY.

The only record we have of shore-whaling on this coast is that furnished by Mr. Earll, who, while visiting the coast in 1880, learned that between 1810 and 1820 Capt. John Sprague, of Manahawkin, with a crew of seven men, followed whaling exclusively for a few years, with fair results. They had a camp and try-works on the shore, and were provided with a whale-boat, in which they put off from the beach whenever a whale was seen.

COAST OF NORTH CAROLINA.

The whale-fisheries of Beaufort seem to have been prosecuted continuously for a long period of years, and the oldest inhabitants are unable to give any information of their origin. There has never been any extensive business, and the fishing has been confined wholly to small boats going out from the shore, with the exception of two vessels run during a few months each. The first was the Daniel Webster, 24.15 tons, that fitted out for whaling in the winter of 1874–'75, with a crew from Provincetown, Mass., but after three months' cruising she gave it up and returned to Provincetown, having taken nothing. The next vessel, the Seychille, 47.07 tons, came to Beaufort in the winter of 1878–'79, but was lost in the August storm of 1879, having taken nothing.

The usual plan is for the fishermen to establish camps among the sand hills along the shore between Cape Lookout and Little River, where they live from the 1st of February to the last of April. When the season arrives for whaling, three crews of six men each unite to form a camp, and proceed to build a house out of rushes in some desirable location near the shore, for protection against the weather. Their boats, usually three in number, and their implements, are placed in readiness on the beach, and a lookout selected, where one man is stationed, to give the signal if the whales come in sight.

At this season of the year the whales are moving northward, and in their migrations often come within a short distance of the shore, where they are pursued and often captured by the fishermen. As soon as the whale is harpooned the "drug" is thrown over, and when he turns to fight the fishermen, armed with guns, shoot him with explosive cartridges, and, after killing him with their lances, tow him to the shore, where they try him out.

The number of crews varies with the season, it formerly averaging but two or three, of eighteen men each. In the spring of 1879 four crews were engaged in this fishery, and five whales were taken.

In the spring of 1880 there were six crews of 108 men stationed between Cape Hatteras and Bear Inlet, but the season being unusually open, most of the whales had passed before the fishermen came on the shore, and but one was taken, the bone and oil selling for $408.

The yearly catch of late is about four whales, averaging 1,800 gallons of oil and 550 pounds of bone each, giving the catch a value of $4,500. The shares usually range from thirty to forty, as follows: Each boat one share, the gun two shares, the gunner an extra share, and each steersman an additional one-half share, the men all receiving one share each.

The whaling-gun was introduced into the locality by the schooner Daniel Webster, of Provincetown, in 1874.

COAST OF SOUTH CAROLINA AND GEORGIA.

There are no regular whaling-camps on this coast, but whaling vessels from the north often cruise a short distance off Port Royal, S. C., and Brunswick, Ga., sometimes meeting with good success. These vessels are of the smaller class, ranging from 53 to 117 tons, and spend the winter and early spring months before their departure for the off-shore grounds in capturing whales near the bars off this coast. They were formerly in the habit of going to Fernandina, Fla., every fall to ship their oil and bone to the North, but owing to the yellow fever at that place some of them came to Brunswick, Ga., in 1876, and one of them secured a whale in this vicinity. The following year two vessels came in January and remained till the middle of March, getting one whale. The third year two whales were caught by the same vessel, and in 1879 four vessels visited the locality, and had taken up to March 1, five whales yielding 226 barrels of oil and 2,750 pounds of bone. The whaling-ground is on a bar only about 4 miles from the shore. A whale after being captured by the whalemen in boats, is towed by the vessel into the sound and there stripped of blubber and the oil tried out.

An exciting scene occurred at Charleston in the spring of 1880, which is thus described in the Charleston News of January 8:

"UNUSUAL SPORT IN CHARLESTON HARBOR.—Several days ago the almost unprecedented presence of a whale in Charleston Harbor was announced. Whether driven here by stress of weather, seeking misanthropic seclusion from his kind, or on an exploring expedition, will never be known, but his presence was a huge black verity. Several timid and ineffectual attempts had been made to effect his capture or destruction, but all were futile, until a regular hunt was

organized yesterday, Mr. Armstrong Hall, engineer, and Captain Smith, of the tug Royal Arch, leading it. The attacking force originally consisted of two of Messrs. Bangs & Dolby's row-boats, each manned by three oarsmen, an experienced and trustworthy coxswain, and a man in the bow of each armed with a harpoon. Other boats with their crews joined in the chase, however, when the whale was seen near Fort Sumter at about 9.45 a. m. He had been first met and struck on the bar, however, by the boats above mentioned at about 8 o'clock, a harpoon and line being made fast in his body near the tail. Pursuit was continued, one of the boats towing after the whale by the line, and the other being rowed to within a short distance of him as he would rise to blow, and the harpoons being launched at him whenever a favorable opportunity offered. During the chase he had been working his way to landward, and soon got in the shoal water near Fort Johnston, on James Island. In his struggles he became entangled in the stout line attached to the harpoon, and wound himself in it so that it held firmly. He remained in the shoal water during the morning, the line having been cut to save the boat during a "flurry," and in the afternoon, at about 1.30 o'clock, an attempt was made to secure him. Four steam-tugs—the Morgan, the Republic, the Wade Hampton, and the Royal Arch—were present, besides probably fifty or sixty row-boats, and a few small sailing craft.

"The news of the capture had spread rapidly, and quite a crowd, including a number of ladies, gathered on the battery and watched the struggle that ensued. The line was taken aboard and made fast to one of the tugs, which attempted to coax the fish toward the city. But the steamer proved to be too unhandy for the delicate manipulation required, and the line was finally snapped, a piece of considerable length being left attached to the whale worn *en traine*. Then ensued a series of exciting maneuvers. The tugs would approach him in turn as opportunity offered, and those aboard would drive lances and harpoons at him, with more or less effect, or attempt to throw great running nooses over the flukes of his tail as they were thrust above the surface in the creature's struggles. He indulged in a series of the most extraordinary gymnastic performances, turning complete somersaults, and occasionally standing on his head, apparently for several moments, with from 2 to 6 feet of his tail projecting above the water.

"Meantime, many of the small boats were dodging about him, and missiles were hurled at him whenever a fair chance was offered. Time and again barbed harpoons and the long keen blades of lances were plunged into his sides and back, and time and again did they fail to hold, being drawn back by the lines by their owners. He was slowly but surely scuffling and turning himself through the mud, which was seen upon his head several times, across the Ashley River toward White Point Garden, the center of an ever-varying circle of all sorts of craft, armed with all sorts of weapons. In his progress he ran under the bow of the schooner Minnehaha, where earnest efforts were made to lasso him, a compliment which he returned by standing on his head and thrashing her with his tail until she shook from stem to stern. He struck several blows upon her jib-boom, which was damaged somewhat, the rigging thereabout being badly torn. He would lash the water with the flukes of his tail, making reports like the discharge of a musket, and drenching all in his neighborhood. He came to the surface frequently to blow, which he did with a noise resembling that made by the blowing out of steam from an engine, sending a fountain from each of his nostrils. At one time he got beneath the bow of one of the tugs, lifting it almost clear of the water, and a stroke of his tail wrenched off one of the cabin doors that stood open. It is impossible to describe, and almost impossible to imagine, the tremendous force of one of these strokes. The great volumes of water that rose after each showed the immense strength that was put forth in them.

"Two of the tugs ran over him, and the propeller of the Wade Hampton gave him several blows, the effects of which were seen upon his bleeding back as he next rose. The line had also evidently chafed him considerably, the skin near the tail being perceptibly raw from it. It appeared about this time as if he was almost exhausted. He would now and then cease his struggles entirely, and lie placidly upon the water with almost his entire body exposed, as it resting. Observers could almost imagine that they could see him pant, and his snorts came in quick succession, and seemed to have a ring of distress or despair in them. His motions, too, were slower and more languid, as if he were about to relinquish the unequal struggle and die.

"All this time the two boats that had originated the chase had steadily followed him up, the men in the bows driving their long lances into his body near where their experience taught them was a vital point. Suddenly there was a cheer. One of the tugs rather involuntarily had gotten so close on him that the remainder of the line hanging to him was secured by a boat-hook, and quickly spliced to another line on board. About half an hour of playing him followed, when the line, which had been stranded gradually, again parted. Half a dozen efforts were made to throw a noose over his tail from the deck of the Wade Hampton, from which place such trifles as a rifle-bullet or so and two or three balls from a large revolver were fired into him without perceptible effect. One or two of the efforts to throw the noose over him were very nearly successful, but he seemed to dodge beneath the water as it fell about him.

"Another cheer announced another apparent success. A lance thrust from one of the Bangs & Colby boats had evidently struck him deeply, and the men in her yelled exultantly as they rapidly backed away. The blood poured out and dyed the water around, and in a few seconds a gigantic plume of crimson spray arose as he came up to blow. As he lifted his side from the water and struck another gigantic blow, the blood could be seen pouring forth in a stream like that from a small hose. He lay comparatively quiet, and another and stronger line was passed about him from the Morgan. With this he was played for another half hour, during which time the small boats kept steadily striking him whenever he appeared. He had by this time changed his course somewhat, turning toward the center of the harbor, and crossing the stream across the bows of the bark Framat, which he narrowly missed striking.

"The confusion of boats and lines was very great, tugs, bateaus, and row-boats being gathered about the fish, alternately advancing and backing, amid a chaos of yells, oaths, cries of warning, and orders, the confusion being increased when the object of all attention would suddenly begin to lash the water or execute some fancy movement, causing a wild scattering of craft on all sides. That some one was not drowned or knocked in the head is a subject of general wonder.

"At last, when just alongside the Wade Hampton, the whale, who had lines enough about him almost for a ship's rigging, seemed suddenly to decide to free himself by one mighty effort. In a second almost the water for many feet about him became a mass of seething, heaving foam. He turned over and over, fairly churned the sea with his tail, threw first his ugly head, and then the great black rubber-looking flukes far above the surface, and bent himself almost double, straightening out again with terrific violence. When the spray and foam were gone and men had an opportunity to look, the Morgan's line was found slack and broken. The whale had freed himself and disappeared. His track was rapidly followed, the struggle having by this time been brought to a point opposite the Southern wharves, which were packed with people.

"The game appeared once or twice at long intervals, and was finally come up with by the pursuers, now greatly diminished in numbers, on the eastern side of Cooper River, near the shore. Again the chase became hot, one or two strokes being given, and the Morgan running over the whale again. About this time, however, he ran so close in that the tugs were afraid to

follow, and stood idly at a distance. Only about seven row-boats were now engaged in the hunt, the others having retired from it, among the few which still followed being that laid hands upon by the News and Courier deputation.' The fish turned and went down Hog Island Channel, the oarsmen pulling steadily and cheerily after him.

"Talk of sport! What sport is comparable with the rush through the water after such huge game as this, when tired muscles forget their weariness and are endowed with fresh life at every sight of the great head and every splash of the monster's body? 'Give away! Give away with a will!' And with oars going, the gunwales parting the smooth water, which seemed to rush by, and every nerve and sinew tense and firm, the chase followed, no one knowing fatigue or stopping to measure distances in such a hunt. At last the boats huddle together, and spread again in a circle as the fish is caught up with. A moment and he appears, and in that moment a long-boat shoots by his side, and the man in the bow, cool and steady, and with a deliberation that looks cruel, plunges his lance into the mountain of flesh, while the oars are backed with a rush and surge, and the craft glides away. Again and again this is repeated, the boats moving in a continual semi-circle, hemming the great fish in, and forming a barrier, which he could burst like pack-thread if he knew it, to the deep water where his safety and rest lie. Slowly he works out, tacking this way and that, and getting the merciless steel upon almost every reappearance.

"He was evidently weakening this time. His plunges beneath the water were shorter and shorter in duration, and he seemed to gasp for breath as he came up. At last a bare-footed sailor in one of the first two boats, the man who struck the first blow in the morning (Garrison, of North Carolina), drove his lance home. The boat backed away, but there was no need for it. An inert black mass lay upon the surface, moving gently with the motion of the water. Dead at last.

"Then the boats rushed in and clustered around the dead giant. The Royal Arch came up, and from her deck some one fired a rifle-ball into the whale's back. There was something like a shudder, a feeble serpentine motion of the body, and then stillness. This was just at sunset, off Shem Creek, on the east shore, and cheer after cheer arose, the whistle of the tug joining in the triumphal chorus. Lines were quickly made fast about the great body, and it was towed to Sullivan's Island, where it will remain a part of to-day.

"The fish is a 'right whale.' As well as could be estimated last night his length is from 40 to 50 feet, and the thickness of his body from 10 to 15 feet. His captors estimate that he will yield from $600 to $800 worth of oil. When examined after death the body and sides of the monster were found to be thickly seamed and scarred in every direction with the marks of the lances, harpoons, and hooks, showing that the hunters had aimed well."

COAST OF CALIFORNIA.

By David S. Jordan.

According to Captain Scammon "shore-whaling was commenced at Monterey, in the year 1851, by Captain Davenport, formerly a whaling-master of much experience and enterprise. The whales were pursued in boats from the shore, and when captured were towed to the beach and flensed, much in the same manner, doubtless, as it had been done by our New England whalers more than one hundred and fifty years ago. At the point where the enormous carcass was stripped of its fat, arose the whaling-station, where try-pots were set in rude furnaces, formed of rocks and clay, and capacious vats were made of planks, to receive the blubber. Large mincing-tubs, with mincing-horses and mincing-knives, cutting-spades, ladles, bailers, skimmers, pikes, and gaffs, with other whaling implements, surrounded the try-works; and near by, a low structure,

covered with brushwood, constituted the store-house for oil. A light shanty, with four compartments, served the purpose of wash-room, drying-room, store-room, and cooper's shop, and a sort of capstans, termed 'crabs,' were used in lieu of the ship's windlass, whereby the falls to the heavy cutting-tackles were hove in, when fastened to the blanket-piece, which served to roll the massive forms of the captured animals on the beach during the process of flensing."

"From this experiment of local whaling," continues Scammon, "sprung up a system of shore or coast whaling, which has been prosecuted for over twenty years (1874), and which extends from Half-Moon Bay (latitude 37° 30′), on the north, to Point Abanda (latitude 32° 20′), in Lower California." In 1874 there were "eleven whaling parties scattered along this belt of coast, located at Half-Moon Bay, Pigeon Point, Monterey Bay (two), Carmel Bay, San Simeon, San Luis Obispo, Goleta, Portuguese Bend (near San Pedro), San Diego, and Point Abanda. The organization of each party is nearly on the same plan as that of the whale-ship's officers and crew, all being paid a certain share, or 'lay,' which corresponds to the position or individual services rendered by each member. A 'whaling company,' as it is termed, consists of one captain, one mate, a cooper, two boat-steerers, and eleven men; from these, two whale-boats are provided with crews of six men each, leaving four hands on shore, who take their turn at the lookout station, to watch for whales, and attend to boiling out the blubber when a whale is caught. The stock of the company consists of boats, whaling implements, and whaling gear, which is divided into sixteen equal shares, and the 'lay' of each member is the same. The captain and mate, however, are paid a bonus of $200 or $300 for the term of engagement, which is one year, and they are also exempt from all expenses of the company.

"The whaling year begins on the 1st of April, this being about the time that the California gray whales have all passed toward the Arctic Ocean, and the humpback whales begin their northern passage. The cruising limits of the local whalers extend from near the shore line to 10 miles at sea. At dawn of day the boats may be seen, careening under a press of sail, or propelled over the undulating ground-swell by the long measured strokes of oars, until they reach the usual whaling-ground, where the day is passed plying to and fro, unless the objects of pursuit are met with. Each boat is furnished with Greener's harpoon-gun, mounted at the bow, besides the bomb-gun in general use, which imparts to them more of a military appearance than the usual aspect of a whaling craft. Generally, whales are first seen from the boats, but occasionally they are discovered by the man on watch at the station, who signals to the boats by means of a flag elevated upon a pole, with which he runs toward the quarter where the whales are seen; or a series of signals are made from a tall flag staff.

"The cetaceous animals frequenting the coast, having been so long and constantly pursued, are exceedingly wild and difficult to approach, and were it not for the utility of Greener's gun the coast fishery would be abandoned, it being now next to impossible to 'strike' with the hand-harpoon. At the present time (1874) if the whale can be approached within 30 yards it is considered to be in reach of the gun-harpoon. When the gunner fires, if he hits his game, the next effort made is to haul up near enough to shoot a bomb-lance into a vital part, which, if it explodes, completes the capture; but if the first bomb fails the second or third one does the fatal work. The prize is then towed to the station, and, if it be night, it is secured to one of the buoys, placed for the purpose, a little way from the surf, where it remains until daylight, or until such time as it is wanted to be stripped of its blubber. The whales generally taken by the shore parties are humpbacks and California grays; but occasionally a right whale, a finback, or a sulphur-bottom is captured.

"The localities of several of the stations are quite picturesque. Some of them are nearly concealed from seaward view, being inside some rocky reef, or behind a jagged point, with its outlying rocks, upon which each successive wave dashes its foam, as if forbidding the approach of ship or boat. The one which most interested us is half hidden in a little nook, on the southern border of the Bay of Carmel, just south of Point Pinos. Scattered around the foot-hills, which come to the water's edge, are the neatly whitewashed cabins of the whalers, nearly all of whom are Portuguese, from the Azores or Western Islands of the Atlantic. They have their families with them, and keep a pig, sheep, goat, or cow prowling around the premises; these, with a small garden-patch, yielding principally corn and pumpkins, make up the general picture of the hamlet, which is a paradise to the thrifty clan in comparison with the homes of their childhood. It is a pleasant retreat from the rough voyages experienced on board the whale-ship. The surrounding natural scenery is broken into majestic spurs and peaks, like their own native isles, with the valley of the Rio Carmel a little beyond, expanded into landscape loveliness.

"Under a precipitous bluff, close to the water's edge, is the station, where, upon a stone-laid quay, is erected the whole establishment for cutting-in and trying-out the blubber of the whales. Instead of rolling them upon the beach, as is usually done, the cutting-tackles are suspended from an elevated beam, whereby the carcass is rolled over in the water—when undergoing the process of flensing—in a manner similar to that alongside a ship. Near by are the try-works, sending forth volumes of thick black smoke from the scrap-fire under the steaming caldrons of boiling oil A little to one side is the primitive storehouse, covered with cypress boughs. Boats are hanging from davits, some resting on the quay, while others, fully equipped, swing at their moorings in the bay. Seaward, on the crest of a cone-shaped hill, stands the signal-pole of the lookout station. Add to this the cutting at the shapeless and half-putrid mass of a mutilated whale, together with the men shouting and heaving on the capstans, the screaming of gulls and other sea fowl, mingled with the noise of the surf about the shores, and we have a picture of the general life at a California coast-whaling station."*

In 1879 shore whale-fisheries were, or had lately been, in operation at the following points on the coast of California:

(*a*) Santo Tomas, in Lower California, about 35 miles south of San Diego.

(*b*) Cojo Viejo, in Santa Barbara County, just south of Point Conception and 51 miles west of Santa Barbara.

(*c*) Port Starford, in San Luis Obispo County.

(*d*) San Simeon, in San Luis Obispo County.

(*e*) Carmelo Bay, in Monterey County.

(*f*) Monterey, in Monterey County.

There have been whale-fisheries also at the following points:

(*a*) Ballast Point, at San Diego.

(*b*) Dead Man's Island, in San Pedro Bay, Los Angeles County.

(*c*) Portuguese Bend, just north of San Pedro Bay, n Los Angeles County.

(*d*) Goleta or Moore's Landing, 8 miles west of Santa Barbara, in the same county.

(*e*) Point Sur, in San Luis Obispo County.

(*f*) Pigeon Point, in San Mateo County.

(*g*) Half-Moon Bay, in San Mateo County.

* SCAMMON: Marine Mammalia, pp. 247-250.

The first shore-whaling camp on the California coast was established by Capt. Joseph Clark near Monterey, about the year 1851.* From Monterey Captain Clark went to San Diego and thence to Portuguese Bend. He went to San Simeon about 1864.

Capt. Frank Anderson, who is said to be now the most experienced whaling captain on the coast, is a native of the Azores Islands, his Portuguese name having been dropped on naturalization in the United States, as is the general custom among the natives of the Azores. He was at first a whaler on ships from New Bedford, then came to California in 1866, and since 1873 he has had charge of whaling-camps as captain. He was at San Luis Obsipo until 1874, at Portuguese Bend till 1877, and at Pigeon Point till 1879, when he with his entire company removed to Cojo Viejo.

The San Diego fishery was established by Captain Clark about 1858. In 1869 the whalers were driven off from Ballast Point in January, the land being taken for Government purposes. The company lost the rest of that year; then they went to Santo Tomas, in Mexico, at which point a company has been most of the time subsequently, but Captain Anderson is informed that they have now suspended. Before the arrival of this party at Santo Tomas, another party, under Captain Price, had been there in 1864 and 1865. The Mexican Government charged a fee of about $50 annually, and the United States customs officers at San Francisco admitted the oil free of duty, although shipped from a Mexican port, "in consideration of the fact that they were Americans and poor men who worked for their living." This privilege was afterwards refused to certain San Francisco capitalists.

In 1866 a station existed for a short time on Dead Man's Island, a circular rock rising in San Pedro Bay.

Portuguese Bend is an unusually good station for winter whaling, although little comes there in summer. While there Mr. Anderson used to work only in winters. In the three winters, December to April, spent there, 2,166 barrels of oil were obtained.

Pigeon Point has many summer whales, but the water is too rough in winter. The first year 1,000 barrels were obtained; the second year 564. In 1877, in the month of September, a whale 120 feet long is reported by the New Bedford Standard to have been "towed into Pigeon Point for the whaling company, making two whales at anchor at that port."

Goleta was not a very good station. The camp came about 1870 and broke up in 1878. There were three companies there in all, the first of Jamaica negroes. One winter 450 barrels were obtained there.

Whaling was practiced is Los Angeles County for a time, but was discontinued in 1876.

The following species of whales are found on the Pacific coast:

(1) Sperm whale, not taken by shore camps.

(2) Humpback whale, or summer whale.

(3) Gray whale, or devil fish, so called because it fights harder than the others.

(4) Right whale, not often seen.

(5) Sulphur-bottom whale (*Sibbaldius sulfureus* Cope). Large, 80 to 110 feet long. Twelve of them were taken at Pigeon Point, but none yet at Cojo. They pass by going north in April and south in the fall. They are hard to hold or tow, because when dead the under jaw drops down.

(6) Finback. Two struck at Cojo, but lost in deep water. They are very slim, with but little blubber, 100 to 120 feet long, and make about 30 barrels of oil.

* Scammon says the first camp was established by Captain Davenport, at Monterey, in 1851.

(7) Bowhead, seen only in Aretie regions.

(8) Russian whale. Scarce and only in Aretie regions. Very large.

The humpbaek whale goes north in summer, returning in the fall. Some migrate as far as Alaska, but many not beyond Point Concepeion. This is therefore almost the only speeies taken in summer. Four have been taken at Cojo this year. The eows are about 50 feet long, and the bull whales about 45. The former produce about 70 barrels of oil, the bulls about half as mueh. The four taken at Cojo produced 148 barrels of oil. This species was formerly mueh more abundant than now. Since 1875 it has beeome quite scarce. The whalebone of this species is blaek, but of little value; said to be worth .045 per pound in Japan, but not worth shipping. The oil of this speeies is white and quite thick. The reddish and thinner oil of the gray whale sells more readily, but both bring the same price. The oil of the sulphur-bottom whale is like lard, and beeomes solid in cold weather. All these oils are ehiefly used in rope-making; some of it in leather working. The oil made from blubber is more valuable than that taken from the inside, and is kept separate from the latter. The gray whale is usually about 45 feet long, the bulls 35. They generally follow the line of the edge of the kelp in going southward. There are usually two or three together. "They feed on sardines and shrimps." They go southward from December to February to calve in the Gulf of California. Then they return northward from the latter part of February to May. The most of February is a "slaek time," when few are seen. When they return northward the cows and calves usually keep well out to sea, the bulls farther toward shore. The whalebone of this species is white, scanty, and worthless. A gray cow whale sometimes yields about 90 barrels of oil; a bull less than half as much.

Camp at Cojo Viejo.—The company consists of twenty men in winter and eighteen in summer. Fifteen of these constitute the management, own the property, and share the proceeds equally. Captain Anderson is employed by these, reeeiving $100 in eash and one-seventeenth of all receipts (above freights and commission). There are two others reeeiving one thirty-fifth of the proceeds, one one-fortieth, and another one fifty-fifth. Two Chinamen also accompany the camp, receiving for their services the sinews of the whale, whieh are shipped to China, supposably for soup. These sinews used to sell at 50 cents per pound to the Chinese in San Franciseo, then at 40 cents, and afterwards there was no market. They are now worth about 25 cents per pound in San Francisco, and are said to sell at $1 per pound in China. There are 20 to 30 pounds of sinews in a whale.

The whole company at Cojo eame originally from the Azores, with the exeeption of two or three from the Madeiras. The same persons constituted the company on Pigeon Point. The company have built for themselves a large house, in which they eat and sleep, and store their guns and harpoons. Beside this, the captain, who is accompanied by his wife, has a separate smaller house, and the Chinese another after their fashion. These are on a bluff above the beach. On a cliff above is a signal-port, where two men watch for whales. On the beaeh below are the kettles for trying the oil, the barrels, and other things of that sort. In a little laguna are the two whaleboats not in use.

The entire outfit cost about $2,000, exclusive of the houses, &c. The total expenses of the camp are $4,000 to $5,000 yearly. There are four whaling-boats, two being in use each half of the year, while the others are being repaired, painted, &e. These were made in New Bedford, where they cost $145 each, but cost $200 at San Franeisco. The outfit of a boat when ready to attack a whale is worth about $600. It consists of eight bomb-lances, two harpoons, one 200-fathom line, two guns, a swivel-gun, worth $200, for the harpoons and large bombs, and a smaller gun, worth $55, for the bomb-lanees. The smaller bomb-lanees are made in Norway, and eome twenty-five in

a box, at $94 per box. These are shot at the whale from a short thick gun, held at the shoulder. They explode in the flesh of the whale, "disgusting him," but not usually killing him. Of the sixteen gray whales thus far taken at Cojo, there was but one which did not have scars from bomb-lance wounds. The whales are becoming so shy, that these things can rarely be shot closely enough to prove effectual. These bomb-lances are a little over a foot long. A much larger bomb-lance, holding a pound of powder, invented by Anderson, and made for him in Norway, is used by this camp. It is fired from the swivel-gun, and usually kills the whale. They cost $5 each.

The harpoons are usually much more effectual. The sort used, differing somewhat from any in use in the Atlantic, is manufactured in Cambria, in San Luis Obispo County. A rope is fastened to this, and it is shot from the large swivel-gun at the whale. These harpoons fired from guns have been in use on the coast since about 1868; the Cambria harpoon by Anderson since about 1872. The harpoons cost $9 each. Some of them have been used five times, but occasionally one is hopelessly bent, or the rope holding it is broken. The swivel-gun is made in England. It is placed in the bow of the boat; sometimes men are killed by the recoil. One man in Anderson's camp was kicked in the chest by it and died of hemorrhage. The harpoon weighs 7 to 9 pounds, the rope about 37 pounds. The gun will not shoot well more than 150 feet, the deflection of the projectile preventing it from striking squarely at a greater distance. At a distance of more than 90 feet it is necessary to aim above the whale. Unless the whale is held by a line, it is likely to sink when dead, and in rough weather it is hard to prevent them from sinking even when so held. Harpoons are thrown by hand only when necessary to hold up dead whales. The whale-lines are brought from New Bedford.

The company arrived at Cojo from Pigeon Point April 25, 1879, and devoted the following summer to getting ready for work. The following are the dates when whales were caught; humpback whales, October 18 and 24, two on each day; California gray whales, on December 14, 21, 24, 28, and 29, January 5, 9, 10, 12 (two whales), 14, 17, 21, 22, 25, February 1; making a total of twenty whales up to February 14. A camp is considered to do well if obtaining fifteen whales per year. The rent of the land, with privilege of garden, cow-pasture, and firewood, is usually about $100 per year, but is only $1 at Cojo.

The oil is barreled, and being rolled into the surf is taken on a lighter and transferred to a San Francisco steamer and consigned to parties in San Francisco for sale. On January 23 there were shipped 3,285 gallons; February 2, 13,534½ gallons; now on hand, 315 gallons; total product, April to February, 17,134½ gallons, worth about 45 cents per gallon in San Francisco. The bones of the whale are worth about $10 per ton for soap-making in San Francisco, but their shipment from Cojo is not considered profitable.

Carmelo Camp.—At the south end of the Bay of Carmelo is a whaling-camp, consisting of seventeen men all told; all Portuguese, from Azores Islands, commanded by Captain Mariano. The outfit is owned by a company of four, of whom Mariano is one, and the rest are outside parties. The other sixteen are hired on different lays, averaging one-fiftieth. The captain receives one-fifteenth. During the past year they have caught three humpback, one finback, and three gray whales, one of the humpback whales in the spring, which is unusual. Two hundred barrels of oil have been obtained, the finback yielding 30 barrels of a lighter oil, but selling for no more. This company runs from October to March only, the men then disbanding and going elsewhere. They have two whaling-boats only, and use the harpoons made by G. W. Proctor, at Cambria or San Mareos, and also sometimes those made by Merritt, in Monterey. Carmelo is a very good whaling-station, inferior to Monterey only, but there is not so good a chance for long chases of whales. Three right whales were seen this year, but none caught. Last year Mariano's company

was at Point Sur, farther south in Monterey County. There are many whales at Point Sur, but the coast is very rugged and the sea runs very high, so that for much of the winter the boats had to be hauled out of the water and the men dared not venture out. In 1878–'79 at Point Sur, one humpback, three gray, and a right whale were taken, and in 1877–'78, at Point Sur, one gray and one sulphur bottom. One large man-eater shark (*Carcharodon rondeleti*) was taken by the whalers at Carmelo last year.

MONTEREY WHALING COMPANY.—Another whaling-camp is at Monterey. This consists of twenty-three men all told, all Portuguese, and all but one from the Azores. This company has no captain, but their most efficient man, Mr. Verissimo, is made secretary, having charge of all business and receiving no salary. The three boat-headers in the company receive a lay of one twenty-third, the cook is hired outright, and the residue of receipts are divided equally among the other nineteen who own the outfit. This company, with changing membership, has been in Monterey since 1855. Verissimo has been here since 1867. This year fourteen whales have been obtained from September to April—seven gray whales (three down and four up whales), six humpback whales, and one right whale—besides two basking sharks (*Cetorhinus maximus*); in all 500 barrels of whale-oil and 8 of shark-oil.

The basking shark is rare here, sometimes not seen for twenty years. This year several were seen in Monterey Bay. "When a man is on the lookout for whales he can't see sharks." The sharks come to the surface at times, and remain quiet for a while, and their "flukes" and dorsal fins may be seen by one who is watching. The shark-oil should be worth 60 to 75 cents a gallon, each shark yielding 125 gallons. In 1878–'79 one humpback and three gray whales were taken, making 185 barrels of oil, and in 1877–'78 eight whales, making 500 barrels. Years ago this business paid better, for whales were more abundant, and higher prices were paid for the oil.

This company own three good boats, New Bedford made, and four guns of each kind. Their harpoons are mostly made by Merritt, a blacksmith in Monterey. They are thought superior to Proctor's, in that they are less likely to slip out of the whale; the posterior flange of the head is wider. With one of them nineteen whales have been shot. They are made of Swiss iron, and cost $10 each.

The Monterey Democrat thus describes the dangers of shore-whaling in that vicinity: "On Friday of last week the crew of one of our whale-boats narrowly escaped total destruction. They had struck and made fast to a California gray, a species particularly vicious, and were approaching him for a shot with the bomb-gun. There were a lot of porpoises around the creature, which suddenly appeared to be 'gallied' by them, and passed in his race. The boat under sail and running swiftly, got, unawares, within the sweep of the leviathan's tail, and when the shot was delivered a stroke in response from that tremendous creature crushed like an egg-shell the timbers of its bow. The sea rushed in through the fracture, and the boat being weighted down with her crew, an anchor, and two heavy guns, sank below the surface. The captain had been struck in the side by a fragment of the broken timbers, and was almost paralyzed. In the confusion, for a moment or two, no one thought to cut the rope by which the fish was fast, and it had resumed its fight. A tragedy was imminent, but luckily the captain recovering himself, ordered the rope to be cut, and the immediate and most pressing danger was escaped. The peril was, however, still considerable. Two of the crew could not swim, and they were all immersed to their necks in ice-cold water. Once or twice the boat rolled over, and they were in that perilous condition for half an hour before their consort, which was at some distance, heard their cries, and came to their rescue."

The following item about whaling at Monterey appeared in the Monterey Californian:

"Last week our Portuguese fishermen killed a large female whale of the California gray species (*Rhachianectes glaucus*), about 60 feet in length, being some 22 feet larger than has ever been killed here before—the average of females killed being about 42 feet. After cutting off the blubber they found inside a nearly full-grown male calf, which measured 18 feet from the end of its nose to the tip of its tail, or fluke, as the whalers call it; the circumference of the body at its center 9 feet; the head about 4 feet in length; pectoral fins 3 feet; breadth of tail 3½ feet, and it had two ridges on the lower jaw. When brought on shore it still had 3 feet of the umbilical cord attached to it. The whalebone on its upper jaw was soft and white; the tongue large and soft; the eyes nearly full size, about as large as a cow's, and the skin was of a dark brown, mottled white. It had no dorsal fin. The females, when with young, generally keep off shore when on their way down south, to bring them forth in the warm waters of the bays of Lower California, where they remain all winter and go north in the spring. The females, when with calf, are dangerous, as they often attack the boats of the whalers. The writer once saw a boat cut completely in two by the flukes of one of these whales, and it looked as if it had been chopped in two by a dull ax; and several of the men were wounded. The term of gestation is about one year. Formerly these marine monsters were so numerous in Monterey Bay that whalers would fill up lying at anchor. Oftentimes they would be seen playing in the surf and rolling the barnacles out of their sides and backs on the sand beach—an odd way of scratching themselves."

San Simeon Whaling Company.—The men in this company are all Portuguese but one, and most of them are from the Azores Islands. Captain Clark (*née* Machado) is from the Azores, whence he shipped as a seaman to the United States. He began whale-fishing at Monterey, where an American, Captain Davenport, the first California shore-whale fisher, was engaged before him. In 1858 he began whaling at San Diego. In 1864 he was at Portuguese Bend, and in 1865 started the San Simeon Camp, where he has ever since remained.

There are twenty men in the camp at San Simeon. They are hired by Captain Clark, who owns the entire outfit. The boat-pullers receive one-fiftieth of the lay (*i. e.*, all receipts), the boat-steerers receive one-fortieth, and the strikers one-sixteenth.

Thirteen whales have been taken this season (up to February 21). One summer whale or humpback, November 15; the others all gray whales. No other kinds have ever been secured by Clark, and the humpback whale is not taken later than December.

The last whale southward bound was taken January 29, and a few northward-bound whales have been noticed—about February 18, the first February 7.

The following is the record of the number taken each year at San Simeon: 1865 to 1871, 20 to 25 each year, never less; 1872, 21; 1873, 22; 1874, 16; 1875, 12; 1876, 7; 1877, 13; 1878, 3; 1879, 14=500 barrels; 1880, 13+.

It takes about ten or twelve whales per year to pay the expenses of the camp, especially now when oil is so low. Four hundred and fifty barrels of oil have been obtained this year and shipped to Charles Sealy, of San Francisco, to be sold on commission. Since 1865 the whales have been growing more scarce and more shy. When they return from the South they keep out farther than when they come down. The sea is often rougher, and the head winds render it difficult to follow them. They rarely take more than four return whales. At San Diego only gray whales, and rarely a right whale, are taken.

The camp is provided with four whale-boats made in New Bedford, costing $200, $175, $150, and $150 each. Two are in use for whaling and one for towing all the time, the other rests. There are also two swivel-guns, made in England, each costing $200; two bomb-guns, made in New Haven (?), costing $50; and some bomb-lances, made in Norway. The harpoons are made by G.

W. Proctor, formerly of Cambria, now of San Marcos, San Luis Obispo County. Mr. Proctor is a blacksmith. He began making harpoons in 1870 or 1871. The first one made was presented to Captain Clark, who struck three whales with it and then put it up to keep for luck. Mr. Proctor has no patent on the harpoons, and no warerooms or factory. He makes them out of the very best iron, better than that used in the English harpoon. They are heavier than the latter, and the posterior part of the head is made thick, instead of thin and sharp. There is also a little contrivance by which the turning of the head in the flesh is made more certain. They are now used by nearly all the California whalers, and are considered by them as better and more durable than the others. The harpoons are used for making fast to the whale; the bombs for killing. Often flint lance-heads and bone harpoons of the Eskimos are found in the whales, and very few of them are unscathed. The neighboring Chinamen help when a whale is brought in, receiving the sinews for their share. The total outfit is worth $1,000 to $1,500; the houses about $300.

Whales going down are fatter than when returning. A south-bound whale makes perhaps 35 barrels of oil, but a north bound only 25 barrels. Mostly bull whales are taken. On the south journey the larger cows come nearest shore and first. When they return the cows and calves are farthest out, the bulls and dry cows near shore.

Portuguese Bend was once a good whaling-station, but lacked wood and water. San Diego was an excellent station until the only suitable place was taken by the Government. Santo Tomas is a good place from the chance of taking sperm whales.

Port Starford Camp.—This camp is located on "Whaler's Point," about a mile north of the landing at "Port Starford." This camp consists of 21 men, all but one Portuguese, and mostly from the Azores. To the American, Michael Noon, I am indebted for the information obtained, Captain Marshall (Marsiali) being away. The property is owned by four or five shareholders, the captain being one of them and the others are hired by these, each man receiving a particular lay, the oarsmen one sixty-fifth to one-seventieth, the boat-steerers one thirty-fifth to one-fortieth, the strikers one-seventeenth to one-twentieth. The station is usually fairly good but this year they have had poor luck; only four whales, all gray, having been secured. In 1879 nine, in 1878 eleven were taken. Most of these were gray; though a few humpbacks were taken in the fall. One hundred and fifty barrels of oil have been shipped to San Francisco from this camp. They have three whale-boats here made at New Bedford. The other items of outfit are the same as at San Simeon. The whole cost about $1,500, and would sell for about half that amount.

Captain Marshall established the station here, and has been in charge all the time since its beginning in 1868 or 1869. The men in this company, as at San Simeon, are discharged in the summer, and a new set hired each fall, many of them different. Some of its members are engaged in summer in fishing for the market of San Luis Obispo.

Statistical recapitulation.—The aggregate amount of oil taken by the several shore parties, prior to 1874, is estimated by Scammon at not less than 95,600 barrels; of this amount 75,600 barrels were obtained from California gray whales, and 20,000 barrels from humpbacks, finbacks, and sulphur-bottoms. "The value of the oil may be placed at about $13 a barrel, which would give a gross of about $1,242,800, or an annual product for twenty-two years of $56,490. To obtain this oil not less than 2,160 California grays and 800 humpbacks and other whalebone whales were robbed of their fatty coverings. If we add to this one-fifth for the number of whales that escaped their pursuers, although mortally wounded, or were lost after being killed, either by sinking in deep water or through stress of weather, we shall swell the catalogue to 3,552. To this add one-eighth for unborn young, and the whole number of animals destroyed would be 3,996, or about 181 annually. This may be regarded as a low estimate; doubtless, the number of these creatures

destroyed every year by the enterprising California whalemen far exceeds the above estimate."* The production of the various whaling-camps in 1879 was 63 whales, yielding 58,084 gallons of oil, valued at $26,137.80. The total number of men engaged at the camps was 101, nearly all of whom were Portuguese.

SHORE-WHALING BY ESKIMOS AND INDIANS.

The Eskimos of Alaska capture whales of several species, using their flesh for food and from the blubber preparing oil for domestic use. The whalebone is saved and traded with the whaling-vessels coming along those shores in the summer season. The beluga or white whale is also an object of pursuit.

Mr. Petroff, in his census report on Alaska, says: "The oil obtained from the beluga and the large seal (Maklak) is a very important article of trade between the lowland people and those of the mountains, the latter depending upon it entirely for lighting their semi-subterranean dwellings during the winter, and to supplement their scanty stores of food. The oil is manufactured by a very simple process. Huge drift-logs are fashioned into troughs, much in the same manner as the Thlinket tribes make their wooden canoes. Into these troughs filled with water the blubber is thrown in lumps of from 2 to 5 pounds in weight; then a large number of smooth cobble-stones are thrown into a fire until they are thoroughly heated, when they are picked up with sticks fashioned for the purpose, and deposited in the water, which boils up at once. After a few minutes these stones must be removed and replaced by fresh ones, this laborious process being continued until the oil has been boiled out of the blubber and floats on the surface, when it is removed with flat pieces of bone or roughly fashioned ladles, and decanted into bladders or whole seal skins."† Mr. Petroff sends us the following graphic description of the hunt:

"BELUGA HUNTING AT ALASKA.—Next day about noon I was invited to participate in a canoe excursion in pursuit of some beluga or white grampus, a member of the whale family, but of an average length of only 16 or 20 feet. The blubber of this animal is considered a great delicacy by the Indians in this neighborhood, and the Laiada chief wished to get a supply of that greasy staff of life before returning home. Accordingly we started off in ten bidarkas, all the Indians being provided with various sizes of spears, while I took nothing but my rifle. In half an hour after leaving the mouth of the river the proposed hunting-ground was reached and the canoes separated in search of the game. For some time we cruised about without seeing a 'blow,' but finally the long expected signal shout was heard from one of the canoes, and all assembled immediately around their intended victim, which was a female beluga, with a calf following in its wake. First the old one would come up and blow, and in a few seconds after the young one would follow suit, throwing up a diminutive spout. The calf was attacked first, and as soon as its blood dyed the water, the dam turned around as if in pursuit of the murderer, describing circles around the floating body of its offspring and lashing the water into foam with its tail and flukes. While racing around the animal received well-aimed spears from the bidarkas, which had formed a circle, and as these weapons are provided with inflated bladders near the head, the beluga was soon buoyed up on the surface of the water, being too exhausted to draw under the large number of bladders fastened to its back and sides, and in that position was easily killed. Three more were killed in the same manner, and the party was preparing to return to the village when I thought I would try another way of securing the game, and without giving any notice to the men in the other canoes, as I ought to have done, I aimed my rifle at a beluga which was showing its huge white back above the water a short distance from me. The shot went off and its effect was instantaneous, though not exactly as I had

* SCAMMON: Marine Mammalia, p. 251.

† Alaska, its Population, Industries, and Resources, by Ivan Petroff. Tenth Census, Vol. VIII.

expected. The shot was well aimed and hit the spine of the animal, inflicting a mortal wound; but while the beluga was floundering about in its death struggles, lashing the water into foam dyed with its own red blood, one stroke of the tail upset one of the canoes, throwing the inmates into the water. There was plenty of assistance on hand, however; the canoe was righted, and the men crawled into it, very wet to be sure, but not at all in a bad humor. The accident was the subject of jokes innumerable on the way home. When the last beluga had been secured, and its body fastened to the stern of our canoe, the whole squadron was set in motion. With the tide in our favor, we glided along swiftly in spite of the weighty carcasses we had in tow, and as we drew near to the village the monotonous boat song was chanted by the men as they plied their paddles. On the high bank of the river the old chief was standing ready to receive us, while the squaws were sitting in the grass and watching our approach, joining with their shrill voices in the song as soon as we were near enough to be heard. On our arrival at the beach the whole village had assembled to view and admire the spoils of our day's sport. As soon as the belugas had been dragged ashore, knives were drawn on all sides and slices of the blubber cut off and eaten raw, apparently with great gusto, by old and young. I tasted a small morsel, and must confess that it resembles raw bacon fat more than anything I ever swallowed; but that is only the case immediately after the killing; as soon as the blubber is half a day old the rancid, fishy taste is there and grows stronger every day. It was dark before all the blubber had been cut off and safely stored out of reach of the village dogs, but late as it was the chief's house was prepared for a continuation of yesterday's feast and games. I was not prepared for a second siege of that kind and managed to slip away unobserved, glad to escape an ordeal which would have been more trying on a Caucasian's olfactory nerves than that of the day before, on account of the fresh supply of blubber and oil. Before I arose next day the visiting party from Laiada had taken their departure to set some other village in commotion, while the good people of Chketuk were yet reveling in remembrance of the joys just past."

The Indians of Cape Flattery are said to derive their principal subsistence from fishery products, the most important of which are the whale and halibut. Mr. James G. Swan, in a report on the Makah Indians, in No. 220 Smithsonian Contributions to Knowledge, 1869, says: "Of the former [whales] there are several varieties which are taken at different seasons of the year. Some are killed by the Indians; others, including the right whale, drift ashore, having been killed either by whalemen, swordfish, or other casualties. The various species of whales are: The sperm whale, kōts-ké, which is very rarely seen; right whale, yakh'-yo-bad-di; blackfish, klas-ko-kop-ph; finback, kaú-wid; sulphur-bottom, kwa-kwau-yak'-t'hle; California gray, che-che-wid or chet'-a-pūk; killer, se-hwau. The generic name of whales is chet'-a-pūk. The California gray is the kind usually taken by the Indians, the others being but rarely attacked.

"Their method of whaling, being both novel and interesting, will require a minute description—not only the implements used, but the mode of attack, and the final disposition of the whale, being entirely different from the practice of our own whalemen.

"From information I obtained, I infer that formerly the Indians were more successful in killing whales than they have been of late years. Whether the whales were more numerous, or that the Indians, being now able to procure other food from the whites, have become indifferent to the pursuit, I cannot say; but I have not noticed any marked activity among them, and when they do go out they rarely take a prize. They are more successful in their whaling in some seasons than in others, and whenever a surplus of oil or blubber is on hand, it is exchanged or traded with Indians of other tribes, who appear quite as fond of the luxury as the Makahs. The oil sold by these whalers to the white traders is dogfish oil, which is not eaten by this tribe, although

the Clyoquot and Nootkan Indians use it with their food. There is no portion of a whale, except the vertebræ and offal, which is useless to the Indians. The blubber and flesh serve for food; the sinews are prepared and made into ropes, cords, and bowstrings; and the stomach and intestines are carefully sorted and inflated, and when dried are used to hold oil. Whale-oil serves the same purpose with these Indians that butter does with civilized people; they dip their dried halibut into it while eating, and use it with bread, potatoes, and various kinds of berries. When fresh, it is by no means unpalatable; and it is only after being badly boiled, or by long exposure, that it becomes rancid and as offensive to a white man's palate as the common lamp-oil of the shops."

5. DEVELOPMENT OF THE SPERM-WHALE FISHERY.

EARLY HISTORY OF WHALING AT NANTUCKET.—The fishery for sperm whales began at a much later period than that for right whales, but the exact date of its commencement is unknown. The whales taken by the early settlers of New England were mostly the right or whalebone species and the first spermaceti whale known to the people of Nantucket caused great excitement. It was found dead on the shore, and quite a dispute arose concerning its ownership, "for the sperm procured from the head was thought to be of great value for medical purposes." It would thus appear that sperm whales had been heard of by these people, but had not been seen by them. "The first spermaceti whale taken by the Nantucket whalers," says Macy, "was killed by Christopher Hussey. He was cruising near the shore for right whales, and was blown off some distance from the land by a strong northerly wind, where he fell in with a school of that species of whales, and killed one and brought it home. At what date this adventure took place is not fully ascertained, but it is supposed to be not far from 1712. This event gave new life to the business, for they immediately began with vessels of about thirty tons to whale out in the 'deep,' as it was then called, to distinguish it from shore-whaling. They fitted out for cruises of about six weeks, carried a few hogsheads, enough probably to contain the blubbers of one whale, with which, after obtaining it, they returned home. The owners then took charge of the blubber, and tried out the oil, and immediately sent the vessel out again. In 1715 the number of vessels engaged in the whaling business was six, all sloops of from thirty to forty tons burden each, which produced £1,100 sterling, or $4,888.88."*

BEALE'S ACCOUNT OF THE ORIGIN OF THE SPERM-WHALE FISHERY.—The history of the sperm-whale fishery is accurately given by Thomas Beale,† in his history of the sperm-whale, in which he says: "The origin of the sperm-whale fishery, that is before it became organized as a branch of commerce—like the origin of other fisheries of the same nature, is involved in such deep mystery as almost altogether to defy the searching acumen of the historian. Without looking into the ancient, romancing, and classical histories, with which most of the countries of Europe abound, and which contain wonderful stories of the appearance, death, or capture of the sperm-whale, or other creatures of the same order, it may be sufficient for some of us to know that during the early part of the last century a few daring individuals who inhabited the shores of the American continent, fitted out their little crafts, furnished with weak and almost impotent weapons, to attack and destroy in its own element the mighty monarch of the ocean, in order to rob his immense carcass of the valuable commodity with which it is surrounded. But even as far back as the year 1667 we find a letter, published in the second volume of the Philosophical Transactions, from Mr. Richard Norwood, who resided at the Bermudas, which states that the whale-fishery had

* MACY: Hist. Nantucket, pp. 32, 36.

† The Natural History of the Sperm-Whale by Thomas Beale, Surgeon: London, 1836; 12mo., pp. 393.

been carried on in the bays of those islands for 'two or three years,' evidently meaning the black-whale fishery; for in another part he says: 'I hear not that they have found any spermaceti in any of those whales;' but subsequently he states in the same letter: 'I have heard from credible persons that there is a kind of whale having *great teeth*, as have the spermaceti, at Elentheria and others of the Bermuda Islands. One of this place, John Perinchief, found one there dead, driven upon an island, and though I think ignorant of the business, yet got a great quantity of spermaceti out of it.' He says again: 'It seems they have not so much oil as ours (meaning the black whale), but the oil, I hear, is at first like spermaceti, but they clarify it, I think, by the fire.'

"But in volume iii, Philosophical Transactions," continues Beale, "in a letter from the same place, written a year or two afterwards, we find something like a beginning of the sperm-whale fishery threatened by a Mr. Richard Stafford, who informs us that he has killed several black whales himself, and who is represented as a very intelligent gentleman. He says: 'Great stores of whales make use of our coast;' but in another part he states: 'But here have been seen spermaceti whales driven upon the shore. These have divers teeth about the bigness of a man's wrist. I have been,' says he, 'at the Bahama Islands, and there have seen of this same sort of whale, dead on the shore, with sperma all over their bodies. Myself and about twenty others have agreed to try whether we can master and kill them, for I could never hear of any of that sort that was killed by any man, such is their fierceness and swiftness.' He concludes by remarking that 'one such whale would be worth many hundred pounds.' A weighty reason for the establishment of the fishery, no doubt. The same writer, in another part of his letter, states: 'There is one island among the Bahamas, which some of our people are settled upon, and more are coming thither. It is called New Providence, where many rare things might be discovered, if the people were but encouraged.' This same New Providence afterwards became so famous as a whale-fishing station by the exertions of our American descendants. But even before these needy adventurers commenced their career of spermaceti hunting, we have had it proved to us that the Indians who inhabited the shores of America used to voyage out to sea and attack this animal from their canoes, and pierce him with their lances of wood or other instruments of the same material, which were barbed, and which, before they were plunged into his flesh, were fastened by a short warp, or piece of rope, to a large block of light wood, which was thrown overboard the moment the barbed instrument was thrust into its body, which, being repeated at every rising of the whale, or when they were so fortunate as to get near enough to do so, in a few instances, by a sort of worrying-to-death system, rewarded the enterprising savage with the lifeless body of his victim, but which in most cases was that of a very young one; and even this, when towed to the shore, it was impossible for them to turn over, so that they were obliged to content themselves with flinching the fat from one side of the body only.

"But although, as has been before stated, Mr. Richard Stafford had threatened to commence the sperm-whale fishery at the Bahama Islands, it appears rather doubtful whether he did so or not, when we come to peruse the letter of the Hon. Paul Dudley, F. R. S., published in 1724, Phil. Trans., vol. xxxiii, an extract of which states: 'I very lately received from Mr. Atkins, an inhabitant of Boston, in New England, who used the whale-fishery for ten or twelve years (black whales), and was one of the first that went out a fishing for the spermaceti whales about the year 1720.' It also appears in this account that the fishery even then was very little understood, for Mr. Atkins himself says 'he never saw, nor certainly heard of a spermaceti female taken in his life,' for he states 'the cows of that species of whale, being much more timorous than the males, and almost impossible to come at, unless when haply found asleep upon the water, or detained by their calves.' In another part of this letter the Hon. Paul Dudley states: 'Our people formerly

used to kill the whale near the shore; but now they go off to sea in sloops and whale boats in the months of May, June, and July, between Cape Cod and Bermuda, where they lie by in the night, and sail to and again in the day, and seldom miss of them; they bring home the blubber in their sloops. The true season for taking the right or whalebone whale is from the beginning of June to the end of May; for the spermaceti whales, from the beginning of June to the end of August.'"

CONDITION OF THE FISHERY FROM 1720 TO 1775.—About the middle of the eighteenth century the value of oil increased by the opening up of new markets, and the people of New England pushed forward with zeal in the whaling industry. The English, French, and Dutch had been very successful in the northern fishery for whalebone whales, but had taken no part in the capture of sperm whales, leaving this work for the American fleet which began to grow rapidly in the number and size of its vessels. In 1720 the whaling fleet of New England numbered only a few sloops of about 36 tons each, making voyages east to Newfoundland and south to the Gulf Stream. By 1731 the American fleet amounted to 1,300 tons, and the size of the vessels increased so that in 1746 schooners and brigs from 100 to 130 tons were employed. Just before the Revolutionary war the whaling industry was very prosperous in New England, the fleet was large, and the profits considerable. Voyages were made to the north and south for sperm and right whales, but the chief object of pursuit was the sperm whale, whose oil was nearly three times the value of that of the right whale. The principal grounds visited for the sperm whale were off the coast of Brazil and Guiana, various parts of the West Indies, the Cape Verde and Western Islands, and eastward of the Banks of Newfoundland.

Seammon gives the following statistics to show the condition of the business from 1762 to 1770, inclusive:

Year.	Number of vessels.	Number of barrels.	Value of production.
1762	78	9,440	$102,518 40
1763*	60	9,238	100,324 68
1764	72	11,983	131,135 38
1765	101	11,512	125,020 32
1766	118	11,969	129,983 24
1767	108	16,561	179,852 46
1768	125	15,439	167,667 54
1769	119	19,140	462,996 60
1770	125	14,331	346,666 89
	906	119,613	1,746,165 51

*Scoresby, in his account of the Whale Fishery of the British Colonies in America, states there were eighty vessels employed in the American fisheries during the year 1763.

"About 1774," says Seammon, "the fleet was augmented by still larger vessels, some of which crossed the equator, and obtained full cargoes upon that noted ground called the 'Brazil Banks,' while others cruised around Cape Verde Islands or the West Indies, in the Gulf of Mexico, Caribbean Sea, or upon the coast of the Spanish Main. Soon after they extended their voyages to the South Atlantic, around the Falkland Islands, and to the coast of Patagonia, where fur-seal skins and sea-elephant oil were sometimes obtained. In such instances these whaling and sealing expeditions were called 'mixed voyages.'"*

"Between the years 1770 and 1775," says Macy, "the whaling business increased to an extent hitherto unparalleled. In 1770 there were a little more than one hundred vessels engaged; and in 1775 the number exceeded one hundred and fifty, some of them large brigs. The employment

*SCAMMON: Marine Mammalia and American Whale Fishery, p. 206.

of so great and such an increasing capital may lead our readers to suppose that a corresponding profit was realized; but a careful examination of the circumstances under which the business was carried on will show the fallacy of such a conclusion. Many branches of labor were conducted by those who were immediately interested in the voyages. The young men, with few exceptions, were brought up to some trade necessary to the business. The rope-maker, the cooper, the blacksmith, the carpenter, in fine, the workmen, were either the ship-owners or of their household; so were often the officers and men who navigated the vessels and killed the whales. Whilst a ship was at sea, the owners at home were busily employed in the manufactory of casks, iron work, cordage, blocks, and other articles for the succeeding voyage. Thus the profits of the labor were enjoyed by those interested in the fishery, and voyages were rendered advantageous even when the oil obtained was barely sufficient to pay the outfits, estimating the labor as a part thereof. This mode of conducting the business was universal, and has continued to a very considerable extent to the present day. Experience taught the people how to take advantage of the different markets for their oil. Their spermaceti oil was mostly sent to England in its unseparated state, the head matter being generally mixed with the body oil; for, in the early part of whaling it would bring no more when separated than when mixed. The whale oil, which is the kind procured from the species called 'right whale,' was shipped to Boston or elsewhere in the colonies, and there sold for country consumption, or sent to the West Indies."*

The extraordinary zeal that the Americans took in the whale-fishery at this time called forth from Mr. Burke that glowing tribute which has become familiar to every American. "Whether this eloquent address," says Beale, "had any effect or not upon the minds of our own merchants and ship-owners in stimulating them to fit out ships for the sperm and other whale-fisheries, I am not aware, but it is certain that in the following year (1775) the first attempt was made to establish the sperm whale fishery from Britain; and we accordingly find, from private statements on which I can securely rely, that ships of from 100 to 109 tons burden were sent to South Greenland, coast of Brazil, Falkland Islands, and the Gulf of Guinea, for the purpose of procuring sperm and other oils. The names of the ships which were thus employed in these distinct expeditions were the Union, Neptune, Rockingham, America, Abigail, Hanover, Industry, Dennis, Beaver, and Sparrow, but the principal places of resort of the spermaceti whale not having been yet discovered, the vessels met with very trifling success.

"Bounties granted.—In the following year, 1776, the Government, with a view to stimulate all persons engaged in these fisheries, established a principle of reward for those ships which were most successsful in their endeavors; in accordance with which, five different *bounties* or premiums were offered, forming a scale of prizes for those who were so fortunate as to prove the five gradations of success, the sum of £500 being the maximum, and that of £100 being the minimum prize. In 1781 four ships were fitted out for the river St. Lawrence, but after they had been out a considerable time they returned with the discouraging announcement of having only procured 6 gallons of sperm oil among them during the whole time of their absence.

"Sperm whales from France.—In 1784, France, which it appears had preceded the other nations of Europe in the whale-fishery, but had for many years past, for some cause or other, hardly had any share in it, now endeavored to revive it, and with this view Louis XVI fitted out six ships from Dunkirk on his own account, which were furnished at a great expense with a number of experienced harpooners and able seamen from Nantucket. The adventure was more successful than could have been reasonably expected, considering the auspicies under which it was carried on. Several private individuals followed the example of His Majesty, according to Mr.

* Macy: Hist. Nantucket, p. 68.

McCulloch, 'and in 1790 France had about forty ships employed in the fishery. The Revolutionary war destroyed every vestige of this rising trade. Since the peace the Government has made great efforts for its renewal, but hitherto without success; and it is singular, that with the exception of an American house at Dunkirk, hardly any one has thought of sending out a ship from France.'

"A PROSPEROUS PERIOD.—In the year 1785 the English shipmasters began to discover the haunts of the sperm whale, the principal object of pursuit, for we find that after they had been out twelve months many vessels returned with from 20 to 80 tons of sperm oil each, so that in the year 1786 we find 327 tons of sperm oil was brought to this country, and which sold for £43 per ton. And the success which attended our whaling expeditions at this time was quite equal to that which the American whalers met with. In 1786 the bounties were increased to £700 maximum and £300 minimum, which had the effect of increasing the perseverance and activity of our whalers, for we now discover them staying out eighteen and even twenty-eight months, and bringing home much larger quantities of sperm oil. During the year 1788 the ships that were sent out were much increased in size, so that they were frequently of from 150 to 300 tons burden, and they still continued, like the Americans, to fish on this side Cape Horn, taking the common black, as well as the sperm whale, at such places as the Gulf of Guinea, coast of Brazil, Falkland Islands, and, for sperm whales in particular, about the equinoctial line. But if the Americans had been the first to establish the fishery on their own shores, and even throughout the North and South Atlantic Oceans, it was the destiny of the mother country to enjoy the honor of opening the invaluable sperm fisheries of the two Pacifics, the discovery of which formed an era in the commercial history of this country. For not only was the sperm-whale fishery by this discovery prodigiously increased, but other commercial advantages accrued from the whalers who resorted to these seas opening a trade with the people who inhabited the extensive shores which bound the enormous ocean."*

"In the year 1789 a gentleman from Cape Cod, who had returned from service in the East India Company, having seen sperm whales near Madagascar, communicated the fact to some of the Nantucket whalemen, who, profiting by the knowledge, in due time dispatched ships to that coast, which proved to be a rich whaling ground."†

The American whale fishery, just before the Revolutionary war, employed a total of not less than 360 vessels of various kinds, with an aggregate burden of nearly 33,000 tons, and produced about 45,000 barrels of spermaceti oil, 8,500 barrels of whale oil, and 75,000 pounds of whalebone annually. By the year 1789 this large fleet had been reduced to about 130 sail of vessels, producing annually scarcely 10,000 barrels of spermaceti oil and about 15,000 barrels of whale oil, with a corresponding proportion of whalebone.

THE BEGINNING OF THE PACIFIC SPERM-WHALE FISHERY.—"In 1788," says Beale, "the grand mercantile speculation of sending ships round Cape Horn into the Pacific, in order to extend the sperm-whale fishery, was reserved for the bold and enterprising mind of Mr. Enderby, a London merchant and ship-owner, who fitted out, at a vast expense, the ship Amelia,‡ Captain Shields, which sailed from England on the 1st of September, 1788, and returned on the 12th of March, 1790, making an absence of one year and seven months, but bringing home the enormous cargo of 139 tons of sperm oil, and likewise having the good fortune to receive £800 more by way of an increased bounty in consequence of the peculiar nature of the expedition. The Amelia having been the first ship of any country which had entered the Pacific in search of whales, her suc-

* BEALE: *op. cit.*, pp. 144–146. † SCAMMON: Marine Mammalia, p. 209.

‡ The Amelia was an English fitted ship, manned by the Nantucket colony of whalemen; her first mate, Archelus Hammond, of Nantucket, killed the first sperm whale known to have been taken in the Pacific Ocean.

cess gave an amazing impulse to all persons engaged in the fisheries, so that several ships, both from this country and America, immediately followed in her track, for on her return in 1790 many vessels were directly sent off, the crews of which continued the fishery along the coasts of Chili and Peru with great advantage; so that in 1791 we had a great addition in the importation of sperm oil, amounting this year to 1,258 tons, making an increase over the importation in the year 1786 of 931 tons. In 1791 the bounties were again altered, but the alteration merely related to the time the ships should remain out. The ships which were at this time engaged in the fishery carried from twenty-two to thirty men each. This enterprising branch of commerce was carried on year after year with considerable success, subject to but slight variations in the annual and gradual increase in the importation of oil, giving employment to a vast number of persons, many of whom were enriched to an immense amount by the success which attended their exertions in this now profitable pursuit."*

The new grounds for sperm whale in the Pacific discovered by American whalemen in English vessels, were soon resorted to by vessels from Nantucket. The first vessels sailed in 1791, and returned "loaded with oil, and reported that whales were plenty, the coast agreeable to cruise on, and the climate healthy. This was sufficient encouragement, notwithstanding the length of the voyages, for a considerable part of the whaling interest to be directed that way. An additional number of vessels was then fitted out, which together made a considerable fleet."†

Starbuck says that six ships sailed for the Pacific fishery in 1791 from Nantucket and one from New Bedford. In the mean time ships from Dunkirk, among them the Falkland, Canton, and the Harmony, had already performed their voyages, and in February, 1792, arrived at Dunkirk with full cargoes. It was the custom in those days to nearly fill with sperm, then return to the Atlantic Ocean and complete their load on the coast of Patagonia or on Brazil Banks, commanders preferring to round Cape Horn with a snugly-loaded ship. The names of the six Nantucket vessels were the Beaver, Washington, Hector, Warren, Rebecca, and Favorite. "These ships," says Scammon, "were only 250 tons burden, dull sailers, having no copper on their bottoms, and but scantily fitted with whaling appliances or provisions. The scene of their first exploits was upon the coast of Chili. These pioneer voyages, through the persistent daring of the hardy men who led them, were eminently successful, which induced the people of the neighboring settlements of other New England ports to extend their whaling commerce, and but few years passed before a numerous fleet were plying over those rough waters. Gradually, however, they extended their cruises toward the more distant but smiling regions of the tropics. As early as 1800,‡ American whalers were plowing the sparkling waters along the coast of Peru, and their keels cut the equatorial line, north and south, in the Pacific. A favorite cruising-ground was from the Spanish Main westward around the Galapagos Islands. There a rich harvest rewarded them, where they labored in a genial climate, with an almost uninterrupted succession of fine breezes and pleasant weather. At certain seasons, north of the equator, the northeast trades blew fresh, and at the south they would frequently increase to a brisk gale; but these periodical breezes, compared with the heavy gales of the Atlantic and the tedious weather about Cape Horn, served only to enliven them into renewed activity under the heated rays of a tropical sun, when in pursuit of the vast herds of cachalots which were met with, bounding over or through the crested waves. During these long voyages it became unavoidably necessary to occasionally go into port, in order to 'recruit ship.' When arrived at these places of supply, good store of fresh meat, water, and vegetables was laid in, and the ship's company were allowed to pass, in turn, a few days of liberty on shore. In due time those ports along the coast of Chili and Peru, which were suited

* Beale: *op. cit.*, pp. 146–149. † Macy: Hist Nantucket, p. 141. ‡ Nantucket paper.

to the requirements of the adventurers, became famous places of resort for American whale ships. The principal ones were Talcahuano and Valparaiso, in Chili, and Payta, Callao, and Tumbez, in Peru. At these places usually could be obtained any needed recruits, and the picturesque scenery, blended with those sunny climes, together with the charms of the beautiful women, made their periodical visits to the coast peculiarly attractive, and wrought an entire temporary change from the life on 'blue water.' The abrupt and lofty group of islands, the Galapagos, which extend into both latitudes from the equator, and the little island of Cocos, situated in the rainy region on the border of Panama Bay, were frequently visited, and became more familiar to the whalemen, in many instances, than their Atlantic homes. Every rugged mountain and verdant valley of the former were traversed in hunting the galapago, or 'elephant terrapin,' which furnished them with ample supply of the most delicious meat, and the latter was resorted to for fresh water, which was dipped from cascades flowing out of their natural reservoir beyond the wooded bluffs. And upon the rocks about the beach of Chatham Bay, rudely chiseled, are the records of those pioneer whale fishers, with the dates of the visits of transient vessels, from the pigmy shallops of Drake's time to the magnificent national ships of the present century."*

Sperm whaling at New Zealand and the offshore Ground.—The sperm-whale fishery at New Zealand began about the year 1802, and in 1803, according to Beale, "many vessels were plowing the China Seas, about the Molucca Islands, in search of the sperm whale."† In 1818‡ Capt. George Gardner, in the ship Globe, of Nantucket, discovered the famous "offshore ground" that was soon visited by scores of sperm whalers. In speaking of this discovery Scammon says: "The love of adventure tempted the whalers to turn their prows even from the sunny shores of Peru, and, with flowing sheets, they coursed over the Pacific until, in latitude 5° to 10° south and longitude 105° to 125° west, the objects of pursuit were found in countless numbers, whose huge forms blackened the waves and whose spoutings clouded the air as far as the eye could discern."

The Japan Ground.—The next important sperm-whale ground to be discovered was the Japan Ground. The honor of opening this profitable whaling ground is claimed by both Americans and Englishmen. According to Starbuck,§ "having received word from Captain Winship, of Brighton, Mass., who had friends at Nantucket, that on a recent voyage from China to the Sandwich Islands he had seen large numbers of sperm whales on that coast, Capt. Joseph Allen, in the ship Mars, was dispatched there." The Mars sailed from Nantucket October 26, 1819, arriving home March 10, 1822, with 2,425 barrels of sperm oil, and within two or three years a fleet of thirty sail of vessels were cruising on the new ground. By 1835 there were cruising in the North Pacific, between the coasts of New Albion on the east and the Japan Islands on the west, near a hundred ships,‖ one-third English, and the others Americans.

The first English whaling vessel to visit the new field was the ship Syren, of 500 tons burden, commanded by Capt. Frederick Coffin, of Nantucket, and carrying a crew of thirty-six seamen. "The Syren," says Beale, "sailed from England on the 3d of August, 1819, and arrived off the coast of Japan on the 5th of April, 1820, where she fell in with immense numbers of the spermaceti whale, which her crew gave chase to with excellent success; for they returned to their native land on the 21st of April, 1822, after an absence of about two years and eight months, during which time they had by their industry, courage, and perseverance, gathered from the confines of the North Pacific Ocean no less than the enormous quantity of 346 tons [2,768 barrels] of sperm

* Scammon: *op. cit.*, pp. 210, 211.
† Beale: *op. cit.*, p. 149.
‡ Proceedings American Antiquarian Society, No. 57, p. 29.
§ Report U. S. Fish Commission, 1875–'76, p. 96.
‖ Macy: Hist. Nantucket, p. 224.

oil, which was brought into the port of London in safety and triumph, showing a success unprecedented in the annals of whaling, and which astonished and stimulated to exertion all those engaged in the trade throughout Europe and America. The success which attended this expedition not only rewarded the seamen and others who composed the crew, but the spirited owner who had sent them out also must have felt the solid and weighty considerations which he no doubt received in return for the great and successful enterprise to which he had given origin. After the return of the Syren the Japan fishery was speedily established, and remains to this day [1839] the principal one in both Pacifics; and although it has been so much resorted to by ships of different nations ever since, which have carried off immense quantities of sperm oil, yet such is the boundless space of ocean throughout which it exists, that the whales scarcely appear to be reduced in number. But they are more difficult to get near than they were some years back, on account of the frequent harassing they have met with from boats and ships, so that they have now become well aware of the reckless nature of their pursuers, and they evince great caution and instinctive cunning in avoiding them."*

SPERM WHALING IN THE INDIAN OCEAN.—"In 1828," says Scammon, "four ships were sent from Nantucket to cruise for sperm whales off the coast of Zanzibar, around the Seychelle Islands, and about the mouth of the Red Sea; and one of the number, with the very appropriate name of Columbus, through the skill and energy of the captain, sailed up the Red Sea in quest of the objects of pursuit."† The Seychelle Islands had been visited by the English whaler Swan, a vessel of 150 tons, in 1823, for the purpose of searching for sperm whales, and the captain had been directed to prosecute the fishery, if possible, at the entrance of the Red Sea and Persian Gulf. The expedition did not prove as successful as was anticipated, though the effect of opening up the new fields was of great subsequent advantage, "for although," says Beale, "the Swan did not return until the 27th of April, 1825, and had only procured 40 tons of sperm oil during all the time of her absence, yet her want of entire success was not owing to the absence of whales at the places to which they were sent, for the crew saw immense numbers, but from a series of misfortunes which befel them, and which rendered them incapable of prosecuting the fishery with all the energy and entire devotion which it requires to bring about a successful termination. The ships which resorted to the Seychelles after the return of the Swan had good reason to be well satisfied with the success which attended their efforts, not only from the number of whales which they found there, but from its being so much nearer home than the Japan fishery, by which much time was saved in the outward and homeward passages."‡

CONDITION OF THE FISHERY, 1837 TO 1880.—In the year 1837 the sperm-whale fishery was at its highest point of prosperity. The production of the American fleet that year was 5,329,138 gallons of sperm oil, valued at $4,396,538.85. Most of the fleet at this period were scattered over the various grounds in the North and South Pacific Oceans, and in the Japan Sea, and cargoes of over 3,000 barrels were not uncommon on a three years' cruise. "Most of our whale ships," says Macy, in 1835, in his History of Nantucket, "go into the Pacific by the way of Cape Horn; some by the eastern route south of New Holland and Van Dieman's Land; others after cruising awhile in the Indian Ocean, in the neighborhood of Madagascar and month of the Red Sea, pursue their way into the Pacific Ocean through the Straits of Timor, between New Guinea on the south and the Pelew Islands on the north, touching at the Ladrone Islands, and then onward to the Japan coast. They there meet ships which sailed from home about the same time with themselves and came by the way of Cape Horn. Others, too, meet at the same place that came by the route south of New

* BEALE: *op. cit.*, p. 149. † SCAMMON: *op. cit.*, p. 212. ‡ BEALE: *op. cit.*, p. 152.

Holland. It must appear obvious that our whale ships are exploring in a more effectual manner than twenty national ships could every part of the vast Pacific. They have discovered many islands, reefs, and shoals, which navigators sent out expressly for exploring purposes had passed unseen."

The extraordinary success of the fleet of whalers led to a rapid increase in the number of vessels engaged, so that in 1839 the fleet of the United States numbered 555 vessels, whose aggregate tonnage was 169,354 tons. Nearly 500 of these vessels were ships and barks, a large proportion of which were in the Pacific sperm-whale fishery. In 1842 the number was 594, at which time, according to Scammon, the foreign whaling fleet amounted to 230 sail, and the combined fleet of the world engaged in whaling was 824 vessels. The fleet from the United States reached its highest number in 1846, when 678 ships, 34 brigs, and 17 schooners and sloops, a total of 729 vessels, measuring 230,336 tons, were engaged in this industry. It is impossible to give the exact number of these vessels that were engaged in sperm whaling, but it is probable from a careful estimate that nearly one-half of the entire fleet followed this branch of the whale fishery. In 1844 the sperm-whale fleet of the United States numbered 315 vessels, of which 242 were ships and barks in the Pacific, and 73 schooners in the Atlantic sperm fishery. At about this time the New Holland branch of the English whale fishery was rapidly growing, the proximity of those whaling ports of Australia to some of the most productive cruising-grounds enabling the ships fitted out there to perform three voyages while the English and American were performing two. The number of whale ships from French, German, and Danish ports at this time, according to Cheever, was between 60 and 70, and the English fleet, which in 1821 numbered 323 ships, was reduced to 85.

The fleet from the United States began now to decrease, and the receipts of sperm oil became less and less, until in 1860 the entire production of sperm oil by American vessels was only 2,306,934 gallons. The price of this oil, however, had advanced from 82½ cents in 1837 to $1.41½ per gallon, and the entire fleet of whaling vessels was reduced to 560 sail. In 1870 the receipts of sperm oil had further decreased to 1,738,265 gallons, and the whaling fleet numbered 316 sail, of which number 231 were principally sperm whaling and the balance right whaling. These sperm whalers were distributed over the various grounds as follows: 125 in the North and South Atlantic, 41 in the Indian Ocean, and 65 in the Pacific Ocean. In 1875 the sperm-whale fleet numbered 134 sail and the entire whaling fleet 163 vessels, and the receipts of sperm oil were 1,342,435 gallons.

The general decline of the whale-fishery, resulting partly from the scarcity of whales, has led to the abandonment of many of the once famous grounds, and cargoes of sperm oil are obtained only after the most energetic efforts in scouring the oceans. In the Western Pacific Ocean, the Indian Ocean, and the Japan Sea, where once large fleets of vessels cruised, there are now but few. The results of this branch of the whale-fishery during the year 1877 on the different grounds were varied. In the North Atlantic Ocean eighty-two vessels took 13,500 barrels, the largest yield for many years. Good catches were also taken by the fleet off Chili, on the Off-shore Ground, at New Zealand, and the Sooloo Sea. Vessels in the South Atlantic had fair success, while but little oil was taken in the Indian Ocean.

In 1880 the Indian Ocean and Sooloo Sea sperm-whale grounds were abandoned by the American fleet.

LENGTH OF VOYAGES.—The length of a sperm-whaling voyage in the North Atlantic, where it is generally carried on in the smaller class of vessels, is from six to eighteen months, though occasionally a vessel may return with a fair cargo in five months, while another vessel of large size

may remain from home for three years. Voyages to the South Atlantic and Indian Ocean occupy from two to four years, depending largely upon the abundance of whales. These vessels are principally ships and barks, the schooners and brigs finding employment in the North Atlantic fishery.

The Pacific Ocean whalers remain from home three or four years, or even a greater length of time, transshipping their oil from San Francisco, Honolulu, and South American ports, and taking supplies from time to time at convenient places.

STATISTICS FOR 1880.—The receipts of sperm oil from the American fleet in the year 1880 were 1,184,841 gallons, the smallest quantity, with the exception of the years 1865 and 1874, received since the year 1826. The entire yield of the fleet from 1804 to 1880 was 166,604,496 gallons, and the number of sperm whales taken, allowing 25 barrels to each whale and 10 per cent. of those taken as lost, was 232,790. The receipts of sperm oil by decades since the year 1810 were as follows:

Period.	Quantity.
	Gallons.
1810 to 1820	5,159,495
1820 to 1830	22,848,336
1830 to 1840	41,241,310
1840 to 1850	39,146,055
1850 to 1860	26,260,806
1860 to 1870	16,305,377
1870 to 1880	12,819,493

The products of the sperm-whale fishery, in addition to the oil from the blubber and head, and ivory from the teeth, includes that very valuable substance ambergris, which when pure is worth its weight in gold. A full discussion of the manner of obtaining ambergris and the value of the production is given in the section of this report treating of Preparation of Products.

CAPT. H. W. SEABURY ON SPERM WHALES.—"The largest sperm whale that I have seen taken," says Capt. H. W. Seabury, of New Bedford, "was 120 barrels; though I have heard of one that made 148 barrels. The male or bull, when full grown, varies from 70 to 110 barrels, very seldom going beyond the latter amount, and is from 50 to 70 feet long. Female or cow sperm whales have been caught that made 50 barrels, though they do not often yield more than 35 barrels. They vary much in size in different places. In the Caribbean Sea, Gulf of Mexico, and along the Gulf Stream through the Atlantic, they run small, and full-grown cows will not average over 15 barrels. Those caught in the Pacific Ocean near the equator as far as longitude 135° west, average about 25 barrels while those caught farther west and in most parts of the Indian Ocean run smaller. The cows with their young give from nothing up to 35 barrels, and seem to go in schools together, and we frequently see from twenty-five to fifty and sometimes one hundred or more in a school, with occasionally a large bull among them, and at times, though seldom, we find all sizes together. The male or bull whales seem to separate from the cows and calves when about the size of 35 barrels, as we seldom get them in the schools of the mother and its young to make more oil than that, and we find the young bulls in pods or schools beyond that size; we find them in what we call 40-barrel bulls, where they generally go in larger numbers than they do as they increase in size; we find them again in smaller schools of about the size of 50 barrels, and again about 60 barrels, where we sometimes see eight or ten together, and 70 barrels four or five, and beyond that one, two, and three, except on New Zealand Ground, where the large whales go in larger bodies; many times we raise a large sperm whale alone, or sometimes two within a short distance of each other, going their regular course from 3 to 6 miles per hour; they will make their course as

straight as we can steer a ship, and make their distances very regular during the time they are up and down; a large whale will usually stay down when not disturbed from forty to fifty minutes; have known them to stay down one hour; their time on the top of the water about fifteen minutes—spouting during that time, say forty-five times, or three times to the minute. Schools are quite often seen going off their regular course. The small whale does not stay down so long as the large one, and is not quite so regular; when feeding they are up and down quite often. The usual way of raising or discovering the whale is from the mast heads, where men are stationed all the time in good weather during the day; the spout is generally seen first, unless they are breaching or lap-tailing, which makes white water and is more easily seen than the spout, and can be seen farther off. In a very clear day with a moderate breeze a spout can be seen 6 miles, and sometimes 7 miles, and a breach 12 when a large one. A breach is when the whale comes out of water; he generally comes out headforemost two-thirds of his length and falls over on his side, which throws up a large amount of water; the size of the breach is in proportion to the whale. A lap-tail is when the whale throws his tail out of water, and when he lets it down it usually throws up a great deal of water, and experienced whalemen can tell the different kind of whales very readily shortly after they see them spout, or by their breach; the sperm-whale spout is blown out forward and from the forward end of the head, and is thick and bushy, while the finback is straight up and thin; the right is forked forming two spouts at the top; the humpback is lower and thin; the breach of a sperm whale, when made regular, will be like a cone and be much higher than other whales, which are lower, and makes more of a splash—spreading out; the length of the sperm whale are according to their size; the longest I should think would not exceed 70 feet, the head forming about one-third of the length, and making about one-third of the oil. There are some exceptions as to this; the large whale will usually make 38 per cent. head, while the smaller one will not make over 30 per cent., so that it makes some difference in a cargo that is obtained of large whales or small ones. The case of a large whale, which is the top of the head, will yield from 8 to 12 barrels pure spermaceti. In former years it was the custom to hang the same in the ship's tackles, and bail the oil out in buckets; the practice is still in use now in small vessels, but large ones, since the patent gear to the windlass has been in use, have usually hove the whale head in on deck, first separating the junk from the case, and taking the junk first, then the case, and bail the oil out while the same lies on deck; (much more is saved in this way than in the old process of bailing them alongside;) the outside, or white horse, as it is termed, is then thrown overboard, the junk is cut up into horse-pieces, as they are called by whalemen, and put into casks on deck, or tanks below deck, if the ship is provided with one preparatory to bailing out the same. The jaw of a large sperm whale is about 18 feet long, meaning the longest ones, and projects out of the head about 10 feet, and the prongs or pans are inside about 8 feet. There are generally about forty-four teeth to a jaw, a row being formed on each side. On the upper jaw there are no teeth, the teeth to the lower jaw going into sockets in the upper when the mouth is closed. Their food is a fish called squid, at times said to be very large; we often see small ones on the top of the water, and pieces of the larger ones floating about on the surface from the size of a bucket to the size of a barrel; while in the act of killing them they sometimes throw up pieces of the squid."

6. THE DEVELOPMENT OF THE NORTH PACIFIC AND ARCTIC WHALE FISHERY.

THE NORTH PACIFIC AND PACIFIC-ARCTIC FISHERY.

THE BEGINNING OF THE FISHERY.—The history of whaling in the Arctic Ocean north of Bering Strait, begins in the year 1848, when Captain Roys, of the bark Superior, of Sag Harbor, N. Y., cruised there and took many large whales. The Honolulu Friend gives the following

account by Captain Roys of the opening up of this profitable whaling region: "I entered the Arctic Ocean about the middle of July, and cruised from continent to continent, going as high as latitude 70, and saw whales wherever I went, cutting in my last whale on the 23d of August, and returning, through Bering Strait, on the 28th of the same month. On account of powerful currents, thick fogs, the near vicinity of land and ice, combined with the imperfection of charts and want of information respecting this region, I found it both difficult and dangerous to get oil, although there were plenty of whales. Hereafter, doubtless, many ships will go there, and I think there ought to be some provision made to save the lives of those who go there should they be cast away."*

The whales taken by Captain Roys were of the bowhead species, which is peculiar to Arctic regions. Vessels had been taking the right whale in the Okhotsk Sea and neighboring waters for some years prior to the inauguration of the Bering Strait fishery, but it was not until about this time that whalemen began to take notice of the bowhead or Greenland whale that had been looked upon as of no more importance than the finback or sulphur-bottom whales. They were greatly surprised when they discovered with what ease the bowhead could be killed, and the great amount of oil and bone it yielded. According to Starbuck, the first bowheads were taken in the year 1843 on the coast of Kamchatka by ships Hercules, Captain Ricketson, and Janus, Captain Turner, both of New Bedford. This species of whale was first taken in the Okhotsk Sea about 1847, or, as Captain Roys thinks, in 1848 or 1849.†

CAPTAIN BARNES ON ARCTIC WHALING IN 1877.—The following account of Arctic whaling during the season of 1877 is kindly furnished by Capt. William M. Barnes, of bark Sea Breeze, of New Bedford. The letter was written to Capt. H. W. Seabury, and published in the New Bedford Evening Standard of November 21, 1877.

"We came yesterday (October 22) through the Aleutian Islands by the 172° west longitude pass. Better charts and a greater familiarity with these islands than we formerly possessed have deprived them of much of the dread we formerly entertained for them, and I do not think that any vessel has lately taken the old route on the down passage to the west of the islands. In going north last spring we passed the chain at the same place on May 4, and three days later came up to ice in latitude 56° 30′ north. From that time till the 23d of the same month we skirted the ice to westward, attempting in different places to penetrate it, but ever finding it too compact. On May 24 we were in sight of land, 250 miles west-southwest from Cape Navarin, and on that day we entered the ice in company with barks Roman and Mount Wollaston. In a week we had worked through a belt of ice of some 40 miles in width, and had come into a strip of clear water, inshore of the ice, and extending all the way to Cape Navarin. It was the luck of the Sea Breeze to get into this water a few hours ahead of the other two vessels, and with a good breeze we soon were a long way from them, but before they lost sight of us whales had made their appearance in the loose ice around their ships, and each vessel succeeded in taking two large ones.

"On the 6th of June we were off Cape Navarin, and on the 10th off Plover Bay, not having seen a single whale. On the following day, off Cape Chaplin, we saw and chased a whale going quick north, and on the same day spoke Captain Redfield, of a trading schooner, who reported the eastern part of the sea quite free from ice, and that he had seen quite a number of whales off St. Lawrence Island. So we, going by our experience in these last few years, supposed that the whales had already gone to the north, and made the best of our way into the Arctic. It proved, however, that there was still a large body of whalers somewhere in the southern ice that came up through the straits after nearly all the whales had passed through. The several trading vessels

* Whale and his Captors, p. 105. † See Scammon's Marine Mammalia, p. 60, and Nimrod of the Sea, p. 388.

report seeing many whales, and that quite a number were taken by the natives at different places. At this time most of the whalers were walrnsing, but a few that were in the line of whales in the Arctic took one or more. In two or three days they had all gone past and no more whales were seen till the ships were off Point Barrow.

"From the middle of June till the last of July we were engaged in catching walruses. The past season was rather a poor one for this branch of business, as it was later than usual before the walruses were found in large numbers. We took 2,000, that yielded 1,200 barrels of oil. There does not yet appear any diminution in the number of these animals; still if the ships continue to catch them as they have done for the last few years it cannot be long before there will be a great decrease. This season a schooner was fitted from San Francisco expressly for walrus catching, and doubtless the fair success she met with will prompt the fitting away of others next year, so I fear the poor walruses are destined to suffer.

"Early in August we arrived off Point Barrow. We found a number of whalers already there, and some of them boiling. The ice, when we passed up, was some 10 miles off shore, at the Sea Horse Islands, and from there to Point Barrow, 70 miles, there was a strip of clear water 20 miles wide, but which will almost be closed up if the wind came a few hours from the west. From Cape Smith to Point Barrow there was a body of ice aground, and on the western edge of the bank that extends to the north from the point there was a wall of ice some 6 miles long and 60 feet or more in height, so high that there were only a few places where it was possible from the "crow's nest" to look over it. This wall, however, was quite narrow, and probably was formed when a pack moving from the west took the ground on this bank, in some 7 fathoms of water, the pressure behind piling the succeeding ice upon that which was grounded. We found the ships anchored near the end of this wall. To the northeast there was an opening in the ice of several miles of greater or less extent, according to the wind, while to the eastward of the point the ice lay in huge floes many miles in extent, and but little separated. Only near the point was there much small ice, and among this there was much that was so large as to make navigation among it unsafe and difficult. The whales were already coming from the east, and would cross the open water near the end of the ground ice and bury themselves in the western pack.

"On August 15 five vessels started to the eastward, and the next day passed out of sight. One vessel after another would follow, and by the last of the month the whole fleet was to the east of Point Barrow. To the north was an unknown amount of ice, but it was possible, with care and with a favoring wind, to thread one's way along the land among the floes of ice. In this difficult navigation the Roman and Milton came to grief, and returned to the point. Some of the vessels report having gone as far east as Return Reef. The Sea Breeze went no farther than Smith's Bay. The vessels that first went east found whales off Point Tangent, 40 miles from Point Barrow, but farther east very few whales were seen—fortunately, as it proved—as it is acknowledged that if whales had been found and the fleet been detained a few days to the eastward New Bedford would again have had to deplore the loss of her northern fleet.

"Early in September the ships were all back to Point Barrow. The weather was now quite cold, and the ice encroaching fast on our open space. On the 6th of September, in company with bark Mercury, we steered to the southwest and run 80 miles between the ice and land, and then to the west of Herald Island. We found much open ice over the usual whaling-ground. September 13 we were in the longitude of Herald Island, but 80 miles to the south of it, and the ice trending to the southwest, so we turned again to the east. Here we spoke bark Cleone,* Captain Nye, who was also working east and reported the Rainbow working up towards Herald Island.

* Cleone wrecked the same year in Saint Lawrence Bay, Captain Nye afterwards lost in Mt. Wollaston.

In a few days we were back among the eastern ships, and on the 17th of the month learned that the Three Brothers had been abandoned in the ice around Point Barrow, and that the ships that brought down her crew barely escaped the double danger of being inclosed by the ice and of being frozen in. We had now northeast wind, quite cold, and snowy. A few nights after the W. A. Farnsworth was lost, her crew barely having time to escape as they stood.

"At this time there was more young ice than I have ever before seen in the Arctic. On the 20th of September, in latitude 70° 20′, the whole ocean appeared to be frozen over, the young ice being nearly an inch thick, so that the ship needed a fresh breeze to force her way through it; and a few days later we found ice nearly 2 inches thick still farther south.

"About the 20th of September several vessels left, some it is reported leaving the sea to look for right whales. Others went westward.

"The northeast wind freshened to a gale, and on the 25th of September we had drifted to south of Cape Lisburne, and in company with the Mount Wollaston anchored under the lee of Point Hope. Next day took our anchors and steered south to leave the sea, but before we had reached East Cape met a south wind and swung off again for Herald Island. October 1, sighted Herald Island, also vessels whaling, and soon after whales. The south wind, with a current running north, had carried the ice so far that ships were now whaling close to the island in clear water. Learned soon after that there had been many whales here; that the Rainbow had worked up through 80 miles of ice and found them here about the middle of September, and that all the vessels here had been doing well. There were in sight here nine sails; if any more, not immediately around the island, and it was thought that all the others had left the sea. The last whales were taken here October 10, by barks Cleone and Helen Mar. We took three only, making 330 barrels. For many years I have not seen so many or such large whales as about here for the first week in October.

"Left Herald Island October 10. On the 12th anchored in Saint Lawrence Bay. Found here the Rainbow, 17 whales; Norman, 14 whales; and Mount Wollaston, 8 whales. Soon after arrived there the Pacific 11 whales, the Northern Light 9 whales, the Progress 8 whales, the Helen Mar 13 whales, and the Cleone 11 whales.

"We sailed from Saint Lawrence Bay October 18, leaving five vessels there. Two days later we killed and lost a right whale, near Saint Matthew's Island, by the sinking of the whale. And now the season seems closed, and nothing remains but to make the best of our way to port. * * *

"Long before you will receive this, in all probability you have learned all that is to be known concerning the vessels abandoned last season. Only two vessels survived the winter. There were, I believe, five men, Hawaiian natives, who made their way over the ice to the Acors Barns, the vessel that lay nearest the land, away to the east of Point Barrow. It chanced that in the gale that soon came on, after the fleet was abandoned, that this vessel was driven through a break in the ground-ice that walled the northern shore, and these men succeeded in reaching the land and Point Barrow soon after the departure of the vessels that were saved. Three of these men were badly frozen and soon died. The two others were kindly cared for by the natives on the point, and when I saw them on board Hawaiian brig William H. Allen were fat and hearty. The bark Clara Bell was abandoned a few miles south from Cape Smith. She was found lying at her anchor, wholly clear from ice, and with no further damage than was done by the natives, who took whatever was of any use to them, and cut and hacked till they had made a bad looking vessel of her. The first few vessels helped themselves to whatever was left of value, and the schooner Newton Booth, of San Francisco, took the remaining oil. The Clara Bell lay there at her anchor till about the 20th of September, when she broke adrift and came up with the current and went out of sight in the ice to the northeast. She was last seen off Harrison's Bay.

"I cannot learn that anything certain is known concerning the other abandoned ships. There was a report that some trading vessel understood from the natives, at Point Hope, that during the winter a ship made her appearance off the point, among the ice; that they (the natives) boarded her; that they found no one on her; but on the ice near her the bodies of two men who had perished while trying to reach the land. It seems probable to me that in the strong northeast gales of the fall the abandoned ships were driven to the southwest, and were drifting around with the ice through the winter, and if not sooner broken to pieces, were carried away in the spring among the ice moving north. The Acors Barns was burned by the natives.

"The men that spent the winter among the natives report most kind treatment. They say, however, that occasionally they had to flee from one house to another, when the inmates of the first were having a drunken frolic, as at such times they could not be sure of their lives. A few years ago these people did not know the use of intoxicating liquors. What a comment on our boasted civilization and on the genuineness of our Christianity that this little colony of people, in this most remote corner of the earth, must suffer and be imbruted because of us! It is a grievous shame, and one that I hope will soon come to an end." [The Sea Breeze arrived at San Francisco November 11, having had a long and rough passage down—a succession of southerly gales—with 1,450 barrels oil, 5,000 pounds whalebone, and 6,000 pounds ivory.]

CAPTAIN PEASE ON ARCTIC WHALING.—Captain Pease, of the ship Champion, of Edgartown, in a letter published in the New Bedford Shipping List, of November 29, 1870, thus describes some of the incidents of Arctic whaling:

"We made and entered the ice on the 17th day of May, about 40 miles south of Cape Navarin, weather thick and snowing; on the 20th the weather cleared up, showing about a dozen ships in the ice. The weather having every appearance of a gale, I worked out of the ice, and soon found myself surrounded by fifty ships. Saw but one whale in the ice. On the 23d, weather pleasant, two or three ships worked a short distance in the ice; the next day the fleet commenced following and in a few hours fifty ships were on a race to Cape Thaddeus; it was oak against ice, and like all heavy moving bodies which come in collision, 'the weakest structure always gives way;' so with the ships, they *all* came out more or less damaged in copper and sheathing—the Champion four days ahead to Cape Thaddeus, in clear water.

"Unfortunately, for the first time since whaling, there were no whales. On the 13th of June we lowered for a whale going quick into the ice, Cape Agchen bearing southwest 90 miles, and before getting the boats clear the ice packed around us. From that time until the 26th, so close and heavy was the ice packed around us, that we found it impossible to move the ship. With our sails furled, we drifted with the ice about 12 miles per day toward Cape Agchen, the ship lying as quiet as in a dock, but on the 22d, when close under the cape, a gale set in from the southward, producing a heavy swell and causing the ship to strike heavily against the ice. We saved our rudder by hooking our blubber-hooks to it and heaving them well taut with hawsers to our quarters. Had the current not taken an easterly shore course, the ship must have gone on shore. The wind blowing on shore, which was distant less than half a mile, 5 to 6 fathoms of water under us, ship rolling and pounding heavily against the ice, weather so thick we could not see 50 yards, made it rather an anxious time. For thirty-six hours I was expecting some sharp-pointed rock would crash through her sides. On the 24th, finding only 4½ fathoms water, little current, with the larger pieces of ice around, we let go an anchor and held her to a large floe of ice. Here we broke our sampson-post off in the deck. On the morning of the 25th the weather cleared up, showing our position to be at the head of a small bay about 15 miles east of Cape Agchen. Here for two days we lay becalmed and ice-bound. On the second day the ice loosened, when we took

our anchor and by eighteen hours' hard work succeeded in kedging about 4 miles seaward; a breeze then springing up from off shore, we spread sail and passed into clear water. We spent a short time in the straits, but saw nothing of the bowhead kind. Passed into the Arctic July —, and found most of the fleet catching walrus; about a dozen ships (this one among the number) went cruising along the northern ice for bowheads. After prospecting from Icy Cape to near Herald Island, and seeing not a whale, I returned to the walrus fleet. The first ship I saw was the Vineyard, with one hundred and seventy-five walrus; since then I have not seen or heard from her. This walrusing is quite a new business, and ships which had engaged in it the previous season and came up prepared were very successful. While at it, we drove business as hard as the best of them, but soon became convinced that the ship's company (taken collectively) were much inferior to many others; they could not endure the cold and exposure expected of them. I have seen boats' crews that were properly rigged, kill and strip a boat load of walrus in the same length of time another (not rigged) would be in killing one and hauling him on the ice. We took some four hundred, making about 230 barrels. About August 5 all the ships went in pursuit of bowheads (most of them to Point Barrow). When off the Sea Horse Islands we saw a few whales working to the westward, just enough to detain us; we took two making 200 barrels; the weather cold, and a gale all the time. In September I worked up about 70 miles from Point Barrow; saw quite a show of small whales in the sea; took four which made about 100 barrels. As that was a fair sample, and not having the right boys to whale in that ice, where the thermometer stood only 8 above zero, I went back to the westward. Ships that had from forty to fifty men (clad in skins) and officers accustomed to that particular kind of whaling, did well. In going back the fourth mate struck a whale which made about 70 barrels. From the 28th of September to the 4th of October we saw a good chance to get oil, had the weather been good, and a well, hardy crew. We could not cut and whale at the same time. We took four whales which would have made 500 barrels had we had good weather to boil them. On the 4th of October we put away for the straits, in company with the Seneca, John Howland, and John Wells—a gale from the northeast, and snowing. On the evening of the 7th it blew almost a hurricane; hove the ship to south of Point Hope, with main-topsail furled; lost starboard bow boat, with davits—ship covered with ice and oil. On the 10th entered the straits in a heavy gale; when about 8 miles south of the Diomedes, had to heave to under bare poles, blowing furiously, and the heaviest sea I ever saw; ship making bad weather of it; we had about 125 barrels of oil on deck, and all our fresh water; our blubber between decks in horse pieces, and going from the forecastle to the mainmast every time she pitched, and impossible to stop it; ship covered with ice and oil; could only muster four men in a watch; decks flooded with water all the time; no fire to cook with or to warm by, made it the most anxious and miserable time I ever experienced in all my sea service. During the night shipped a heavy sea, which took off bow and waist boats, davits, slide-boards, and everything attacked, staving about 20 barrels of oil. At daylight on the second day we found ourselves in 17 fathoms of water, and about 6 miles from the center cape of Saint Lawrence Island. Fortunately the gale moderated a little, so that we got two close-reefed topsails and reefed courses on her, and by sundown were clear of the west end of the island. Had it not moderated as soon as it did, we should, by 10 a. m., have been shaking hands with our departed friends."

Another difficulty of North Pacific navigation is mentioned in a letter from Capt. William H. Kelley, of the bark James Allen, of New Bedford, to the Hawaiian Gazette, in 1874.* He says: "One of the perplexities of the navigator cruising in the Arctic Ocean is the singular effect northerly and southerly winds seem to have upon the mariner's compass. Captains have noticed this singu-

* See New Bedford "Shipping List," January 5, 1875.

larity for years, and no solution of the matter, as far as I have learned, has yet been arrived at. Navigators have noticed that with a north or northeast wind they can tack in eight points, while with the wind south or southwest in from fourteen to sixteen points. All navigators know that for a square-rigged vessel to lie within four points of the wind is an utter impossibility, the average with square-rigged vessels being six points. This peculiar action of the compass renders the navigation of the Arctic difficult and at times dangerous, especially in thick, foggy weather. Navigators in these regions have proved to their satisfaction that on the American coast, north and east of Point Barrow, to steer a land course by the compass and allow the variations given by the chart, 44° 15′ east, with the wind at north or northeast, *would run the ship ashore, steering either east or west.* * * * Experience, therefore, has obliged navigators to ignore the variations marked upon the charts, and lay the ship's course by the compass alone to make a land-course safe in thick weather. * * * With an east or west wind the effect on the compass is not so great as with other winds. I have said this much to show the working of the compass in the Arctic Ocean during different winds, not that I admit that the wind has any effect whatever upon the compass. I give the facts as they came under my observation, and corroborative testimony will be borne by any shipmaster who has cruised in the Arctic Ocean."

THE DANGERS OF THE FISHERY.—Whaling in the Arctic Ocean is attended with uncertainty in every particular, both in regard to the condition and movement of the ice, and the movement of the whales. The early departure of the animals to inaccessible regions among the ice, and the anxious weeks spent in awaiting their return, make this ground one of the most exciting regions that whalemen can find, and the surroundings are of more than usual interest. Much has been written in the accounts of Arctic expeditions descriptive of the icy regions, and much is said of the dangers attending navigation in those seas. Nothing can exceed the daring and pluck of the whalemen in their endeavors to search out and capture their prey. Forgetful of surrounding dangers, they pursue the spouting animal far up among the ice-floes, and many a vessel has been crushed to pieces by the ice as she was tracking out a whale. Anxious to secure full fares, they remain amid the freezing waters until early winter stares them in the face, when they plow their way homeward. Several disasters have overtaken the fleet in their zeal to catch the whale, as in 1871, when thirty-two noble craft were left at anchor in sight of certain destruction, the crews, after arduous labor, saving themselves in boats.

The story of the disaster of 1871, as also that of 1876, is told as follows by Starbuck:

"In the fall of 1871 came news of a terrible disaster to the Arctic fleet, rivaling in its extent the depredations of the rebel cruiser. Off Point Belcher thirty-four vessels lay crushed and mangled in the ice; in Honolulu were over twelve hundred seamen who by this catastrophe were shipwrecked.

"Early in May the fleet arrived south of Cape Thaddeus, where they found the ice closely packed, and the wind blowing strong from the northeast.* This state of affairs continued during the most of the month. June came in with light and variable winds and foggy weather; but the ice opening somewhat, the ships pushed through in sight of Cape Navarin, where they took five or six whales, and for a short time heard many more spouting among the ice. About the middle of June the ice opened still more, and the fleet passed on through Anadir Sea, taking a few whales as they went. By the 30th of June the vessels had passed through Bering Strait, preceded by the whales. Waiting the further breaking up of the ice, they commenced catching walruses, but with comparatively poor success. During the latter part of July, the ice disappearing from the east shore south of Cape Lisburne, the fleet pushed on to the eastward, following the ice, the

* Harper's Weekly, December 2, 1871.

principal portion of which was in latitude 69° 10′. A clear strip of water appearing on the east shore, leading along the land to the northeast, they worked along through it to within a few miles of Icy Cape. Here some of the vessels anchored, unable to proceed farther on account of the ice lying on Blossom Shoals.

"About the 6th of August the ice on the shoals started, and several ships got under way. In a few days most of the fleet was north of the shoals, and, aided by favorable weather, they worked to the northeast as far as Wainwright Inlet, eight vessels reaching there on the 7th, Here the ships either anchored or made fast to the ice, which was very heavy and densely packed. and whaling was carried on briskly for several days, and every encouragement was given for a favorable catch. On the 11th of August a sudden change of wind set the ice inshore, catching a large number of boats which were cruising for whales in the open ice, and forcing the ships to get under way to avoid being crushed. The vessels worked inshore under the lee of the ground ice, and succeeded, despite the difficulties of the situation, in saving their boats by hauling them for long distances over the ice, some of them, however, being badly stoven. On the 13th the ice grounded, leaving a narrow strip of water along the land up to Point Belcher. In this open water lay the fleet anchored or fast to the ice, waiting for the expected northeast wind that was to relieve them of their icy barrier, whaling constantly being carried on by the boats, though necessarily under many adversities.

"On the 15th of August the wind came around to the westward, driving the ice still closer to the shore and compelling the vessels to work close in to the land. The drift of the ice inland was so rapid that some of the vessels were compelled to slip their cables, there being no time to weigh anchor. By this event the fleet was driven into a narrow strip of water not over a half a mile in width at its widest part. Here, scattered along the coast for 20 miles, they lay, the water from 14 to 24 feet deep, and ice as far as the lookouts at the mastheads could see. Whaling was still carried on with the boats off Sea-Horse Island and Point Franklin, although the men were obliged to cut up the whales on the ice and tow the blubber to the ships.

"On the 25th a strong northeast gale set in and drove the ice to a distance of from 4 to 8 miles off shore, and renewed attention was given to the pursuit of the whale. Up to this time no immediate danger had been anticipated by the captains beyond that incidental to their usual sojourn in these seas. The Eskimo, nevertheless, with the utmost friendliness, advised them to get away with all possible speed, as the sea would not again open; but this was contrary to the Arctic experience of the whalemen, and they resolved to hold their position.

"On the 29th began the series of conflicting circumstances resulting in the destruction of the fleet. A southwest wind sprang up, light in the morning, but freshening so toward evening that the ice returned inshore with such rapidity as to catch some of the ships in the pack. The rest of the fleet retreated ahead of the ice, and anchored in from 3 to 4 fathoms of water, the ice still coming in and small ice packing around them. The heavy floe-ice grounded in shoal water and between it and the shore lay the ships, with scarcely room to swing at their anchors.

"On the 2d of September the brig Comet was caught by the heavy ice and completely crushed, her crew barely making their escape to the other vessels. She was pinched until her timbers all snapped and the stern was forced out. and hung suspended for three or four days, being in the mean time thoroughly wrecked by the other vessels; then the ice relaxed its iron grip and she sunk. Still our hardy whalemen hoped that the looked-for northeasterly gale would come, and felt greater uneasiness on account of the loss of time than because of their present peril. Their experience could not point to the time when the favoring gale had failed to assure their egress. Nothing but ice was visible off shore, however, the only clear water being where they lay, and

that narrowed to a strip from 200 yards to half a mile in width, and extending from Point Belcher to 2 or 3 miles south of Wainwright Inlet. The southeast and southwest winds still continued, light from the former and fresh from the latter direction, and every day the ice packed more and more closely around the doomed vessels.'

"On the 7th of September the bark Roman, while cutting in a whale, was caught between two immense floes of ice off Sea Horse Islands, whence she had helplessly drifted, and crushed to atoms, the officers and crew escaping over the ice, saving scarcely anything but their lives.

"The next day beheld the bark Awashonks meet a similar fate, and a third fugitive crew was distributed among the remaining ships. The peril was now apparent to all; the season was rapidly approaching the end; the ice showed no signs of starting, but on the contrary the little clear water that remained was rapidly filling with ice and closing around them. Frequent and serious were the consultations held by the captains of the beleaguered vessels. One thing at least was evident without discussion; if the vessels could not be extricated, the crews must be got away before winter set in, or the scanty stock of provisions they had could only postpone an inevitable starvation. As a precautionary measure, pending a decision on the best course to adopt, men were set to work to build up the boats, that is, to raise the gunwales so as to enable them the better to surmount the waves. Shoes* were also put on them, to prevent, as far as possible, injury from the ice. The brig Kohola was lightened in order to get her over the bar at Wainwright Inlet, upon which there were only 5 or 6 feet of water. Her oil and stores were transferred to the deck of the Charlotte, of San Francisco, but when discharged it was found that she still drew 9 feet of water, and the attempt to get her over the shoal water was abandoned.† An expedition of three boats, under the command of Capt. D. R. Frazer, was now sent down the coast to ascertain how far the ice extended; what chances there were of getting through the barrier; what vessels, if any, were outside, and what relief could be relied upon. Captain Frazer returned on the 12th, and reported that it was utterly impracticable to get any of the main body of the fleet out; that the Arctic and another vessel were in clear water below the field, which extended to the south of Blossom Shoals, 80 miles from the imprisoned crafts; and that five more vessels, then fast in the lower edge of the ice, were likely to get out soon. He also reported, what every man then probably took for granted, that these free vessels would lay by to aid their distressed comrades. It is a part of the whaleman's creed to stand by his mates. On hearing this reported, it was decided to abandon the fleet, and make the best of their way, while they could, to the rescuing vessels. It was merely a question whether they should leave their ships and save their lives, or stand by their ships and perish with them.

"The morning of the 14th of September came, and a sad day it was to the crews of the ice-bound crafts. At noon the signals, flags at the mast heads, union down, were set, which told them the time had come when they must sever themselves from their vessels.‡ As a stricken family

*A sheathing—in this case copper—being used.

†The same experiment, with the same result, was tried by Captain Redfield, of the brig Victoria.

‡The following protest was written on the 12th of September, and signed by all the captains on the following day before abandoning their vessels:

"POINT BELCHER, *Arctic Ocean, September* 12, 1871.

"Know all men by these presents, that we, the undersigned, masters of whale-ships now lying at Point Belcher, after holding a meeting concerning our dreadful situation, have all come to the conclusion that our ships cannot be got out this year, and there being no harbor that we can get our vessels into, and not having provisions enough to feed our crews to exceed three months, and being in a barren country, where there is neither food nor fuel to be obtained, we feel ourselves under the painful necessity of abandoning our vessels, and trying to work our way south with our boats, and, if possible, get on board of ships that are south of the ice. We think it would not be prudent to leave a single soul to look after our vessels, as the first westerly gale will crowd the ice ashore, and either crush the

feels when the devouring flames destroy the home which was their shelter, and with it the little souvenirs and priceless memorials which had been so carefully collected and so earnestly treasured, so feels the mariner when compelled to tear himself from the ship, which seems to him at once parent, friend, and shelter. In these vessels lay the result of all the toil and danger encountered by them since leaving home. Their chests contained those little tokens received from or reserved for friends thousands of miles away, and nothing could be taken with them save certain prescribed and indispensable articles. With heavy hearts they entered their boats and pulled away, a mournful, almost funereal, flotilla, toward where the vessels lay that were to prove their salvation. Tender women and children were there, who, by their presence, sought to relieve the tedium of a long voyage to their husbands and fathers, and the cold north wind blew pitilessly over the frozen sea, chilling to the marrow the unfortunate fugitives.

"The first night out the wanderers encamped on the beach behind the sand-hills. A scanty supply of fire-wood they had with them and such drift-wood as they could collect sufficed to make a fire to protect them somewhat from the chilling frost. The sailors dragged boats over the hills, and by turning them bottom upward and covering them with sails, made quite comfortable habitations for the women and children. The rest made themselves comfortable as best they could.

"On the second day out," says Captain Preble, "the boats reached Blossom Shoals, and there spied the refuge-vessels lying 5 miles out from shore, and behind a tongue of ice that stretched like a great peninsula 10 miles farther down the coast, and around the point of which the weary crews were obliged to pull before they could get aboard. The weather here was very bad, the wind blowing fresh from the southwest, causing a sea that threatened the little craft with annihilation. Still the hazardous journey had to be performed, and there was no time to be lost in setting about it. * * * All submitted to this new danger with becoming cheerfulness, and the little boats started on their almost hopeless voyage, even the women and children smothering their apprehensions as best they could. On the voyage along the inside of the icy point of the peninsula everything went moderately well; but on rounding it they encountered the full force of a tremendous southwest gale and a sea that would have made the stoutest ship tremble. In this fearful sea the whale-boats were tossed about like pieces of cork. They shipped quantities of water from every wave which struck them, requiring the utmost diligence of all hands at bailing to keep them afloat. Everybody's clothing was thoroughly saturated with the freezing brine, while all the bread and flour in the boats was completely spoiled. The strength of the gale was such that the ship Arctic, after getting her portion of the refugees on board, parted her chain-cable and lost her port anchor, but brought up again with her starboard anchor, which held until the little fleet was ready to sail.

"By four o'clock in the afternoon of the second day all were distributed among the seven vessels that formed the remnant of the fleet that sailed for the Arctic Ocean the previous spring. Not a person was lost to add to the grief already felt or to increase the gloom of their situation.

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ships or drive them high upon the beach. Three of the fleet have already been crushed, and two are now lying hove out, which have been crushed by the ice, and are leaking badly. We have now five wrecked crews distributed among us. We have barely room to swing at anchor between the pack of ice and the beach, and we are lying in three fathoms of water. Should we be cast on the beach it would be at least eleven months before we could look for assistance, and in all probability nine out of ten would die of starvation or scurvy before the opening of spring.

"Therefore, we have arrived at these conclusions: After the return of our expedition under command of Capt. D. R. Frazer, of the Florida, he having with whale-boats worked to the southward as far as Blossom Shoals, and found that the ice pressed ashore the entire distance from our position to the shoals, leaving in several places only sufficient water for our boats to pass through, and this liable at any moment to be frozen over during the twenty-four hours, which would cut off our retreat, even by the boats, as Captain Frazer had to work through a considerable quantity of young ice during his expedition, which cut up his boats badly."

(Signed by the masters.)

To the Europa were assigned 280; to the Arctic, 250; to the Progress, 221; to the Lagoda, 195; to the Daniel Webster, 113; to the Midas, 100; and to the Chance, 60; in all 1,219 souls in addition to their regular crews. On the 24th of October the larger portion of these vessels reached Honolulu, and the remaining ones of the seven speedily followed.

"On the receipt of the news of this disaster, more particularly in New Bedford, great excitement was occasioned. The value of the wrecked vessels sailing from that port alone exceeded, with their cargoes, $1,000,000. But the owners of whaling-vessels were not the men to yield supinely to a single misfortune, however overpowering it might seem, and the ensuing year twenty-seven ships were busy in the Arctic, and in 1873 twenty-nine visited that precarious sea.

"The names of the beleaguered fleet were: from New Bedford, barks Awashonks, value $58,000; Concordia, $75,000; Contest, $40,000; Elizabeth, $60,000; Emily Morgan, $60,000; Eugenia, $56,000; Fanny, $58,000; Gay Head, $40,000; George, $40,000; Henry Taber, $52,000; John Wells, $40,000; Massachusetts, $46,000; Minerva, $50,000; Navy, $48,000; Oliver Crocker, $48,000; Seneca, $70,000; William Rotch, $43,000; ships George Howland, $43,000; Reindeer, $40,000; Roman, $60,000; Thomas Dickason, $50,000. From New London, bark J. D. Thompson, value $45,000; and ship Monticello, $45,000. From San Francisco, barks Carlotta, value $52,000; Florida, $51,000; and Victoria, $30,000. From Edgartown, ships Champion, value $40,000; and Mary, $57,000. And from Honolulu, Sandwich Islands, barks Paira Kohola, $20,000; Comet, $20,000; and Victoria 2d and ship Julian, $40,000. The Honolulu vessels had generally American owners, having been placed under the Hawaiian flag to protect them from rebel cruisers.

"Capt. William H. Kelley, who commanded the Gay Head, visited the locality the following year, and wrote home the condition of such of the vessels as still remained. The Minerva lay at the entrance to Wainwright Inlet, as good in hull as when abandoned. The T. Dickason lay on her beam-ends on the bank, bilged and full of water. The Seneca was dragged by the ice up the coast some distance; her bowsprit was gone, bulwarks stove, and rudder carried away, and she was frozen in solid. The Reindeer sank, and the Florida was ashore on Sea Horse Islands, burned to the water's edge. The rest of the fleet were either carried away by the ice, crushed to pieces, or burned by the natives. The Gay Head and Concordia were burned where they lay. The bark Massachusetts went around Point Barrow. There was one white man on board her who staid up here last winter. He made his escape over the ice this summer, and was five days getting back to the ships. He was about used up when they found him this summer. The natives set out to kill him, but the women saved him, and afterward the old chief took care of him. He saved a large quantity of bone, but the natives took it away from him, except a small quantity. He said $150,000 would not tempt him to try another winter in the Arctic. He said that four days after we left the ships last year the water froze over and the natives walked off to the ships; and fourteen days after there came on a heavy northeast gale and drove all but the ground-ice away (that never moved). Shortly after there blew another northeast gale, and he said that of all the butting and smashing he ever saw, the worst was among those ships driving into each other during those gales. Some were ground to atoms, and what the ice spared the natives soon destroyed, after pillaging them of everything they pleased.'"

In the season of 1876 the fleet met with another disaster of less pecuniary extent but more appalling in its effect on human life. The fleet consisted of eighteen American ships and barks and two foreign vessels. Of these, twelve were lost or abandoned in the Arctic. "Much of the melancholy story seems a duplicate description of that of 1871. Again the fleet had entered that fatal ocean early in August, and again commenced the season's whaling with prospects of fair

success; again the ice commenced closing around them; again they cherished delusive hopes that a strong gale would drive it off shore and afford them a means of escape, and again these hopes were doomed to a bitter disappointment. Again the masters decided it was necessary to abandon their vessels, and again the abandonment was accomplished. Here the parallel ceases. Several men perished from exposure in journeying from one beleaguered vessel to another apparently more safe, and many died on the toilsome, perilous march and voyage to the rescuing ships. Many more preferred to stay by the ships and risk their chances of surviving during the terrible Arctic winter to assuming the nearer and, to them, apparently no less dangerous alternative of an immediate escape."* Three hundred men escaped, and fifty-three remained among the natives. There was no feasible way to communicate with them until the summer of 1877. Provisions and fuel were reported amply sufficient for them, and with the first clear water of 1877 ready hands and willing hearts hastened to their assistance. The experiences of these men during the winter and until their rescue in the summer of 1877 are told by Captain Barnes on page 77, above; only two of the abandoned vessels survived the winter: one of these was burned by the natives and the other was lost in September, 1877. The names of the lost and abandoned vessels with their approximate values, not including cargoes, were as follows: (Of these the Arctic was lost; the others abandoned.) From New Bedford, the Acors Barns, $36,000; Camilla, $36,000; Cornelius Howland, $40,000; James Allen, $36,000; Java 2d, $25,000; Josephine, $40,000; Marengo, $40,000; Mount Wollaston, $32,000; Onward, $40,000; and St. George, $36,000. From San Francisco, the Clara Bell, $24,000. And from Honolulu, the Arctic, $32,000, and Desmond, $24,000. A total loss of $442,000. The estimated value of the cargoes was about $375,000 more.

In 1877 three of the Arctic fleet were lost, in 1878 one, and in 1879 three. The description of the class of vessels employed in this fishery is given under the head of vessels and apparatus, and the cruising-grounds are discussed under the head of whaling-grounds.

STATISTICS OF PACIFIC-ARCTIC WHALING 1835 TO 1880.—The following statement gives a summary of each season's fishing of the North Pacific fleet from 1835 to 1880. The locality includes the waters between the Asiatic and American coasts north of 50° north latitude.

Statement showing the number of American vessels in the North Pacific fleet each year and their catch of oil and bone.

[Compiled from Whalemen's Shipping List.]

Year.	No. of vessels.	Average barrels whale oil.	Total barrels whale oil.	Total pounds whalebone.†	Remarks.
1835	1				
1836	1				
1837	1				
1838	1				
1839	2	1,400	2,800		
1840	3	587	1,760		
1841	20	1,412	28,200		
1842	29	1,627	47,200		
1843	108	1,349	146,800		
1844	170	1,528	259,570		
1845	263	953	250,600		
1846	292	869	253,800		

* History Whale Fishery, in U. S. Fish Commission Report, 1875–'76.

† Arctic whalebone not recorded separate prior to 1868.

Statement showing the number of American vessels in the North Pacific fleet each year and their catch, &c.—Continued.

Year.	No. of vessels.	Average barrels whale oil.	Total barrels whale oil.	Total pounds whalebone.*	Remarks.
1847	177	1,059	187,443	.....	
1848	159	1,164	185,256	.....	
1849	155	1,334	206,850	.....	
1850	144	1,692	243,648	.....	
1851	138	626	86,360	.....	
1852	278	1,343	373,450	.....	
1853	238	912	217,056	.....	
1854	232	794	184,063	.....	
1855	217	873	189,579	.....	
1856	178	822	146,410	.....	
1857	143	796½	113,000	.....	
1858	196	620	121,650	.....	
1859	176	535	94,160	.....	
1860	121	518	62,678	.....	Two of the fleet lost, the George and Mary and Paulina.
1861	76	724	55,024	.....	
1862	32	610	19,525	.....	
1863	42	857	36,010	.....	
1864	68	522	35,490	.....	
1865	59	617	36,415	.....	
1866	95	598	56,925	.....	
1867	90	640	57,620	.....	Also eleven foreign vessels.
1868	61	708	43,230	627,500	Also seven foreign vessels that took 4,370 barrels oil, 66,000 pounds bone.
1869	43	890	38,275	525,000	Also six foreign vessels that took 6,475 barrels oil, 85,000 pounds bone.
1870	46	1,069	49,205	659,550	Also nine foreign vessels that took 8,080 barrels oil, 97,000 pounds bone.
1871	35	.....	.....	15,000	All but seven of the fleet were lost, including four foreign vessels.
1872	27	730	19,730	258,200	Also four foreign vessels took 1,900 barrels oil, 29,400 pounds bone.
1873	30	676	20,295	239,300	Also four foreign vessels; two of them took 980 barrels oil, 5,300 pounds bone.
1874	23	883	20,380	222,100	Also four foreign vessels that took 2,530 barrels oil, 25,000 pounds bone.
1875	16	1,355	21,680	230,460	Also four foreign vessels that took 3,450 barrels oil, 36,800 pounds bone.
1876	18	.....	5,250	35,200	All but eight of the fleet lost, also two foreign vessels.
1877	19	1,096	17,530	153,800	Three of the fleet were lost. One foreign vessel took 300 barrels oil, 3,000 pounds bone.
1878	17	770	13,080	114,200	One of the fleet lost.
1879	21	.....	18,800	200,500	Three of the fleet lost.
1880†	19	1,406	26,709	409,000	
Total	4,300	.....	3,994,397	.....	

* Arctic whalebone not recorded separate prior to 1868.

† Since the above was compiled the reports for subsequent years have been received, as follows: 1881, 23 vessels, 24,740 barrels of whale oil, 387,000 pounds whalebone; 1882, 32 vessels, 22,975 barrels whale oil, 360,500 pounds whalebone; 1883, 38 vessels, 10,155 barrels whale oil, 159,400 pounds whalebone; 1884, 39 vessels, 20,450 barrels whale oil, 318,700 pounds whalebone. The fleet in 1880 included two steamers, in 1884 the number of steamers had increased to nine. Another marked change in this fishery is the larger proportion of vessels hailing from San Francisco, as is shown on subsequent pages in the details of each year's voyage.

The cruising grounds of the fleet, prior to 1848, were south of Bering Strait, chiefly on the Northwest Ground. In 1848 a vessel passed through the Strait and was very successful. From that date the Arctic fleet increased rapidly in numbers. Since the year 1868 the principal resort of the North Pacific fleet (so called) has been the Arctic Ocean north of Bering Strait, as shown on following pages.

The details of each voyage to the North Pacific and Arctic Oceans since 1868 are given in the following lists, compiled from the Whalemen's Shipping List:

List of vessels comprising the North Pacific whaling fleet of 1868, with the season's catch of each vessel.

Name of vessel.	Fishing ground.	Season's catch.	
		Whale oil.	Bone.
NEW BEDFORD.		*Barrels.*	*Pounds.*
Active	Arctic	800	17,000
Adeline	Okhotsk	400	4,500
Alto	Kadiak	425	4,000
Aurora	do	400	5,000
Awashonks	Arctic	800	13,000
Benj. Cummings	Okhotsk	260	3,000
California	Arctic	1,000	18,000
Cicero	Kadiak	280	2,000
Corinthian	Arctic	1,050	15,000
Concordia	do	600	10,000
Cornelius Howland	do	1,100	16,000
Daniel Webster	do	925	15,000
Eagle	do	800	8,000
Engenia	Kadiak	200	
Fanny	do	500	5,000
Gay Head	do	600	4,000
George	do	150	1,000
George Howland	Arctic	600	8,000
Helen Mar	do	1,000	18,000
Helen Snow	do	1,050	19,000
Hercules	Okhotsk	350	3,000
Hibernia	Kadiak	630	5,000
Islander	do	260	1,500
James Allen	Arctic	1,050	18,000
Java	Kadiak	630	6,000
John Carver	Arctic	550	8,500
John Howland	do	1,000	17,000
John Wells	do	950	18,000
Josephine	do	1,200	17,000
Lydia	do	400	7,000
Massachusetts	do	800	15,000
Midas	Okhotsk	1,175	9,000
Milo	Arctic		
Nautilus	do	1,000	11,000
Navy	do	160	1,200
Norman	Kadiak	600	9,000
Ocean	Arctic	550	4,500
Ohio	do	1,150	20,000
Onward	do	1,300	25,000
Oriole	do	1,000	16,000
President	Kadiak	470	4,000
Progress	Arctic	1,000	20,000
Rainbow	Kadiak	90	1,000
Reindeer	Arctic	1,550	25,000
NEW BEDFORD—continued.			
Sea Breeze	Okhotsk	1,100	15,000
Seine	Kadiak	30	300
St. George	Arctic	300	4,000
Tamerlane	Kadiak	430	4,000
Thomas Dickason	do	370	3,500
Three Brothers	Arctic	1,170	21,000
Trident	Kadiak	1,050	8,000
Washington	Arctic	100	2,000
52 ships and barks		35,505	505,000
FAIRHAVEN.			
General Scott	Arctic	1,100	15,000
EDGARTOWN.			
Champion	Arctic	500	8,500
Europa	Okhotsk	325	3,000
Vineyard	Arctic	1,300	22,500
3 ships		2,125	34,000
NEW LONDON.			
Acors Barns	Arctic	450	4,500
Monticello	do	900	16,000
Nile	Okhotsk	450	6,000
3 ships and barks		1,800	26,500
SAN FRANCISCO.			
Florida	Arctic	1,700	31,000
Massachusetts	do	1,000	16,000
1 ship and 1 bark		2,700	47,000
HONOLULU.			
Comet	Arctic	600	12,000
Julian	do	1,100	18,000
Kohola	do	700	15,000
William Rotch	Okhotsk	900	7,000
4 ships and barks		3,300	52,000
BREMEN.			
Eagle	Kadiak	170	3,000
Count Bismarck	Arctic	600	9,500
2 barks		770	12,500
TAHITI.			
Norman	Kadiak	300	2,500

RECAPITULATION.

Fishing ground.	Ships and barks.	Whale oil.	Bone.
		Barrels.	*Pounds.*
Arctic Ocean	41	35,005	575,200
Okhotsk Sea	8	4,960	50,500
Kadiak	19	7,635	68,800
Total	68	47,600	694,500

List of vessels comprising the North Pacific whaling fleet of 1869, with the season's catch of each vessel.

Name of vessel.	Fishing ground.	Season's catch.	
		Whale oil.	Bone.
NEW BEDFORD.		*Barrels.*	*Pounds.*
Active	Arctic	800	12,000
Aurora	do	1,500	17,000
Awashonks	do	700	11,000
Benj. Cummings	Okhotsk	200	2,300
California	Arctic	750	14,000
Concordia	do	1,450	18,500
Cornelius Howland	do	1,300	18,000
Daniel Webster	do	1,000	12,000
Elizabeth Swift	do	900	15,000
Emily Morgan	Bristol Bay	600	2,000
Gay Head	Arctic	1,200	16,500
George Howland	do	1,200	15,000
Helen Mar	do	600	10,500
Helen Snow	do	1,000	16,000
Henry Taber	do	800	17,000
Hercules	Okhotsk	500	5,000
Hibernia	Arctic	800	13,500
James Allen	do	950	13,500
Janns	Okhotsk	575	3,000
John Carver	Arctic	800	14,000
John Howland	do	1,700	21,000
Josephine	do	1,100	17,000
Lagoda	do	650	11,600
Marengo	do	1,000	13,500
Massachusetts	do	1,000	16,000
Norman	do	1,000	17,000
Ohio	do	400	7,500
Oliver Crocker	do	980	14,000
Onward	do	1,000	15,000
Oriole	do	1,250	14,500
Progress	do	1,100	13,000
Rainbow	Arctic	900	13,000
Roman	do	750	11,500
Sea Breeze	do	1,050	12,000
Trident	do	1,600	18,000
William Rotch	Okhotsk	450	2,500
36 ships and barks		33,605	462,900
EDGARTOWN.			
Europa	Okhotsk	500	5,000
Vineyard	Arctic	600	8,500
2 ships		1,100	13,500
NEW LONDON.			
Acors Barns	Arctic	600	11,000
J. D. Thompson	do	900	12,600
Monticello	do	120	
Nilo	Okhotsk	350	4,000
4 ships and barks		1,970	27,600
SAN FRANCISCO.			
Florida	Arctic	1,600	21,000
HONOLULU.			
Weilhelm 1st	Arctic	1,300	15,000
Kohola	do	800	15,000
Eagle	do	1,600	25,000
Count Bismarck	do	1,200	15,000
Julian	do	1,500	15,000
Comet	do	75	
6 ships and barks		6,475	85,000

RECAPITULATION.

Fishing ground.	Ships and barks.	Whale oil.	Bone.
		Barrels.	*Pounds.*
Arctic Ocean	42	41,575	586,200
Okhotsk Sea	6	2,575	21,800
Bristol Bay	1	600	2,000
Total	49	44,750	610,000

List of vessels comprising the North Pacific whaling fleet of 1870, with the season's catch of each vessel.

Name of vessel.	Fishing ground.	Season's catch.	
		Whale oil.	Bone.
NEW BEDFORD.		*Barrels.*	*Pounds.*
Active	Arctic	1,050	18,000
Alaska	do	740	10,000
Aurora	do	1,300	15,000
Benjamin Cummings	do	1,080	15,000
California	do	1,400	15,000
Concordia	do	1,600	16,000
Cornelius Howland	do	1,550	18,000
Daniel Webster	do	1,200	18,000
Elizabeth Swift	do	1,150	15,600
Emily Morgan	do	750	8,000
Engenia	do	400	6,000
Fanny	do	1,200	20,000
George	Bristol Bay	400	5,000
Henry Taber	Arctic	1,100	19,650
Hercules	do	1,500	20,000
Helen Snow	do	1,000	16,000
Janns	do	350	4,300
John Howland	do	1,500	21,000
John Wells	do	1,100	17,000
Josephine	do	2,100	30,000
Lagoda	do	900	10,000
Marengo	do	1,070	13,000
Midas	do	1,200	16,000
Minerva	do	925	12,000
Navy	do	700	10,000
Norman	do	380	1,000
Ohio	do	1,000	15,000
Oliver Crocker	do	970	12,000
Onward	do	1,650	23,000
Roman	do	1,350	19,000
Sea Breeze	do	1,350	16,000
Seneca	do	1,200	18,000
Thomas Dickason	do	950	14,000
Trident	do	1,800	20,000
William Rotch	do	1,000	13,000
35 ships and barks		38,915	519,550
EDGARTOWN.			
Champion	Arctic	950	12,000
Europa	do	850	11,000
Mary	do	750	10,000
Vineyard	do	1,400	20,000
4 ships and barks		3,950	53,000
NEW LONDON.			
Acors Barns	Arctic	700	8,000
J. D. Thompson	do	1,500	15,000
Monticello	Okhotsk	200	2,000
3 ships and barks		2,400	25,000
SAN FRANCISCO.			
Florida	Arctic	1,900	30,000
Massachusetts	do	1,050	7,000
Menshikoff	do	800	15,000
Victoria	do	190	10,000
4 ships and barks		3,940	62,000
HONOLULU.			
Arctic	Arctic	850	15,000
Comet	do	400	7,000
Count Bismarck	do	1,500	18,000
Eagle	do	1,000	10,000
Julian	do	1,500	18,000
Kohola	do	650	10,000
Onward	do	500	9,000
Parea	do	800	
Wilhelm 1st	do	880	10,000
9 ships and barks		8,080	97,000

RECAPITULATION.

Fishing ground.	Ship and barks.	Whale oil.	Bone.
		Barrels.	*Pounds.*
Arctic Ocean	53	56,685	749,550
Okhotsk Sea	1	200	2,000
Bristol Bay	1	400	5,000
Total	55	57,285	756,550

In the season of 1871 the North Pacific fleet consisted of thirty-five American and four foreign vessels, all but seven of which were abandoned in the ice off Wainwright's Inlet, north of Bering Strait. The names of the saved vessels were the Europa, Arctic, Progress, Lagoda, Daniel Webster, Midas, and Chance. Four of the lost vessels belonged at Honolulu. The following are the names of the abandoned vessels and the ports to which they belonged:

NEW BEDFORD.—*Barks:* Awashonks, Concordia, Contest, Elizabeth, Emily Morgan, Eugenia, Fanny, Gay Head, George, Henry Taber, John Wells, Massachusetts, Minerva, Navy, Oliver Crocker, Seneca, William Rotch. *Ships:* George Howland, Reindeer, Roman, Thomas Dickason.

NEW LONDON.—*Bark:* J. D. Thompson. *Ship:* Monticello.

SAN FRANCISCO.—*Barks:* Carlotta, Florida, Victoria.

EDGARTOWN.—*Ships:* Champion, Mary.

HONOLULU.—Paira Kohola, Comet, Victoria 2d, Julian.

The North Pacific whaling fleet of 1872.

Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*
Active	775	13,000
Alaska	150	3,000
Arnolda	500	9,000
Bartholomew Gosnold	600	8,000
Camilla	1,000	12,000
Europa	800	11,000
Helen Mar	1,050	10,000
Helen Snow	40	400
Illinois	1,000	19,000
James Allen	1,100	15,000
Jireh Perry	1,650	16,000
Josephine	1,200	16,000
Joseph Maxwell	100	1,600
Lagola	500	5,000
Live Oak	1,000	12,000
Louisa	550	10,000
Marengo	1,450	16,500
Midas	1,000	13,500
Nautilus	360	5,000
Northern Light	800	10,000
Progress	900	7,000
Rainbow	70	1,200
Sea Breeze	450	5,000
Tamerlane	360	4,000
Trident	1,300	20,000
Triton	275	6,000
Total	18,980	248,200
NEW LONDON.		
Acors Barns	750	10,000
HONOLULU.		
Arctic	1,000	12,000
R. W. Wood	550	12,000
Total	1,550	24,000
SYDNEY.		
Chance	200	3,000
Faraway	150	2,400
Total	350	5,400

The North Pacific whaling fleet of 1873.

Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*
Active	525	4,000
Alaska	550	8,000
Arnolda	550	6,000
Bartholomew Gosnold	300	
Camilla	550	7,000
Europa	800	8,000
Helen Mar	550	8,500
Illinois	800	11,600
James Allen	1,000	9,000
Java	180	3,500
Java 2d	150	3,000
Jireh Perry	1,150	19,000
Josephine	1,150	14,000
Joseph Maxwell	1,100	14,000
Live Oak	1,600	13,500
Louisa	1,150	11,000
Marengo	820	5,000
Midas	550	6,500
Mount Wollaston	550	9,000
Nautilus	550	7,000
Northern Light	750	4,500
Ocean Steed		
Onward	800	7,000
Progress	1,075	17,000
Sea Breeze	400	3,000
St. George	900	12,000
Triton	100	
Total	18,595	210,100
NEW LONDON.		
Acors Barns	380	4,000
SAN FRANCISCO.		
Florence	320	200
Helen Snow	1,000	15,000
Total	1,320	15,000
HONOLULU.		
R. W. Wood	600	1,000
Arctic	380	4,300
Total	980	5,300
SYDNEY.		
Adventurer		
Faraway		

The North Pacific whaling fleet of 1874.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	NEW LONDON.	*Barrels.*	*Pounds.*
Arnolda	125	1,500	Acors Barns	260	3,200
Bartholomew Gosnold	330	4,500			
Camilla	140	1,500	SAN FRANCISCO.		
Europa	1,050	10,000	Florence	200	2,300
Helen Mar	750	5,200	Tugur	260	3,000
Illinois	1,530	18,300			
James Allen	1,350	19,300	Total	460	5,300
Java	1,375	13,000			
Java 2d	1,100	11,000			
Jireh Perry	1,550	16,000	HONOLULU.		
Josephine	1 400	18,000	Arctic	950	10,000
Joseph Maxwell	950	10,200	Onward	600	5,000
Mount Wollaston	900	12,000			
Marengo	800	7 200	Total	1,550	15,000
Northern Light	1,100	12 800			
Onward	1,800	20,000			
Progress	1,100	14,000	SYDNEY.		
Sea Breeze	60	800	Adventurer	650	5,000
St. George	1,350	9,300	Faraway	330	5,000
Triton	900	9,000			
Total	19,660	213,600	Total	980	10,000

The North Pacific whaling fleet of 1875.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	NEW BEDFORD continued.	*Barrels.*	*Pounds.*
Acors Barns	1,550	13,450	St. George	1,750	14,280
Camilla	1,880	24 200	Triton	1,300	14,000
C. Howland	1,100	10,000	Total	20,480	220,460
Europa	1,650	17,000			
Helen Mar	1,500	12,200	SAN FRANCISCO.		
Illinois	2,100	26,500	Florence	1,200	10,000
James Allen	1,650	15,000			
Java	1,650	16,430	HONOLULU.		
Java 2d	800	6,000	Arctic	2,100	15,000
Mount Wollaston	450	4,800	Onward	750	7,800
Northern Light	750	10,000	Faraway	600	6,000
Onward	1,650	18,000	Desmond	1,000	8,000
Rainbow	1,000	18,600	Total	3,450	36,800

The North Pacific whaling fleet of 1876.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	NEW BEDFORD—continued.	*Barrels.*	*Pounds.*
Acors Barns*			Rainbow	550	10,000
Camilla*			St. George*		
Cornelius Howland*			Three Brothers	1,700	14,900
Illinois*			Total	4,550	33,800
James Allen*					
Java			SAN FRANCISCO.		
Java 2d*					
Marengo*			Clara Bell*		
Mount Wollaston	250	3,000	Florence	700	1,400
Northern Light	1,400	4,100			
Norman	500		HONOLULU.		
Onward*			Arctic*		
Osmanli	150	1,800	Desmond*		

* Lost.

The North Pacific whaling fleet of 1877.

Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*
Cleone*		12,000
Eliza	700	1,500
Helen Mar	1,300	20,500
Java*		
Mercury	1,080	800
Milton		
Mount Wollaston	850	12,000
Norman	1,700	16,000
Northern Light	1,600	16,000
Osmanli	150	2,000
Pacific	1,350	15,000
Progress	1,300	12,000
Rainbow	2,300	25,000
Roman	700	4,000
Sea Breeze	1,500	6,500
Thomas Pope	700	3,000
Three Brothers	*500	*500
SAN FRANCISCO.		
Dawn	600	3,000
Florence	1,200	4,000
HONOLULU.		
William H. Allen	300	3,000
Total	17,830	156,800

* Lost; catch of whalebone saved.

The North Pacific whaling fleet of 1878.

Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*
Abram Barker	300	5,000
Coral	850	12,000
Eliza	950	5,000
Helen Mar	680	7,500
Hunter	680	3,500
John Howland	860	8,000
Mercury	950	6,500
Mount Wollaston	100	700
Norman	850	6,000
Northern Light	850	3,500
Pacific	670	5,500
Progress	600	6,000
Rainbow	1,370	21,000
Sea Breeze	1,200	10,000
Thomas Pope	870	5,000
SAN FRANCISCO.		
Florence*	500	4,000
Dawn	800	5,000
Total	13,080	114,200

* Lost—300 barrels oil and 3,000 pounds bone saved.

The North Pacific whaling fleet of 1879.

Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*
Abram Barker	1,175	15,000
Coral	1,200	15,000
Eliza	950	8,500
Fleetwing	600	4,500
Helen Mar	1,100	15,000
Hunter	1,280	12,000
John Howland	1,150	15,000
Mercury*	975	9,000
Mount Wollaston*	300	4,500
Norman	1,250	13,000
Northern Light	1,150	8,500
Pacific	1,050	8,000
Progress	900	10,000
Rainbow	1,150	17,000
Sea Breeze	1,250	13,000
Thomas Pope	1,000	15,000
Vigilant†	400	6,000
EDGARTOWN.		
Tropic Bird	450	4,000
SAN FRANCISCO.		
Francis Palmer	500	3,500
Dawn	850	4,000
Hidalgo	120	
Total	18,800	200,500

* Lost.

† Last seen in the Arctic Ocean October 10, 1879.

The North Pacific whaling fleet of 1880.

Name of vessel.		Number of whales.	Barrels whale oil.	Pounds whalebone.	Barrels sperm oil.	Pounds walrus ivory.
NEW BEDFORD.						
Abraham Barker	bark	14	1,300	20,000	.....	.....
Coral	do	17	1,700	23,000	.....	150
Eliza	do	16	1,600	23,000	56	1,800
Fleetwing	do	12	1,250	19,000	180	1,100
Helen Mar	do	16	1,450	25,000	.....	100
Hunter	do	19	1,800	30,000	.....	600
John Howland	do	5	500	7,500	40	.....
Mary and Helen	steamer	27	2,250	45,000	300	.....
Norman	bark	10½	1,550	17,000	.....	2,500
Pacific	do	11½	1,700	17,000	80	2,500
Progress	do	17½	1,900	28,000	.....	800
Rainbow	do	24½	2,150	38,000	80	150
Sea Breeze	do	17	1,650	25,500	90	1,200
Thomas Pope	do	10	1,100	15,000	40	900
EDGARTOWN.						
Tropic Bird	brig	9	900	12,000	180	600
SAN FRANCISCO.						
Alaska	schooner	12	550	23,000	.....	.....
Dawn	bark	13	1,400	17,000	.....	1,300
Francis Palmer	do	6½	1,150	12,000	.....	1,150
Hidalgo	brig	8	800	12,000	.....	600
Total for the fleet		265½	*26,700	409,000	1,046	15,450

*Includes 4,000 barrels walrus oil.

The North Pacific whaling fleet of 1881.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	NEW BEDFORD—continued.	*Barrels.*	*Pounds.*
Abram Barker	1,200	14,000	Pacific	1,200	20,000
Atlantic	700	12,000	Progress	1,500	25,000
Belvedere	1,800	32,000	Rainbow	1,650	30,000
Coral	1,450	24,000	Thomas Pope	1,250	24,000
Daniel Webster*	.....	.....	Sappho	350	7,000
Eliza	200	3,000	SAN FRANCISCO.		
Enropat	1,050	12,000	Dawn	1,200	17,000
Fleetwing	1,400	24,000	Francis Palmer	450	6,000
Helen Mar	1,900	30,000	Hidalgo	500	5,000
Hunter	1,200	18,000	Sea Breeze	1,400	25,000
John Howland	1,400	24,000	Tropic Birdt	740	8,000
Josephinet	1,200	11,000	Total	24,740	387,000
Northern Light	1,000	16,000			

*Lost July 2. †Japan Sea.

The North Pacific whaling fleet of 1882.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	NEW BEDFORD—continued.	*Barrels.*	*Pounds.*
Abram Barker	850	13,500	Ohio 2d	600	8,000
Arnolda	300	3,000	Rainbow	1,000	15,000
Atlantic	650	11,000	Reindeer*	350	3,200
Belvedere, steamer	750	9,000	Sappho‡		
Eliza	350	6,000	Stamboul	300	4,000
Europa*	950	11,000	Young Phœnix	225	3,800
Fleetwing	1,250	19,000			
Gazelle	200	3,000	EDGARTOWN.		
George and Susan	900	11,000	Bounding Billow	600	10,000
Helen Mar	800	11,000			
Hunter	1,400	25,590	SAN FRANCISCO.		
Jacob A. Howland	600	9,000	Bowhead, steamer	1,650	26,000
John Howland	1,750	29,500	Coral	1,000	14,000
Josephine	300	5,000	Dawn	900	14,000
Louisa	400	6,000	Francis Palmer	350	5,000
Mabel	700	10,500	Hidalgo	700	8,000
Mary and Susan	1,050	20,500	Sea Breeze and tender	1,309	34,500
Northern Light	800	11,500	Total	22,975	360,500
North Star, steamer†					

*Japan Sea. † Lost July 8. ‡ Lost May 6.

The North Pacific whaling fleet of 1883.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	NEW BEDFORD—continued.	*Barrels.*	*Pounds.*
Abram Barker	600	6,700	Reindeer*	400	3,500
Arnolda	100		Stamboul	50	
Atlantic	125	1,300	Young Phœnix	300	6,300
Belvedere, steamer	500	8,000			
Europa*	650	5,500	SAN FRANCISCO.		
Fleetwing	275	3,900	Amethyst	100	1,500
Gazelle	140	5,900	Balæna, steamer	100	4,000
George and Susan	250	1,400	Bowhead, steamer	950	15,000
Helen Mar	90	1,400	Bounding Billow	240	3,300
Hunter	125	1,200	Coral	380	3,000
Jacob A. Howland	350	4,400	Cyane§		
John Howland†	250	2,000	Dawn	100	1,400
Josephine	330	5,500	Eliza	375	6,000
Louisa‡	300	5,000	Francis Palmer		
Lucretia, steamer	125	1,500	Hidalgo		
Mabel	240	4,500	Narwhal, steamer	430	6,000
Mary and Helen, steamer (new)	380	4,500	Orca, steamer	1,300	20,500
Mary and Susan	200	3,500	Sea Breeze	150	1,800
Northern Light*	325	5,000	Wanderer	125	1,900
Ohio 2d	350	7,000			
Rainbow	450	7,000	Total	10,155	159,400

*Japan Sea. † Lost July 17. ‡ Lost September 22. § Lost August —.

The North Pacific whaling fleet of 1884.

Name of vessel.	Whale oil.	Bone.	Name of vessel.	Whale oil.	Bone.
NEW BEDFORD.	*Barrels.*	*Pounds.*	SAN FRANCISCO.	*Barrels.*	*Pounds.*
Abram Barker	400	7,000	Amethyst	200	2,000
Arnolda	300	5,000	Balæna, steamer	1,700	29,000
Atlantic	70	1,000	Bowhead, steamer †	400	10,000
Belvedere, steamer	260	3,000	Bounding Billow	280	5,000
Fleetwing	900	14,000	Coral	275	3,500
Gazelle			Dawn		
George and Susan	370	5,500	Eliza	130	2,000
Helen Mar			Emma F. Herriman †	1,075	11,500
Jacob A. Howland	850	12,500	Francis Palmer	100	2,000
Josephine	1,000	18,000	Hidalgo	100	2,000
Lucretia, steamer	380	6,700	Hunter	275	3,000
Mabel	100	1,700	Mary and Helen, steamer	1,000	17,000
Mars	240	4,500	Narwhal, steamer	1,250	20,000
Mary and Susan	200	3,500	Northern Light	700	12,500
Ocean	270	4,500	Orca, steamer	2,100	31,000
Ohio 2d	650	11,500	Sea Breeze	325	5,500
Rainbow	750	12,000	Stamboul	300	3,800
Reindeer*	500	5,000	Thrasher, steamer	1,700	25,000
Young Phœnix	950	12,000	Wanderer	260	3,800
EDGARTOWN.					
Napoleon	90	1,700	Total	20,450	318,700

*Okhotsk and Japan Seas. †Lost.

DAVIS STRAIT AND HUDSON BAY FISHERY.

ORIGIN OF THE FISHERY.—The whale-fishery had been extensively prosecuted by the Dutch at Spitzbergen and on the east coast of Greenland for more than a hundred years before it was found necessary to seek other fields. The Dutch were the first to push into new waters and capture the animals on the west coast of Greenland in Davis Strait. They inaugurated the fishery there in the year 1719, and were soon followed by other European nations. Probably the first American vessel to visit Davis Strait sailed from New England, under Captain Atkins, in 1732. He cruised as far as 66° north. In 1736 several whaling vessels returned to New England from those parts, and in 1737 the Davis Strait fleet from Massachusetts alone numbered between fifty and sixty vessels, a dozen of which were fitted at Provincetown.

Douglass, in his History of North America, published in 1760, says "some New England men a few years since attempted whaling in the entrance of Davis Strait, but to no advantage; they generally arrived there too late, in keeping too near the Labrador shore (they kept within 50 leagues of the shore, they should have kept 150 leagues to sea); they were embayed and impeded by the fields of ice. Last year [1745] Nantucket brought about 10,000 barrels of whale oil to market, this year they do not follow it so much, because of the low price of oil in Europe, notwithstanding this year they fit out six or seven vessels for Davis Strait, and sail end of March; they sometimes make Cape Farewell in fifteen days, sometimes in not less than six weeks. The whaling season in both Greenlands is in May and June; the Dutch set out for Davis Strait beginning of March; sometimes they are a month in bearing to weather Cape Farewell; they do not arrive in the fishing-grounds until May. Anno 1743, perhaps a medium year, the Dutch had in Davis Strait fifty whaling ships (at Spitzbergen or East Greenland they had one hundred and thirty-seven whalers) and got seventy-six and a half whales."

The American whale-fishery was very prosperous just before the Revolutionary war, when the annual northern fleet fitted out from Massachusetts numbered one hundred and eighty-three

vessels, measuring 13,820 tons. Many of these cruised in Davis Strait, while the remainder pursued the fishery in the Gulf of Saint Lawrence, about the Straits of Belle Isle, and in other northern waters. After the war the business was greatly reduced in extent, and the northern fleet numbered only ninety-one vessels, very few of which went as far north as Davis Strait. There was at this time, however, a great increase in the northern fisheries from British and French ports, many of these foreign vessels being commanded and in some cases manned by American whalemen who had settled in England, where they might take advantage of the bounty system.

The war of 1812 to 1815 between the United States and England had a very depressing influence on the American whale-fishery; after the war it revived, but the northern cruising grounds were abandoned for the more profitable southern fields that were less exposed to danger and yielded an abundance of sperm and whale oil.

Revival of the fishery in 1846.—It was not until the year 1846 that Davis Strait was again visited by our whalemen. In that year the ship McLennan, under Captain Slate, sailed from New London on the 8th of April, and returned September 17 with about 140 barrels of oil. Part of the officers and crews of the vessel were Englishmen experienced in the fishery in those waters. Although the first voyage was not as successful as could be desired, yet the McLennan was again fitted in the spring of 1847, and sailed March 5, returning October 5 with 1,111 barrels of oil and 15,000 pounds of bone, besides 845 seal-skins obtained off the Newfoundland coast at the beginning of the season. In 1849, 1850, and 1851 other voyages were made, and in 1852 the vessel was lost in the Davis Strait, while on her sixth voyage to those waters. The product of her several voyages was about 3,500 barrels of whale oil and 51,000 pounds bone, besides a few thousand seal-skins and some barrels of seal oil.

Capt. S. O. Buddington, who sailed on the McClennan on her voyages in 1850 and 1851, gives the following account of those and subsequent voyages in which he participated: "On the 7th of March, 1850, I sailed on the McClennan from New London bound for Davis Strait. We were fitted for sealing as well as whaling. When we arrived on the coast of Newfoundland we saw seals on the ice some 40 miles from land. In cruising along the coast as far as the Straits of Belle Isle, we captured about seven hundred seals, saving the skins and blubber. About the middle of May we quitted sealing and went whaling off Discoe, Greenland, and in Baffin's Bay. We got five whales that season, and arrived home October 22. The next year I sailed again in the same vessel, leaving New London February 8. While sealing during the spring along Newfoundland and south of Davis Strait we got about eleven hundred seals and two whales. We did not go as far north as Discoe this year, but whaled in Cumberland Inlet, where we got a few whales, and at the close of the season the vessel left for home, arriving at New London, October 28, with 258 barrels of oil, 4,900 pounds of bone, 1,100 seal-skins, and some seal oil. The entire crew of the McClennan did not return home in her, but myself with a gang of twelve men were left to spend the winter in the inlet, for the purpose of trading with the natives and capturing what whales and seals we could. We built the frame of a hut from spare stuff left by the vessel, and covered it with seal-skins. Here we spent the cold winter, occasionally securing a seal and purchasing articles of the natives in exchange for knives, powder, &c. We were the first whalemen that ever spent a winter in this region. At the opening of spring we found whales in considerable abundance, and with the aid of the natives secured during the spring and summer months sixteen small whales that yielded considerable blubber, and about 16,000 pounds of bone.

"The McClennan left home in the spring of 1852, but never reached the inlet. It is thought she was lost near the entrance to Davis Strait. After waiting long enough to be satisfied that our vessel would not return to take us home, we shipped our oil, skins, and bone on an English

vessel, and sailed on her for Hull, England, leaving the inlet October 1, and arriving at Hull November 7, when we sold our oil, whalebone, and seal-skins. I started for the United States on an English vessel, but she was disabled and returned to port, when I shipped on another vessel, and arrived in New London about the middle of January, 1853.

"On July 13, 1853, I sailed again for Davis Strait on the brig Georgiana. We did not stop for seal on the Newfoundland coast, but hastened to Cumberland Inlet, where we spent the winter with the vessel frozen in the ice. This was the first whaling vessel to winter in the ice in the vicinity of Davis Strait. We had quite a successful time in catching seals and whales at the opening of spring, taking advantage of the first movement of the ice when whales were abundant, and we secured twelve in two days. During the entire voyage we caught twenty-four whales that yielded 890 barrels of oil and 16,000 pounds of bone. By trade and capture we got about 1,000 seal-skins, worth at that time about 75 cents apiece at New London. Arrived home October 8, 1854.

"In the year 1855 I sailed again in the same vessel, leaving New London April 11. Some of the crew were disabled by scurvy while on our way north. This delayed us, so that when we reached Frobisher Bay we were too late in the season for whaling. We wintered in the bay and had a terrible hard time of it, losing fourteen men by scurvy. As soon as the ice opened in the spring we started for home, but our men were weak and it took us several weeks to make a few miles. After many difficulties we finally reached New London September 27, 1856, with no cargo except about 200 seal-skins obtained during the winter.

"In 1857 I sailed on the Georgiana again, and had a very good voyage, leaving New London April 11, and arriving home December 20, with 600 barrels of oil, 12,000 pounds of bone, and about 200 seal skins. I tried it again in the same vessel in 1858. We sailed June 1, the vessel and outfit being valued at $9,000; went to Cumberland Inlet and wintered there, and returned home December 9, 1859, with a cargo valued at $21,000. This was an excellent voyage and quite a contrast to the terrible hardships of our trip two years before.

"On May 29, 1860, I went north in the bark George Henry. Capt. C. F. Hall went with us. This was his first trip to the Arctic. He has written an account of it in a book entitled Arctic Researches, published in 1865. Our whaling-ground on this voyage was in Frobisher Bay, where we wintered two seasons returning home September 13, 1862, with 564 barrels of oil, 10,100 pounds of bone, 450 seal-skins, and 250 walrus-skins. As these were the first quantity of walrus skins brought home by any whaling vessel, we did not know whether they were of any merchantable value. We had prepared them by salting a little and then drying on the rocks. They sold at 50 cents each in New London and were used for belting. During the winter months we lived with the natives in their huts. We got short of provisions and moved from place to place, so that we were sometimes a long distance from our vessel. Wherever we went we took a whale-boat and gear along with us, rigging the boat on a sled for this purpose. Occasionally we would pull the boat to the edge of the ice and go in search of whales, capturing several in this manner.

"I sailed in 1863 on a voyage to Cumberland Inlet in the schooner Franklin. We wintered there and arrived home in 1864. I made two voyages after this, each tolerably successful."

From 1846 to 1852 the McClennan was the only American vessel fishing in the vicinity of Davis Strait. In the latter year this vessel was lost, and in 1853 the Amaret and Georgiana were fitted for those waters. In 1855 the George Henry was added to the fleet, and these three comprised the entire Davis Strait fleet until 1860, when ten vessels were sent out to those waters The vessels that had been sent north prior to 1860 were generally of the older class, and not thoroughly equipped for severe battling with the ice, but that year two large ships were included

in the list. These were fitted at a large cost for the express purpose of pushing farther west through Hudson Strait into the bay where it was anticipated abundance of whales could be found, and where no American vessel had ever been. "Without accurate charts, in waters totally unknown, among ice and strong currents, in short days and long nights, in fogs and gales of wind, with large compass variations, these adventurous navigators pushed their way, and reached the longitude of 90°, spent a winter there, when the thermometer fell to 60° below zero, obtained cargoes worth about $60,000, and returned to the United States in 1861."*

Since 1860 this fishery has been pursued with varying success; the total number of voyages fitted since that date has been one hundred and eight, and the largest number sent out in any one year was nineteen vessels in 1864. About 3 per cent. of the entire catch of whale oil and 5 per cent. of the whalebone taken by the American fleet from 1870 to 1880 was by the Hudson Bay vessels. Most of the whaling has been carried on in Cumberland Inlet and Hudson Bay, no Americans having pushed on as far north as do the Scotch steam whalers that cruise up as far as the seventy-fourth parallel. The first steam-whaling vessel owned in the United States was the steam-bark Pioneer, sent to Davis Strait in 1866. She sailed April 28, and arrived home November 14, with 340 barrels of oil and 5,300 pounds of bone. She sailed again in 1867, and was lost on the voyage, being sunk by the ice. The best voyage ever made by the Davis Strait fleet was by the bark Pioneer that sailed from New London June 4, 1864, and after passing the season in Hudson Bay returned, September 18, 1865, with 1,391 barrels of oil and 22,650 pounds of bone, valued at $150,000.

The vessels in this northern fleet must be double planked around the bow and along the sides near the water line as a protection against the ice. This planking will last for several years. No copper or metal is used on the bottom, and but few sails are needed as the vessel is frozen in the ice much of the time. The natives are of great assistance to the whalers, helping them in taking whales and also in procuring fresh fish and meat. On the Scotch steamers it is the general custom to carry the blubber home to be tried out, but American whalers here, as in other parts of the world, prefer to try it out on board the vessels. The Scotchmen cruise about these waters during the summer months, and then return home, while many of the American vessels winter in the ice.

Most of the whales taken in these northern waters are of the bowhead or polar species—which is peculiarly an ice-whale—and is the same as taken by the Pacific-Arctic fleet. Whales have been taken in the vicinity of Point Barrow, with harpoons in them bearing the marks of vessels that had been pursuing the fishery in the vicinity of Davis Strait; hence it seems certain that there exists a passage from one ocean to the other. An instance of this kind is given by the Honolulu Commercial Advertiser, in December, 1870. It is an account of a harpoon which was found in a whale captured by the ship Cornelius Howland, of New Bedford, then cruising in the North Pacific Ocean. It is the custom among whalemen to have each iron stamped with initials designating the ship to which it belongs. This is done to prevent dispute in case it is necessary to waif the whale, or in case boats from two different ships lay claim to one which has been killed. While off Point Barrow the Cornelius Howland took a large polar whale, in the blubber of which was embedded the head of a harpoon marked "A. G.," the wound made by it having healed over. This was presumed to have belonged to the bark Ansel Gibbs, also of New Bedford. But she was known to have been pursuing the fishery in Cumberland Inlet and its vicinity for some ten or eleven years previously. The obvious inference was that this whale must have found his way

*Mr. R. H. Chapell, of New London, in a letter to Capt. C. F. Hall, quoted in Narrative of the Second Arctic Expedition.

from ocean to ocean by some channel unknown to navigators, and that at some seasons of the year there must be an inter-ocean communication. The Advertiser adds: "We have heard before of instances where whales have been caught at Cumberland Inlet with harpoons in them, with which they have been struck in the Arctic Ocean, but we believe this is the first authenticated instance of a whale having been caught in the Arctic Ocean with a harpoon in it from the Davis Strait side."

Scarcely any effort has ever been made by Americans to find whaling-grounds to the east of Greenland or at Spitzbergen, where the Dutch and English once found such profitable fishing. Two American vessels have been sent to the Spitzbergen seas; one, the Hannibal, of New London, a ship of 441 tons that sailed May 21, 1855, and returned March 21, 1856, with 28 barrels of whale oil; the other vessel was the bark Tempest, also of New London, that sailed May 21, 1857. After an unsuccessful cruise near Spitzbergen and the east coast of Greenland, she sailed for the South Atlantic and thence to the North Pacific Ocean, where, after several cruises, she obtained a fair cargo, and returned to New London in 1861. The four years' cruise of the Tempest was not profitable, but resulted in a loss of $7,000. The owner being asked how he could lose so much by the voyage, said: "I will, by way of reply, mention a few items, and the reader may draw his own inferences. Cost of vessel; interest on the same; outfits; interest on outfits; provisions for a large crew; advance to crew; desertion of men; shipping new hands; repairs on vessel; wear and tear; staving boat; clothing for men; new sails; few whales; insurance; commission; leakage; gauging; commission; wharfage; port charges; taxes; more leakage; outgoes; freight; fog; thunder."

Another attempt of Americans to whale in the waters north of Europe was made at Iceland in the years 1865 and 1866, by Captains Dahl and Royce. They proceeded to Seidis Fjord, in latitude 65° 18′ north, with two vessels, the bark Reindeer, of New York, under the American flag and a little steamer called the Visionary, which was built in Scotland, and sailed under the Danish flag. They had two whale-boats fitted for catching the whales that were towed by the steamer into the fjord where they were cut in. The first season proved unsuccessful, but in the spring of 1866, twenty sulphur-bottom whales were taken yielding about 900 barrels of oil. Extensive arrangements had been made to carry on the fishery, steam oil try-works having been built on land. In the winter of 1865–'66 there was sent to Iceland the Dutch schooner Jan Albert, that had been remodeled into a screw steamer and named the Liteus. The crew consisted of Americans, Danes, Scotch, Russians, and one Polynesian. They further employed two small iron steamers built in Glasgow and Liverpool, and called the Vigilant and Stegpideder. By the end of September they had taken forty whales that yielded about 2,400 barrels of oil. Although this American attempt to establish a whale-fishery at Iceland was partially successful, yet the returns as compared with the expenses of the undertaking did not warrant its continuance, and the fishery was abandoned.

The fishing by Scotch vessels in Davis Strait and east of Greenland, as also the early history of the Spitzbergen whale-fishery are discussed below under the head of Whale Fishing by Foreign Nations.

The total number of American vessels that have engaged in whaling in Davis Strait, Hudson Bay, and vicinity, since the revival of this fishery in 1846, includes 16 schooners, 7 brigs, 13 barks, 7 ships, and 1 steamer, a total of 44 vessels, of which 18 were lost on their voyages. The entire number of voyages fitted out in the same period was 138.

Record of voyages 1846 to 1879.—The following table is a record of each voyage made by the American fleet to the region of Davis Strait and Hudson Bay from 1846 to 1879:

Voyages of the Davis Strait and Hudson Bay fleet from 1846 *to* 1879.

Name of vessel.	Rig.	Tons.	Port.	Sailed.	Returned.	Whale oil.	Whale-bone.	Remarks.
1846–1852.						*Barrels.*	*Pounds.*	
McClennan	Ship	376	New London	Apr. 8, 1846	Sept. 17, 1846	140	.. .	
Do	do	376	do	Mar. 5, 1847	Oct. 5, 1847	1, 111	15, 000	845 seal-skins.
Do	do	376	do	Mar. 3, 1849	Oct. 16, 1849	600	12, 000	
Do	do	376	do	Mar. 7, 1850	Oct. 22, 1850	450	7, 000	700 seal-skins
Do	do	376	do	Feb. 8, 1851	Oct. 28, 1851	258	4, 900	1, 100 seal-skins
Do	do	376	do	Mar. —, 1852	.....	.. ...	.....	Lost in Davis Strait.
1853.								
Amaret	Brig	91	New London	July 13, 1853	Aug. 29, 1854	369	8, 000	
Georgiana	do	190	do	July 13, 1853	Oct. 9, 1854	890	16, 000	
1854.								
Amaret	Brig	91	New London	Sept. 7, 1854	Aug. 12, 1855	Clean.	.....	Arrived at Labrador late, and was frozen in the ice from October, 1854, to July, 1855.
1855.								
George Henry	Bark	303	New London	May 29, 1855	Dec. 26, 1855	184	.....	Brought home the abandoned ship Resolute, of the English expedition in search of Franklin.
Georgiana	Brig	190	do	Apr. 11, 1855	Sept. 16, 1856	Clean.	.....	Wintered in Frobisher Strait; lost 14 men from scurvy.
1856.								
Amaret	Brig	91	New London	May 21, 1856	——, 1857	190	2, 200	
George Henry	Bark	303	do	May 21, 1856	Sept. 17, 1857	418	.....	
1857.								
Amaret	Brig	91	New London	Sept. 7, 1857	Sept. 1, 1858	267	5, 700	Frozen in the ice eight months; took the first whale July 1, and was full July 22.
Georgiana	do	190	New London	Apr. 11, 1857	Dec. 20, 1857	443	6, 500	
1858.								
Georgiana	Brig	190	New London	June 1, 1858	Dec. 9, 1859	847	15, 000	Sailed for $9,000; cargo worth $21,000.
1859.								
Amaret	Brig	91	New London	Apr. 13, 1859	.....	.....	.....	Lost in Cumberland Inlet September 27, 1860. The Amaret was the Rescue of Kane's expedition.
1860.								
Ansel Gibbs	Ship	319	Fair Haven	Apr. 11, 1860	Nov. 11, 1861	500	9, 000	
Antelope	Bark	340	New Bedford	Mar. 15, 1860	Oct. 12, 1863	1, 500	24, 000	
Black Eagle	do	311	do	May 20, 1860	Nov. 3, 1861	1, 122	17, 800	
Daniel Webster	Ship	336	do	Mar. 21, 1860	Jan. 5, 1863	.....	6, 500	Put in Aberdeen, Scotland, on account of the rebellion; sent home 2,500 pounds bone; three men died of scurvy in 1862.
George Henry	Bark	303	New London	May 29, 1860	Sept. 13, 1862	564	10, 100	450 seal and 250 walrus skins.
Georgiana	Brig	190	do	May 1, 1860	Oct. 7, 1861	695	14, 700	
Hannibal	Ship	441	do	Mar. 21, 1860	.....	....	8, 000	Abandoned in Cumberland Inlet October, 1861.
Northern Light	do	513	Fair Haven	July 21, 1860	Oct. 11, 1861	1, 104	21, 000	
Pioneer	Bark	235	New London	June 1, 1860	Oct. 22, 1861	10	.....	
Syren Queen	Ship	461	Fair Haven	June 13, 1860	Oct. 11, 1861	665	15, 700	Five men died of scurvy.
1861.								
Antelope	Bark	340	New Bedford	Oct. 31, 1861	Oct. 12, 1863	1, 500	24, 000	
Northern Light	Ship	513	do	Nov. 18, 1861	Oct. 17, 1862	1, 295	19, 900	
1862.								
Ansel Gibbs	Ship	319	New Bedford	Apr. 15, 1862	Oct. 11, 1863	1, 000	17, 580	
Black Eagle	Bark	311	do	May 5, 1862	Sept. 24, 1863	, 650	30 000	
Georgiana	Brig	190	New London	May 9, 1862	Nov. 3, 1863	319	4, 700	
Orray Taft	Bark	176	New Bedford	Apr. 27, 1862	Oct. 25, 1867	225	3, 000	
Pioneer	do	235	New London	May 24, 1862	Oct. 13, 1863	561	9, 000	
1863.								
Actor	Schooner	90	New London	June 15, 1863	Oct. 25, 1863	51	2, 150	
Andrews	Bark	303	New Bedford	Apr 29, 1863	Oct. 25, 1864	1 046	17, 150	
Daniel Webster	do	336	do	Apr. 21, 1863	Oct. 27, 1864	36	9, 700	
Franklin	Schooner	119	New London	June 24, 1863	Sept. 8, 1864	241	5, 800	
George Henry	Bark	303	do	Mar. 19, 1863	....	.....	.....	Lost in Hudson Bay, 1863.
Isabella	Brig	192	do	June 6, 1863	Oct. 4, 1864	502	7, 250	

Voyages of the Davis Strait and Hudson Bay fleets from 1846 *to* 1879—Continued.

Name of vessel.	Rig.	Tons.	Port.	Sailed.	Returned.	Whale oil.	Whale-o ne.	Remarks.
1863.						*Barrels.*	*Pounds.*	
Northern Light	Ship	513	New Bedford	Apr. 29, 1863	Oct. 24, 1864	1,270	20,900	
Pavilion	Brig	150	Fair Haven	June 15, 1863				Crushed in the ice in Hudson Bay in 1863; seven men lost; survivors suffered severely from cold and exposnre.
Wm. Thompson	Ship	495	New Bedford	Mar. 17, 1863	Dec. 19, 1863	100	1,200	
1864.								
Black Eagle	Bark	311	New Bedford	May 7, 1864	Oct. 1, 1865	781	12,400	
Concordia	do	265	Sag Harbor	June 3, 1864	Oct. 1, 1865	70	900	
Cornelia	Schooner	197	New London	May 9, 1864	Oct. 11, 1865	300	4,200	
Era	do	188	do	Aug. 31, 1864	Sept. 20, 1864	Clean.		
George and Mary	Bark	165	do	June 4, 1864	Oct. 10, 1865	180	2,800	
Georgiana	Brig	190	do	Apr. 13, 1864	Oct. 10, 1865	766	15,250	
Glacier	Schooner	262	New Bedford	June 21, 1864	Nov. 13, 1865	328	5,550	
Helen F.	do	108	New London	June 30, 1864	Sept. 18, 1865	Clean.		
Isabel	do	95	do	June 8, 1864	Oct. 28, 1864	Clean.		
Leader	do	81	do	May 28, 1864	Sept. 11, 1865	287	5,000	
Milwood	Bark	254	New Bedford	Apr. 24, 1864	Oct. 28, 1864	2,082	39,200	
Monticello	do	356	New London	June 30, 1864	Sept. 21, 1865	271	3,900	
Morning Star	do	305	New Bedford	May 14, 1864	Oct. 14, 1865	1,170	17,900	
Orray Taft	do	176	do	Apr. 9, 1864	Oct. 6, 1865	472	7,254	
Oxford	Brig	130	Fair Haven	May 5, 1864	May 31, 1865	75	795	
Pioneer	Bark	235	New London	June 4, 1864	Sept. 18, 1865	1,391	22,650	Value of cargo, $150,000.
S. B. Howes	do	101	do	Apr. 19, 1864	Oct. 5, 1865	199	3,000	
1865.								
Andrews	Bark	303	New Bedford	Apr. 1, 1865	Apr. 25, 1866	1,038	16,600	
Daniel Webster	Ship	336	do	May 20, 1865	Nov. 14, 1866	703	11,500	
Era	Schooner	188	New London	May 17, 1865	Nov. 19, 1866	236	2,900	
Franklin	do	119	do	Apr. 25, 1865	Sept. 17, 1866	534	8,900	
Isabella	Brig	192	do	Mar. 7, 1865	Nov. 9, 1866	584	10,500	
Milwood	Bark	356	New Bedford	Apr. 19, 1865	Nov. 7, 1866	923	14,500	
S. B. Howes	Schooner	101	New London	Oct. 26, 1865	Oct. 9, 1867	300	6,000	
1866.								
Ansel Gibbs	Bark	303	New Bedford	May 1, 1866	Oct. 9, 1867	320	6,000	
Black Eagle	do	311	do	Apr. 20, 1866	Sept. 24, 1867	200	3,000	
Concordia	do	265	Sag Harbor	May 11, 1866	Sept. 13, 1867	440	7,300	
Cornelia	Schooner	148	Groton	Apr. 18, 1866	Oct. 31, 1867	200		
Glacier	do	177	New Bedford	Apr. 10, 1866	Oct. 8, 1867	20	200	
George and Mary	Bark	105	New London	Apr. 18, 1866	Sept. 14, 1867	500	10,000	
Georgiana	Brig	128	do	July 12, 1866	Nov. 29, 1867	800	16,000	
Helen F	Schooner	108	do	July 16, 1866	Nov. 20, 1867	50		
Morning Star	Bark	238	New Bedford	Apr. 18, 1866	Oct. 31, 1867	650	12,000	
Orray Taft	do	134	do	May 8, 1866	Oct. 25, 1867	225	3,000	
Oxford	Brig	91	Fair Haven	May 1, 1866	Sept. 22, 1867	280	8,000	
Pioneer	Bark	228	New Bedford	Apr. 19, 1866	Sept. 12, 1867	500	8,000	
Pioneer	Steamer	212	New London	Apr. 28, 1866	Nov. 14, 1866	340	5,300	First steam whaler from the United States.
Quickstep	Schooner	105	do	June 28, 1866	Sept. 14, 1868	362	6,600	
S. B. Howes	do	101	do	June 28, 1866	Oct. 9, 1866	249	5,600	
U. D	do	77	do	June 6, 1866	Sept. 26, 1866	Clean.		
1867.								
Andrews	Bark	277	New Bedford	May 20, 1867				Lost in Cumberland Inlet November 14, 1867.
Era	Schooner	188	New London	Apr. 11, 1867	Aug. 27, 1868	837	13,400	
Franklin	do	119	do	May 2, 1867	Sept. 10, 1868	393	6,600	
Isabella	Brig	192	do	May 25, 1867	Sept. 14, 1868	668	8,700	
Milwood	Bark	216	New Bedford	Apr. 2, 1867	Nov. 13, 1868	378	3,889	
Pioneer	Steamer	212	New London	Mar. 20, 1867				Sunk among the ice in Hudson Strait, July 6, 1867.
1868.								
Ansel Gibbs	Bark	303	New Bedford	June 3, 1868	Sept. 26, 1869	650	10,000	
Concordia	do	217	Sag Harbor	Apr. 20, 1868	Oct. 7, 1869	200	2,900	

Voyages of the Davis Strait and Hudson Bay fleets from 1846 to 1879—Continued.

Name of vessel.	Rig.	Tons.	Port.	Sailed.	Returned.	Whale oil.	Whalebone.	Remarks.
						Barrels.	*Pounds.*	
1868.								
Cornelia	Schooner	148	Groton	May 26, 1868	Sept. 23, 1869	143	1,765	
George and Mary	Bark	105	New London	May 16, 1868	Sept. 17, 1869	450	8,000	
Georgiana	Brig	128	do	Aug. 5, 1868				Lost in 1868 with entire crew
Helen F	Schooner	108	do	June 20, 1868		1,450	13,600	Lost in Cumberland Inlet November 10, 1876.
Oxford	Brig	91	Fair Haven	July 20, 1868				Lost in Cumberland Inlet in 1869.
S. B. Howes	Schooner	101	New London	June 20, 1868	Nov. 6, 1869	Clean.		
1869.								
Era	Schooner	188	New London	May 11, 1869	Oct. 5, 1870	533	5,400	
Franklin	do	119	do	May 18, 1869	Oct. 5, 1870	473	8,418	
Isabella	Brig	192	do	Apr. 14, 1869	Oct. 15, 1870	527	6,587	
Milwood	Bark	216	New Bedford	Apr. 6, 1869	Oct. 6, 1870	990	15,900	
Quickstep	Schooner	105	New London	May 18, 1869				Lost in 1870.
1870.								
Ansel Gibbs	Bark	303	New Bedford	June 21, 1870	Oct. 6, 1870	1,340	22,040	
George and Mary	do	105	New London	May 3, 1870	Nov. 20, 1871	425	5,000	
S. B. Howes	Schooner	101	do	July 7, 1870				Lost in the inlet in 1873.
1871.								
Ansel Gibbs	Bark	303	New Bedford	Dec. 13, 1871				Lost in Hudson Bay October 19, 1872, having 530 barrels oil and 810,000 pounds bone on board; 3,500 pounds bone were saved; 15 of crew died of scurvy.
Concordia	Bark	217	New London	Apr. 25, 1871	Nov. 9, 1871			Nothing but freight; broken up in 1873.
Glacier	do	195	New Bedford	July 9, 1871	Sept. 26, 1873	75	1,600	
Isabella	Brig	192	New London	May 31, 1871	Oct. 28, 1872		228	
Milwood	Bark	216	New Bedford	Sept. 25, 1871		140		Lost on Black Lead Island.
1872.								
Abbie Bradford	Schooner	115	New Bedford	May 28, 1872	Sept. 7, 1873	878	13,131	
John Atwood	do		Provincetown	May 29, 1872	Oct. 8, 1872	180	3,128	
Orray Taft	Bark	134	New Bedford	July 2, 1872				Lost in Hudson Bay September 14, 1872.
1873.								
Isabella	Brig	192	New London	June 26, 1873	Sept. 2, 1873	Clean.		
1874.								
Abbie Bradford	Schooner	115	New Bedford	May 12, 1874	Sept. 24, 1875	650	12,000	The first mate and a boat's crew were lost in the ice September 5, 1874.
Nile	Ship	293	New London	June 15, 1874	Dec. 9, 1874	800	8,000	
President	Bark	259	New Bedford	June 9, 1874	Sept. 16, 1874	500	8,000	
1875.								
Isabella	Brig	192	New London	June 8, 1875	Aug. 27, 1877	400	4,000	
Nile	Ship	293	do	May 4, 1875	Jan. 11, 1876	380	5,000	
1876.								
A. Houghton	Bark	219	New Bedford	May 23, 1876		200	4,500	Lost in Hudson Bay June 12, 1877; value $24,000.
1877.								
A. J. Ross	Brig	197	New Bedford	July 17, 1877	Apr. 10, 1878	243	2,300	
Era	Schooner	134	New London	July 11, 1877	Dec. 4, 1878	20		
L. P. Simmons	do	89	do	May 30, 1877	Nov. 27, 1878	100	2,000	
Nile	Bark	293	do	July 11, 1877	Dec. 1, 1878	350	8,000	
1878.								
Abbie Bradford	Schooner	115	New Bedford	May 8, 1878	Aug. 31, 1879	550	8,000	
Abbott Lawrence	Brig	160	do	May 4, 1878	Sept. 1, 1879	190	3,000	
A. J. Ross	do	197	do	May 15, 1878		20		Lost in Hudson Bay August 16, 1878
Franklin	Schooner	77	do	July 25, 1878	Aug. 31, 1879	40	215	
Isabella	Brig	132	do	May 14, 1878	Aug. 31, 1879	200	4,000	
Mattapoisett	Bark	110	do	May 28, 1878	Sept. 7, 1879	150	2,000	
1879.								
George and Mary	Bark	105	New Bedford	June 23, 1879	Sept. 22, 1880	70	2,400	Mate froze to death. Brought home remains of Dr. Irving, of Franklin Expedition.
Delia Hodgkins	Schooner	95	New London	June 15, 1879	Nov. 22, 1879	300		
Era	do	134	do	June 23, 1879	Nov. 24, 1880	550	8,000	

7. HISTORY OF THE AMERICAN WHALE FISHERY FROM 1750 TO 1815.

The Dutch and English had carried on the whale-fishery in the northern seas for several years prior to the settlement of New England by Englishmen. Along the shore of Massachusetts whales were constantly being driven ashore and were secured by the inhabitants. In the early records of the colonies we find numerous references to drift whales, but it was not until about the year 1712 that vessels were used, and those of but small tonnage, so that they ventured but on short voyages. By the year 1730, however, the vessels were of larger class and generally sloop-rigged. By the year 1750 there was a large fleet sailing from various ports in New England, which has always been the enterprising center for the whale-fishery in this country.

The following exhaustive review of the American whale-fishery during the period from 1750 to 1815 is quoted from Starbuck's History of the Whale Fishery printed in the report of the United States Commissioner of Fish and Fisheries for 1875–'76:

BOUNTY TO ENGLISH WHALERS.—"The period from 1750 to 1784 was the most eventful era to the whale-fishery that it has ever passed through. For a large proportion of the time the business was carried on under imminent risk of capture, first by the Spanish and French and after by the English. The colonial Davis Strait fishery seems to have been quite abandoned, and the vessels cruised mostly to the eastward of the Grand Banks, along the edge of the Gulf Stream and in the vicinity of the Bahamas. In 1748 the English Parliament had passed a second act to encourage this fishery. By it the premium on inspection of masts, yards, and bowsprits, tar, pitch, and turpentine, and on British-made sail-cloth were to continue, and the duties on foreign-made sail-cloth were remitted to vessels engaged in this pursuit. A bounty was also granted on all ships engaged in whaling during the then existing war; harpooners and others employed in the Greenland fishery were exempted from impressment. The commissioners of customs were, under the required certificate, to pay the second twenty shillings per ton bounty granted by Parliament over the first twenty previously granted.* The ships which had sailed during the previous March or April were to be equal sharers in this bounty with those whose sailing had been delayed. All ships built or fitted out for this pursuit from the American colonies conforming to this act were to be licensed to whale, and in order to receive the bounties must remain in Davis Straits or vicinity from May (sailing about May 1) until the 20th of August, unless sooner full or obliged to return by accident. Foreign Protestants serving in this fishery for two years, and qualifying themselves for its prosecution, were to be treated as though they were natives.† The cause of this concession to the colonies was a part of Lord Shirley's scheme to rid Acadia of the French. It was his desire that George II should cause them to be removed to some other English colony, and settle Nova Scotia with Protestants,‡ and to this end invitations were sent throughout Europe to induce Protestants to remove thither. 'The Moravian Brethren were attracted by the promise of exemption from oaths and military service. The good will of New England was encouraged by care for its fisheries; and American whalemen, stimulated by the promise of enjoying an equal bounty with the British, learned to follow their game among the icebergs of the Greenland seas.'§ 'The New Englanders of this period,' says Bancroft,‖ 'were of homogeneous origin, nearly all tracing their descent to the English emigrants of the reigns of Charles the First and Charles the Second. They were a frugal and industrious race. Along the sea-side, wherever there was a good harbor, fishermen, familiar with the ocean, gathered in hamlets; and each returning season saw them

"* In sixth year of the reign of George II." "† Mass. Col. MSS., Maritime, vi, p. 316."
"‡ The carrying out of this scheme and the destruction of the colony of Acadians justly receives execration."
"§ Bancroft's Hist. U. S., v, p. 45." "‖ *Ibid.*, iv, p. 149."

with an ever-increasing number of mariners and vessels, taking the cod and mackerel, and sometimes pursuing the whale into the icy labyrinths of the northern seas; yet loving home, and dearly attached to their modest freeholds.'

"Of this period Hutchinson says: * 'The increase of the consumption of oil by lamps as well as by divers manufactures in Europe has been no small encouragement to our whale-fishery. The flourishing state of the island of Nantucket must be attributed to it. The cod and whale fishery, being the principal source of our returns to Great Britain, are therefore worthy not only of provincial but national attention.'

"A continual succession of foreign wars, in which the hardy fishermen and farmers of New England were constantly called to the aid of England, coupled with a continual succession of intolerant measures adopted by the mother country toward the plantations, which, in common with the colonists at large, they felt impelled to resist, was gradually preparing America for the eventful struggle which was to end in its independence. By the experience of the wars they learned their strength; through the pressure of the tyrannical acts they learned their rights."

EMBARGO OF 1757.—"Pending the expedition for the reduction of Nova Scotia in 1755 an embargo was laid upon the Bank fishermen, though the risk of capture was so great that it of itself must have quite effectively embargoed many of them.†

"In 1757—the embargo being still continued upon the fishery in these waters—a petition was presented to the general court of Massachusetts from the people of Martha's Vineyard and Nantucket, representing that the memorialists 'being Informed that your Honours think it not advisable to Permit the fishermen to Sail on their Voyages until the time limited by the Embargo is Expired by Reason that their fishing banks where they Usually proceed on said Voyages lyes Eastward not far from Cape breton which may be a means of their falling into the hands of the french which may be of bad Consequence to the Common Cause. Your Memorialists would Humbly observe to Your Honours that that is not the Case with the whalemen their proceedure on their Voyages is Westward of the Cape of Virginia and southward of that until the month of June from which Your Memorialists are of the mind their is nothing like the Danger of their falling into the hands of the Cape breton Privateers as would be If they went Eastward. Your Memorialists would further Observe that the whalemen have almost double the Number of hands that the fishermen Carry which makes Their Charge almost Double to that of fishermen and ye first part of the Whale season is Always Esteemed the Principal time for their making their Voyages which If they lose the greatest part of the People will have nothing to Purchase the Necessaries of life withal they haveing no other way which must make them in miserable Situation. Your memorialists would therefore beg that y^r Honours would take Our Miserable Situation under Consideration and grant our Whalemen liberty to Proceed on Our Voyages from this time If it be Consistent with your Great wisdom as in duty bound shall every pray‡

"'JOHN NORTON (for Martha's Vineyard)
"'ABISHAI FOLGER (for Nantucket)'

"In compliance with the foregoing petition the council passed this resolution (April 8, 1758): 'Inasmuch as the Inhabitants of Nantucket most of whom are Quakers are by Law exempted from Impresses for military Service. And their Livelihood intirely depends on the Whale fishery—

"* Hist. of Massachusetts, ii, p. 400."

"† A duty was laid upon the colonists in 1756 to support a frigate on the Banks to defend the fishery."

"‡ Mass. Col. MSS., Maritime vi, p. 371. From this petition it would appear that, having an unfavorable season at the southward, the whalemen would stand for the Banks hoping to fill there. If, however, a vessel got home early from the north, they frequently went on another voyage to the south and westward in the same year."

Advised that his Excellʸ give permission for all whaling Vessells belongᵍ to sᵈ Ilᵈ to pursue their Voyages, taking only the Inhᵗˢ of sᵈ Island in sᵈ Vessells and that upon their taking any other persons whatsoever with them they be subject to all the Penalties of the law in like manner as if they had proceeded without Leave.'" *

THE GULF OF SAINT LAWRENCE AND STRAITS OF BELLEISLE FISHERY.—"In 1761 the fishery of the Gulf of Saint Lawrence and the Straits of Bellisle was opened to our whalemen, and they speedily availed themselves of its wealth. This was the legitimate result of the conquest of Canada and the cession of territory made by France to England at the conclusion of the war, a result which the colonists had labored hard and spent lives and treasure unstintedly to attain, but of the benefit of which they were destined to be defrauded. A duty was levied on all oil and bone carried to England from the colonies, and by another oppressive act of Parliament they were not allowed to find for this product any other market. The discrimination between the plantations and the mother country was made the more marked since at this time the residents of Great Britain were allowed a bounty from which he provincials were debarred. Against these injustices the merchants of New England, and those of London engaged in colonial trade, respectfully petitioned. They represented that 'in the Year 1761 The Province of Massachusetts Bay, fitted out from Boston & other ports† Ten Vessels of from Seventy to Ninety Tons Burden for this Purpose. That the Success of these was such as to encourage the Sending out of fifty Vessels in the Year 1762 for the same trade. That in the Year 1763 more than Eighty Vessels were imploy'd in the same manner.‡ That they have already imported to London upwards of 40 Ton of Whale Finn: being the produce of the two first years. That upon Entring of the above Finn, a Duty was required and paid upon it, of thirty one Pound ten shillings ℔ Ton. That the weight of this Duty was render'd much heavier by the great reduction made in the price of Dutch Bone since the commencement of this trade from £500 to £330 ℔ Ton.' They represent further that the reason for the conferring of bounties upon vessels in this pursuit from Great Britain was to rival the Dutch,§ but in spite of this encouragement there was not enough oil and bone brought into England by British vessels to supply the demand. They also reasoned that Parliament could not intentionally discriminate between the various subjects of the Crown, granting

"* Mass. Col. MSS., Maritime, vi, p. 371. Martha's Vineyard appears to be ignored in the order."

"† As already explained, Boston was the port of entry for many of the Cape towns and its own immediate vicinity."

"‡ According to the following doggerel there were seventy-five whaling captains sailing from Nantucket in 1763:

Whale-List, by Thomas Worth, M. 1763.

Out of Nantucket their's Whalemen seventy-five,
But two poor Worths among them doth survive:
Their is two Ramsdills & their's Woodhury's two,
Two *Ways* there is, chuse which one pleaseth you,
Folgers thirteen, & Barnards there are four
Bunkers their is three & Jenkinses no more,
Gardners their is seven, Husseys their are two,
Pinkhams their is five and a poor Delano,
Myricks there is three & Coffins there are six,
Swains their are four and one blue gally Fitch.
One Chadwick, Cogshall, Coleman their's but one,
Brown, Baxter, two & Paddacks there is three,
Wyer, Stanton, Starbuck, Moorse is four you see,
But if for a Voyage I was to choose a Stanton,
I would leave Sammy out & choose Ben Stratton.
And not forget that Bocott is alive,
And that long-crotch makes up the seventy-five.
This is answering to the list, you see,
Made up in seventeen hundred & sixty-three."

"§ The Dutch from 1759 to 1768 sent to the Greenland fishery 1,324 ships, which took 3,018 whales, producing 146,419 barrels of oil and 8,785,140 pounds of bone. (Scoresby.) Great Britain in the same time sent about one-third the number of ships."

to one a bounty and requiring of another a duty for the same service. They, however, ask for no bounty—they are content that Great Britain should alone receive the benefit of that—but they simply desire that they should not be taxed with a duty on these imports."*

ENGLISH BOUNTY ABOLISHED.—"The knowledge that the English fishery, even with its bounty, was still unable to fully cope with the Dutch, or even to supply its own home demand, as well as the desire of Earl Grenville to forward certain projects in his American policy, notably the odious stamp-tax, caused some attention to be paid to petitions similar to the foregoing, fortified somewhat by the presence of a special agent from Massachusetts to sustain the position and urge the claims there made. To various sections various tenders were to be made. 'The boon that was to mollify New England,' says Bancroft,† 'was concerted with Israel Maudit, acting for his brother, the agent of Massachusetts, and was nothing less than the whale-fishery. Great Britain had sought to compete with the Dutch in that branch of industry; had fostered it by bounties; had relaxed even the act of navigation, so as to invite even the Dutch to engage in it from British ports in British shipping. But it was all in vain. Grenville gave up the unsuccessful attempt, and sought a rival for Holland in British America, which had hitherto lain under the double discouragement of being excluded from the benefit of a bounty,‡ and of having the products of its whale-fishing taxed unequally. He now adopted the plan of gradually giving up the bounty to the British whale-fishery, which would be a saving of £30,000 a year to the treasury, and of relieving the American fishery from the inequality of the discriminating duty, except the old subsidy, which was scarcely 1 per cent. This is the most liberal act of Grenville's administration, of which the merit is not diminished by the fact that the American whale-fishery was superseding the English under every discouragement. It required liberality to accept this result as inevitable, and to favor it. It was done, too, with a distinct conviction that 'the American whale-fishery, freed from its burden, would soon totally overpower the British.' So this valuable branch of trade, which produced annually 3,000 pounds, and which would give employment to many shipwrights and other artificers, and to three thousand seamen, was resigned to America."

EFFECTS OF WAR.—"With the people of Nantucket every foreign war meant a diminution of their whaling fleet, for there is scarcely any risk that whalemen have not and will not run in pursuit of their prey. During the years 1755 and 1756 six of their vessels had been lost at sea and six more were taken by the French and burned, together with their cargoes, while the crews

"* Mass. Col. MSS., Maritime, vol. vii, p. 243. The concluding portion of this petition, including the signatures, is missing, a fact greatly to be regretted, as it would be extremely interesting to know who the prominent oil-merchants of that time were. The following is the statement of imports of oil and bone from the colonies into England and from Holland to the same country, which accompanied the petition:

Account of Fins & Oil from America to England & Duties from Christmas 1758 *to Christmas* 1763.

Year.	Fins.			Whale-oil.					
		Duty, America.	Duty, London.		Duty, America.	Duty, London.			
	T. Cwt. Lbs	£ *s. d.*	£ *s. d.*	*T. H. G.*	£ *s. d.*	£ *s. d.*			
1758 to 1759	17 0 17	11 0 0	10 14 0	3,245 2 28	1,898 13 8	1,436 3 8			
1760	18 2 9	28 16 6	27 16 4	2,595 1 14	1,518 5 1	1,148 8 5			
1761	27 0 8	42 2 6	40 10 6	3,126 3 31	1,829 4 5	1,383 12 10			
1762	335 2 5	522 3 10	502 5 0	2,483 2 39	1,452 18 9	1,090 0 4			
1763	1,546 3 13	2,427 5 3	2,315 9 4	5,030 0 12	2,942 11 7	2,225 15 11			
Total	1,985 0 24	3,011 10 1	2,896 15 2	16,481 1 16	9,641 13 6	7,293 1 2			

†Bancroft's United States, v, p. 184.

‡ The bounty of 1748 had evidently been legislated out of existence.

were carried away into captivity. In 1760 another vessel was captured by a French privateer of twelve guns and released after the commander of the privateer had put on board of her the crew of a sloop they had previously taken nearly full of oil and burned. The captain of the sloop, ——— Lucc, had sailed with three others who were expected on the coast. The day after Lucc was taken the privateer engaged a Bermudian letter of marque and was beaten. During this engagement several whalemen in the vicinity made their escape. In the same month (June) another privateer of fourteen guns took several whaling vessels, one of which was ransomed for $400, all the prisoners put on board of her, and she landed them at Newport.* In 1762 another Nantucket sloop was taken by a privateer from the French West Indies, under one Mons. Palanqua, while she was cruising in the vicinity of the Leeward Islands."

MARTHA'S VINEYARD AND NANTUCKET WHALERS.—"At Martha's Vineyard whaling did not seem to thrive so well as at the sister island of Nantucket. The very situation of Nantucket seemed favorable for the development of this and kindred pursuits; in fact, the situation made them necessities. While the Vineyard was quite fertile and of considerable extent, Nantucket was comparatively sterile and circumscribed. At the Vineyard a livelihood could be attained from tilling the earth, at Nantucket a large portion of that which sustained life must be wrested from the ocean. A constant struggle with nature, and a constant surmounting of those obstacles incident to their location and surroundings, developed within the Nantucketois a spirit of adventure which was carefully trained into channels of enterprise and usefulness. Hence, the early history of whaling on Martha's Vineyard was not that ultimate success that it was on Nantucket, and while the year 1775 found the latter with a fleet of 150 vessels with a burden of 15,000 tons, the former at the same period could count but 12 vessels and an aggregate of 720 tons.

"In 1752 Mr. John Newman and Timothy Coffin built a vessel of 75 tons, but she was also destined to a brief existence. On her second voyage whaling she was captured near the Grand Banks by the French, and Captain Coffin, her commander, lost his life, his vessel, and his cargo. In the same year (1752) John Norton, esq., with others, purchased a vessel of 55 tons for the carrying on of this business, and, like her contemporary, she failed to survive her second voyage, but was cast away on the coast of Carolina, Capt. Christopher Beetle being at the time in command. Mr. Norton immediately chartered a vessel to get his own off, but on their arrival on Carolina, his vessel was gone, with her sails, rigging, and appurtenances, and he out of pocket a further sum of $500 to the wrecking party. Eight years later (1760), Esquire Norton, with others, built the sloop Polly, 65 tons burden. On her third whaling trip to the southward she too was lost, and by her destruction perished Nicholas Butler, her captain, and thirteen men. Repeated losses had reduced Norton to somewhat straitened circumstances, and, selling what property he had left, he removed to Connecticut, where he died.

"It is impossible to separate in the accounts of whaling at this time the share which Boston took in it from that taken by other ports. The reports which may be found in the current papers rarely gave the name of the port to which entering or clearing vessels belonged. In fact the majority of the reports are merely records of accidents, and it is very rarely indeed that the amount of oil taken by returning whalers is given.

"In 1762 a whaling schooner, commanded by ——— Bickford, was totally lost on Seil (?) Islands. The crew, fourteen in number, were taken off by a fishing vessel."

LONG ISLAND WHALERS.—"Of the Long Island fishery the only record accessible is the meager one regarding Sag Harbor. Easthampton, Southampton, and their more immediate neighbors seem to have been supplanted by this younger town.† Probably prior to 1760 vessels had

"* These vessels were from several whaling ports." "† Sag Harbor was settled in 1730."

been fitted for whaling from this port; if so, their identification is impossible. In 1760, however, three sloops were fitted out by Joseph Conkling, John Foster, and others. They were named Good-luck, Dolphin, and Success, and their cruising ground was in the vicinity of 36° north latitude."

RHODE ISLAND WHALERS.—"The reports regarding Rhode Island are equally meager. Occasional reports are to be found of the arrivals of whaling-vessels, but no report of where they cruised or what success they met with, and no records exist at the custom-house to help clear up the historical mist. Warren comes into notice at this period as quite a thriving whaling-port. The Boston News-Letter of October 23, 1766, says: 'Several Vessels employed in the Whale Fishery, from the industrious Town of Warren in Rhode Island Colony, have lately returned, having met with considerable success. One Vessel, which went as far as the Western Islands, brought home upwards of 300 Barrels of Oil. Some Vessels from Newport have also been tolerably successful. This Business, which seems to be carried on with Spirit, bids fair to be of great Utility to that Government.'"

VIRGINIA WHALERS.—"Williamsburgh, Va., felt the stimulus caused by success in this business; and in the early spring of 1751 several gentlemen subscribed a sum of money and fitted out a small sloop, called the Experiment, for whaling along the southern coast. On the 9th of May, 1751, she returned with a valuable whale. This was the first vessel ever fitted for this pursuit from Virginia, and whether she continued for any length of time in the business is unknown. The encouragement of the first success undoubtedly caused another venture."

BEGINNING OF WHALING INDUSTRY AT NEW BEDFORD.—"In the vicinity of New Bedford whaling probably commenced but little prior to 1760. In that year William Wood, of Dartmouth, sold to Elnathan Eldredge, of the same town, a certain tract of land, located within the present town of Fairhaven, and within three-quarters of a mile of the center of the town, on the banks of the Acushnet River, 'Always Excepting and reserving * * * * * that part of the same where the Try house and Oyl shed now stands.' How long these buildings had been standing at the date of this deed is unknown, but the fact of their being there then is indisputable, and, as it was not the habit in those days to put up useless buildings, they were undoubtedly applied to the purpose for which they were built. That they were considered valuable property is evident from the fact of their being reserved. In 1765, four sloops, the Nancy, Polly, Greyhound, and Hannah, owned by Joseph Russell, Caleb Russell, and William Tallman, and from 40 to 60 tons burden, were employed in the whale-fishery.* In Ricketson's 'History of New Bedford' is published a portion of a log-book of the whaling-sloop Betsey, of Dartmouth, in 1761. The early portion is missing, the first date commencing July 27. These small vessels usually sailed in pairs, and, so long as they kept in company, the blubber of the captured whales was divided equally between them. Hence the reports, in which the captains' names are always given instead of the names of the vessels, which rarely occur, often return the vessels in pairs, with the same quantity of oil to each. The following are a few extracts from this journal as published: 'August 2d, 1761. Lat. 45.54, long. 53.57. Saw two sperm-whales; killed one.—Aug. 6th. Spoke with John Clasbery; he had got 105 bbls.; told us Seth Folger had got 150 bbls. Spoke with two Nantucket men;

* Ricketson's History of New Bedford, p. 58. Mr. Ricketson says: 'To Joseph Russell, the founder of New Bedford, is also attributed the honor of being the pioneer of the whale-fishery of New Bedford. It is well authenticated by the statements of several cotemporaries, lately deceased, that Joseph Russell had pursued the business as early as the year 1755.' From what particular portion of the then town of Dartmouth (which also included what is now known as New Bedford, and Fairhaven) he fitted out his vessels, is uncertain. At that time the land on which stands the city of New Bedford was unpopulated by the whites, and not a single house marked the spot where, within less than a century thereafter, stands the city from which was fitted out more whaling-vessels than from all the other American ports combined."

they had got one whale between them; hey told that Jenkins & Dunham had got four whales between them, and Allen & Pease had got 2 whales between them. Lat. 42.57.—Sunday, August 9th. Saw sperm-whales; struck two, and killed them between us, (naming their escort).—August 10th. Cut up our blubber into casks; filled 35 hhds.; our partner filled 33 hhds. Judged ourselves to be not far from the Banks. Finished stowing the hold.—August 20. Lat. 44 deg. 2 min. This morning spoke with Thomas Gibbs; had got 110 bbls; told us he had spoke with John Aikin, and Ephraim Delano, and Thomas Nye. They had got no oil at all. Sounded; got no bottom. Thomas Gibbs told us we were but two leagues off the Bank.' The Betsey probably arrived home about the middle of September. In 1762 she apparently made another voyage, though the journal up to the 2d of September is missing. On that date they spoke 'Shubel Bunker and Benjamin Paddock.' On the 3d of September they 'Knocked down try-works.'* On the 15th they spoke Henry Folger and Nathan Coffin."

Restrictions to Americans whaling in Gulf of St. Lawrence.—"About this time a new element entered into antagonism with colonial whaling in the Gulf of St. Lawrence and vicinity. Scarcely had the colonists aided to wrest this fishery from the French, when the English governors, in their turn, strove to keep our vessels from enjoying its benefits. In the News-Letter of August 8, 1765, is the following statement: 'Tuesday one of the sloops which has been on the Whaling Business returned here. We hear that the Vessels employed in the Whale Fishery from this and the neighbouring Maritime Towns,† amounting to near 100 Sail, have been very successful this Season in the Gulph of St. Lawrence and Streigths of Belle isle; having, tis said, already made upwards of 9,000 Barrels of Oil.' But this rosy-colored report was speedily followed by another of a more somber hue. In August 22, the same paper says: 'Accounts received from several of our Whaling Vessels on the Labrador Coast, are, that they meet with Difficulties in regard to their fishing, in Consequence of Orders from the Commanding Officers on that Station, a Copy of which are as follows:

"'Memorandum: In Pursuance of the Governor's Directions, all masters of Whaling Vessels, and others whom it may concern, are hereby most strictly required to observe the following Particulars, viz:

"'1 To carry the useless Parts of such Whales as they may catch to at least Three Leagues from the Shore, to prevent the Damage that the neighbouring Fishers for Cod and Seal sustain by their being left on the Shore.

"'2 Not to carry any Passengers from Newfoundland or the Labradore Coast to any Part of the Plantations.

"'3 To leave the Coast by the first of November at farthest.

"'4 Not to fish in any of the Ports or Coasts of Newfoundland lying between Point Richi and Cape Bonavista.

"'5 Not to carry on any Trade or have any Intercourse with the French on any Pretence.

"* In other words, took them down. From this it is evident that some vessels were prepared for trying out their oil on board.

"The News-Letter of July 26, 1764, states that one Jonathan Negers, of Dartmouth, while whaling, was so injured by a whale's striking the boat that he died a few days after."

"† It is impossible to apportion the vessels among their proper ports. The vessels from Cape Cod and the northward cleared at Boston; those from the Vineyard, at Nantucket; those at Dartmouth, sometimes at Nantucket and sometimes at Newport."

"'6 In all your Dealings with the Indians to treat them with the greatest Civility: observing not to Impose on their Ignorance, or to take Advantage of their Necessities. You are also on no Account to serve them with spirituous Liquors.

"'7 Not to fish for any other than Whale on this Coast.

"'Dated on board His Majesty's sloop Zephyr, at the Isle of Bois, on the Labradore Coast, the 21st July, 1765.

"'JOHN HAMILTON.'

"The issue of November 18 reports that on account of this proclamation the vessels 'are returning half loaded.' It was the custom with many early whalemen, especially from the immediate vicinity of Boston, to go prepared for either cod or whale fishing, and in the event of the failure of the one to have recourse to the other. All restrictions which are sustained by an armed force are liable to be made especially obnoxious by the manner of the enforcement, and this was no means a contrary case. It was not at all surprising, then, that the ensuing season's fishing was only a repetition of the failure of that of 1765. 'Since our last,' says the News-Letter, 'several Vessels are returned from the Whaling Business, who have not only had very bad Success, but also have been ill-treated by some of the Cruisers on the Labradore Coast.' Two ships had been fitted out from London, the Palliser and the Labradore, for the express purpose of trading, fishing, and whaling on the coast of Labrador and in the straits of Belle Isle. Capt. Charles Penn, who came out in them as pilot, left the straits on the 9th of July on his way to Newfoundland. On his passage he went on board quite a number of whaling-vessels, and reported that they had met with very poor success; had got only about twenty whales in the entire fleet. In consequence of this failure some of them had, according to the time-honored practice, gone to fishing for cod, but had been interrupted by an armed vessel and by the 'company's ships' (the Palliser and Labradore), and their catch all taken away from them save what their actual necessities required. This was done under the pretense that the whole coast was patented to 'the company,' and by virtue of orders issued by Hugh Palliser, 'governor of Newfoundland, Anticosti, Magdalenes, and Labradore.' Palliser's proclamation, which bore date of April 3, 1766, specified that all British subjects whaling in that vicinity should choose places on shore where they should land, cut up their blubber, and make oil as they arrived, but not to select any place which was used in the cod-fishery. Whalemen from the plantations might take whales on those coasts, but were only permitted to land on some unoccupied place within the Gulf of Saint Lawrence to cut up and try out their blubber; and it was particularly specified that they were not to make use of any place which was used by the British fishermen for the same or a similar purpose. Complaint having been made of the provincial whalemen in regard to their waste interfering with the cod fishery, they were enjoined that they must carry the carcasses of the whales at least three leagues from the shore. No fishermen from the plantations were to be allowed to winter on Labrador. And then Capt. John Hamilton, 'of H. M. sloop of war Merlin, Lieut. Gov. of Labradore,' &c., issued his proclamation: 'This is to give Notice to all Whalers from the Plantations, that they are allowed to fish for Whales only, on the Coast of Labradore, that if they are found to have any other Fish on Board, the Fish will be seized, and they exeluded the Benefit of Whale-fishery this season; and on no Pretence to trade with the Indians; whatever they shall purchase will be confiscated, and after this Notice their Vessels liable to be seized,' &c. Captain Hamilton's decree bore the date of June 25, 1766.

"The result of these arbitrary measures was that the whalemen left those seas and went off the Banks. The close of the season witnessed the return of the whaling fleet with but indifferent

success.* Naturally those interested (and this included the wealthiest merchants and the most skillful mechanics, as well as the most indefatigable mariners) felt aggrieved. It seemed scarcely in consonance with the colonial ideas of justice, crude as those notions appeared to the English nobility, that the beneficial results of a conquest which they almost single-handed had made, and for defraying the expense of which England had declined any remuneration, should be diverted to the sole benefit of those alone who were residents of the British Isles. Merchants in London, too, whose heaviest and most profitable trade was with the provinces, joined their voices in denouncing this wrong. During the early winter the report came that Palliser's regulations were suspended until the ministry and Parliament had time to consider the subject. The matter had already, late in the last whaling season, been brought to the attention of the governor of Newfoundland, and he issued the following supplementary edict, which appeared in the Boston papers of January, 1767:

"'By His Excellency Hugh Palliser, Governor and Commander in Chief in and over the Island of Newfoundland, the Coast of Labradore and all the Territories dependent thereupon:

"'Whereas a great many Vessels from His Majesty's Plantations employed in the Whale-Fishery resort to that Part of the Gulph of St. Lawrence and the Coast of Labradore which is within this Government: and as I have been informed that some Apprehensions have arisen amongst them that by the Regulations made by me relating to the different Fisheries in those Parts, they are wholly precluded from that Coast:

"'Notice is hereby given, That the King's officers stationed in those Parts have always had my Orders to protect, assist and encourage by every Means in their Power, all Vessels from the Plantations employed in the Whale-Fishery, coming within this Government; and, pursuant to his Majesty's Orders to me, all Vessels from the Plantations will be admitted to that Coast on the same Footing as they have ever been admitted in Newfoundland; the ancient Practices and Customs established in Newfoundland respecting the Cod Fishery, under the Act of Parliament passed in the 10 and 11th Years of William IIId commonly called The Fishing Act, always to be observed.†

"'And by my Regulations for the Encouragement of the Whale Fisheries, they are also under certain necessary Restrictions therein prescribed, permitted to land and cut up their Whales in Labradore; this is a Liberty that has never been allowed them in Newfoundland, because of the Danger of prejudicing the Cod-Fishery carried on by our adventurer's Ships, and by Boat-Keepers from Britain, lawfully qualified with Fishing-Certificates according to the aforementioned Act, who are fitted out at a very great Risque and Expence in complying with said Act, therefore they must not be liable to have their Voyages overthrown, or rendered precarious by any Means, or by any other Vessels whatever. And, Whereas great Numbers of the Whaling Crews arriving from the Plantations on the Coast of Labradore early in the Spring considering it as a lawless Country are guilty of all Sorts of Outrages before the Arrival of the King's Ships, plundering whoever they

"* The Boston News-Letter mentions the arrival of Capt. Peter Wells at that port from whaling August 18, 1766. Under date of October 2, the News-Letter says: 'Since our last a Number of Vessels have arrived from Whaling. They have not been successful generally. One of them viz: Capt. Clark on Thursday Morning last discovering a Spermaceti Whale near George's Banks, mann'd his Boat, and gave Chase to her, & she coming up with her jaws against the Bow of the Boat struck it with such Violence that it threw a Son of the Captain; (who was forward ready with his Lance) a considerable Height from the Boat, and when he fell the Whale turned with her devouring Jaws opened, and caught him. He was heard to scream, when she closed her Jaws, and part of his Body was seen out of her Mouth, when she turned, and went off.'"

"† Duties on oil imported in British ships were remitted, the commander and one-third of each crew being British. Duties were also remitted on fat, furs, and tusks of seal, bear, walrus, or other marine animal taken in the Greenland seas. By other acts the imported materials to be used in outfitting were made non-dutiable, and bounties were established, amounting in the final aggregate to 40s. per ton."

find on the Coast too weak to resist them, obstructing our Ship Adventurers from Britain by sundry Ways, banking amongst their Boats along the Coast, which ruins the Coast-Fishery, and is contrary to the most ancient and most strictly observed Rule of the Fishery, and must not be suffered on Account; also by destroying their Fishing-Works on Shore, stealing their Boats, Tackle and Utensils, firing the Woods all along the Coast, and hunting for and plundering, taking away or murdering the poor Indian Natives of the Country; by these Violences, Barbarities, and other notorious Crimes and Enormities, that Coast is in the utmost Confusion, and with respect to the Indians is kept in a State of War. For preventing these Practices in future Notice is hereby given, That the King's Officers stationed in those Parts, are authorized and strictly directed, to apprehend all such Offenders within this Government, and to bring them to me to be tried for the same at the General Assizes at this Place: And for the better Government of that Country, for regulating the Fisheries, and for protecting His Majesty's Subjects from Insults from the Indians, I have His Majesty's Commands to erect Block-Houses, and establish Guards along that Coast. This Notification is to be put in the Harbours in Labradore, within my Government, and through the Favour of His Excellency Governour Bernard, Copies thereof will be put up in the Ports within the Province of Massachusetts, where the Whalers mostly belong, for their Information before the next Fishing Season.

"'Given under my Hand at St. John's in Newfoundland, this First Day of August, 1766.

"'HUGH PALLISER.

"'By Order of His Excellency,

"'JNO. HORSNAILL.'

"There can scarcely be a doubt but that the indiscretions of the whalemen were much magnified (if indeed they really existed) in this pronunciamento of Governor Palliser, for the sake of bolstering up the former one. The whalemen of those days were far from being the set of graceless scamps which he represents them to be. Probably there was here and there a renegade. It would be quite impossible to find in so large a number of men that all were strict observers of the laws. Self-preservation, if no more humane motive existed, militated against the acts of which he complained. The whalemen were accustomed to visit the coast for supplies, in many cases several times a year; usually on their arrival in those parts they stood in for some portion of the coast and 'wooded;' and it is hardly credible that they should wantonly destroy the stores they so much needed, or make enemies on a coast where they might at any time be compelled to land. The colonial governors quite often made the resources under their control a source of revenue for themselves, and the fact of the modification of Palliser's first proclamation only under pressure of the King and Parliament would seem to indicate personal interest in keeping whalemen from the colonies away from the territory under his control.

"It is quite evident that even with this modification the colonial fishermen did not feel that confidence in the Saint Lawrence and Belle Isle fishery that they felt when it was first opened to them, for a report from Charleston, S. C., dated June 19, 1767, states that on 'the 22d ultimo put in here a sloop belonging to Rhode Island, from a whaling voyage in the southern latitudes, having proved successful about ten days before. The master informs us that near fifty New England vessels have been on the whale fishery in the same latitudes this season by way of experiment.'* Over the open sea fortune-seeking governors could exercise no control, and there our seamen probably felt they could pursue their game without let or hindrance. Whales at that time abounded along the edge of the Gulf Stream, and there they continued to be found for some years,

* "Boston News-Letter."

shiftng their ground gradually as their fierce captors encroached more and more upon them to the vicinity of the Western and Leeward Islands, the Cape de Verdes, the Brazil Banks, and beyond. Some few whalemen, in spite of the restrictions, still visited the newly-opened fishing-ground.

"The general results of the various voyages were on the whole good, and other places began to feel the stimulus of a desire to compete. Providence took part, and early in 1768 several vessels were fitted out from that port for this pursuit. New York, too, entered the lists, and Mr. Robert Murray and the Messrs. Franklin fitted a sloop for the same purpose, and she sailed on the 19th of April of that year.* The town of Newport manifested great activity.

"It was currently reported in the colonies, during the early part of 1767, that the irksome restrictions upon whaling were to be entirely removed; petitions to that effect had been presented to the home government, and a favorable result was hoped for, and early in 1768 the straits of Davis and Belle Isle were again vexed by the keels of our fishermen, as many as fifty or sixty anchoring in Canso Harbor in April of that year, a few of them bound for the former locality, but the majority of them cruising in the vicinity of the Gulf of Saint Lawrence and Newfoundland.† Two whaling sloops from Nantucket, one commanded by ——— Coleman, and the other by ——— Coffin, were lost this season in the Straits of Belle Isle, and the crews were saved by Captain Hamilton, of the Merlin sloop of war, who also aided them in saving the sails, rigging, and stores from the wrecks. The fishery in those parts was quite unsuccessful, many vessels, up to the last of August, having taken little or no oil.‡

"In 1768 there sailed from Nantucket eighty sail of vessels of an average burden of 75 tons, and probably fully as many more from other ports—Cape Cod, Dartmouth, Boston, Providence, Newport, Warren, Falmouth (Cape Cod), and perhaps other ports being represented—and the voyages being undertaken to Davis Strait, straits of Belle Isle, Grand Banks, Gulf of Saint Lawrence, and Western Islands. Early in the season the Western Island fleet appears to have done little, but by the middle of September they had obtained an average of about 165 barrels. The northern fleet probably did nearly as well, as numerous instances occur of vessels spoken late in the summer and in the early fall with from 100 to 150 and even as high as 200 barrels. Assuming, then, that one hundred and forty vessels returned with an average produce of 150 barrels (which was the actual average import at Nantucket), and we have as the result of the season's fishing 21,000 barrels, worth, at £18 per ton, the ruling price, £47,200, or about $236,000."

PROSPERITY OF WHALE FISHERY, 1770 TO 1775.—"'Between the years 1770 and 1775,' says Maey, 'the whaling business increased to an extent hitherto unparalleled. In 1770 there

"* There seems to be no accessible report of this vessel's return, and hence the degree of success or failure of her voyage is a matter of doubt. The people of Nantucket were reported to have made £70,000 in 1767."

"† From a log-book kept by Isaiah Eldredge, of the sloop Tryall, of Dartmouth, which sailed April 25, 1768, for the straits of Belle Isle. She cleared from Nantucket, as Dartmouth was not then a port of entry. On Friday, April 29, she was at anchor in Canso Harbor, with fifty or sixty other whalemen. Saturday, May 7, left Crow Harbor and at night anchored in Man-of-War Cove, Canso Gut, 'with about sixty sail of whalemen.' The vessels were continually beset with ice, and on the 23d of May they cleared their decks of snow, which was 'almost over shoes deep.' They killed their first whale on the 22d of July. The larger number of vessels were spoken in pairs, which was the usual manner of cruising. The sloop returned to Dartmouth on the 5th of November. This log runs to 1775, and commences again in 1785, ending in 1797, with occasional breaks where leaves are cut out."

"‡ In October, 1767, a whaling sloop, belonging to Nantucket, arrived at the bar off that port, on board of which were four Indians, who had had some dispute at sea and agreed to settle it on their return. As the vessel lay at anchor the officers and crew—except three white men and these Indians—went ashore. The whites being asleep in the cabin, the Indians went on deck, divided into two parties, and, arming themselves with whaling lances, commenced the affray. The two on one side were killed immediately, the other two were unhurt. The white men hearing the affray, rushed upon deck, and, seeing what was done, secured the murderers. In November of the same year some Newburyport fishermen were astounded at perceiving their vessel hurried through the water at an alarming rate without the aid of sails. Upon investigating the cause, it was found that the anchor was fast to a whale (or *vice versa*), and the cable was cut, relieving them of their unsolicited propelling power.—(Boston News-Letter.)"

were a little more than one hundred vessels engaged; and in 1775 the number exceeded one hundred and fifty, some of them large brigs. The employment of so great and such an increasing capital may lead our readers to suppose that a corresponding profit was realized, but a careful examination of the circumstances under which the business was carried on will show the fallacy of such a conclusion. Many branches of labor were conducted by those who were immediately interested in the voyages. The young men, with few exceptions, were brought up to some trade necessary to the business. The rope-maker, the cooper, the blacksmith, the carpenter—in fine, the workmen were either the ship-owners or of their household; so were often the officers and men who navigated the vessels and killed the whales. While a ship was at sea, the owners at home were busily employed in the manufacture of casks, iron work, cordage, blocks, and other articles for the succeeding voyage. Thus the profits of the labor were enjoyed by those interested in the fishery, and voyages were rendered advantageous even when the oil obtained was barely sufficient to pay the outfits, estimating the labor as a part thereof. This mode of conducting the business was universal, and has continued to a very considerable extent to the present day [1835]. Experience taught the people how to take advantage of the different markets for their oil. Their spermaceti oil was mostly sent to England in its unseparated state, the head matter being generally mixed with the body oil, for in the early part of whaling it would bring no more when separated than when mixed. The whale oil, which is the kind procured from the species called 'right whales,' was shipped to Boston or elsewhere in the colonies, and there sold for country consumption, or sent to the West Indies.'*"

DEPREDATIONS BY PRIVATEERS AND PIRATES.—"The seas continued to be infested with French and Spanish privateers and pirates,† and whalemen, especially those frequenting the ocean in the vicinity of the Western Islands, were, from the very nature of their employment, constantly liable to depredations from these corsairs, whether legalized or lawless. In March, 1771, the sloop Neptune, Captain Nixon, arrived in Newport from the Mole, bringing with him portions of the crews of three Dartmouth whalemen, who had been taken on the south side of Hispaniola by a Spanish guarda costa. These vessels were commanded by Capts. Silas Butler, William Roberts, and Richard Welding. Another whaling vessel, belonging to Martha's Vineyard, commanded by Ephraim Pease, was also taken at about the same time, but released in order to put on board of her the remaining prisoners. At this time Pease had taken 200 barrels of oil, and the Dartmouth vessels, which were carried into Saint Domingo, 100 barrels. These captures were made on the 11th of February.‡

"But it did not always happen that whalemen fell so easy a prey to predatory vessels. A little strategy sometimes availed them when a forcible resistance would have been out of the ques-

"*Bancroft says (Hist. U. S., v, p. 265), in 1765 the colonists were not allowed to export the chief products of their industry, such as sugar, tobacco, cotton, wool, indigo, ginger, dyeing-woods, whalebone, &c., to any place but Great Britain—not even to Ireland. Save in the matter of salt, wines, victuals, horses, and servants, Great Britain was not only the sole market for the products of America, but the only storehouse for its supplies.

"This stringency must, however, have been somewhat relaxed as regards oil, for the Boston News-Letter of September 8, 1768, gives the report from London, dated July 13, that the whale and cod fisheries of New England 'this season promised to turn out extremely advantageous, many ships fully laden having already been sent to the Mediterranean markets.' The success of the Americans seems to have again aroused the jealousy of their English brethren, for in this year an effort was made in Parliament to revive the bounty to English whalemen, with the intent to weaken the American fishery."

"†The word 'pirate' seems to have been in those days of a somewhat ambiguous signification, and was quite as likely to mean a privateer as a corsair."

"‡The men who came home with Captain Nixon were Oliver Price, Pardon Slocum, and Philip Harkins.—(Boston News-Letter.)"

tion, and it may be easily believed that men to whom danger and hairbreadth escapes were part of their every-day life would scarcely submit supinely when there was any chance in their favor. A notable instance of this kind occurred in April, 1771. Two Nantucket whaling sloops, commanded respectively by Isaiah Chadwick and Obed Bunker, were lying at anchor in the harbor of Abaco, when a ship appeared off the mouth of the harbor with her signals set for assistance. With that readiness to aid distressed shipmates which has ever been a distinguishing trait of American whalemen, one of the captains with a boat's crew made up of men from each sloop hastened to render such help as was in their power. The vessel's side reached, the captain immediately boarded her to find what was desired, and much to his surprise had a pistol presented to his head by the officer in command with a peremptory demand that he should pilot the ship into the harbor. He assured the commander that he was a stranger there, but that there was a man in his boat who was acquainted with the port. The man was called and persuaded in the same manner in which the captain had been. The argument used to demonstrate the prudence of his compliance with the request being so entirely unanswerable the man performed the service, anchoring the ship where a point of land lay between her and the sloops. This being done the boat was dismissed and the men returned to their vessels. The Nantucket captains now held a consultation as to what course should be pursued. Those who had been on board the ship noticed that the men seemed to be all armed. They also observed, walking alone in the cabin, a man. The conclusion arrived at was that the ship was in the hands of pirates and the man in the cabin was the former captain, and measures were immediately inaugurated to secure the vessel and crew. To this end an invitation was extended to the usurping captain, his officers, and passengers to dine on board one of the sloops. The courtesy was accepted, and the pirate captain and his boatswain, with the displaced captain as representative of the passengers, repaired on board the sloop. After a short time he became uneasy, and proposed to return to his own vessel, but he was seized by the whalemen and bound fast and his intentions frustrated. The actual captain now explained the situation, which was that the ship sailed from Bristol (R. I. ?) to the coast of Africa, from thence carried a cargo of slaves to the West Indies, and was on her return home with a cargo of sugar when the mutiny occurred, it being the intention of the mutineers to become pirates, a business at that time quite thrifty and promising. Our fishermen now told the boatswain that if he would go on board the ship and bring the former mate, who was in irons, and aid in recapturing the vessel, they would endeavor to have him cleared from the penalties of the law, and they prudently intimated to him that there was a man-of-war within two hours' sail from which they could obtain force enough to overpower his associates. As a further act of prudence, they told him they would set a certain signal when they had secured help from the ship of war.

"The boatswain not returning according to the agreement made, one sloop weighed anchor and stood toward the pirate ship as though to pass on one side of her. As she approached, the mutineers shifted their guns over to the side which it seemed apparent she would pass and trained them so as to sink her as she sailed by. But those who navigated the sloop were fully alive to these purposes, and as she neared the ship her course was suddenly changed and she swept by on the other side and was out of range of the guns before the buccaneers could recover from their surprise and reshift and retrain their cannon. On the sloop stood upon her course till they were out of sight of the ship, then tacking, the signal agreed with the boatswain was set and she was steered boldly for the corsair. As she hove in sight, the pirates, recognizing the sign, and believing an armed force from the man-of-war was on board the whaling vessel, fled precipitately to the shore, where they were speedily apprehended on their character being known. The whalemen

immediately boarded their prize, released the mate, and carried the ship to New Providence, where a bounty of $2,500 was allowed them for the capture and where the chief of the mutineers was hanged."*

SUPERIOR SEAMANSHIP OF AMERICAN WHALEMEN.—"About this time Dr. Benjamin Franklin, being in London, was questioned by the merchants there respecting the difference in time between the voyages of the merchantmen to Rhode Island and the English packets to New York. The variation, which was something like fourteen days, was a source of much annoyance to the English merchants, and believing the place of destination might have something to do with it, they seriously contemplated withdrawing the packets from New York and dispatching them to Rhode Island. In this dilemma they consulted Dr. Franklin. A Nantucket captain, named Folger,† who was a relative of the doctor's, being then in London, Franklin sought his opinion. Captain Folger told him that the merchantmen were commanded by men from Rhode Island who were acquainted with the Gulf Stream and the effect of its currents, and in the passage to America made use of this knowledge. Of this the English captains were ignorant, not from lack of repeated warnings, for they had been often told that they were stemming a current which was running at the rate of 3 miles an hour, and that if the wind was light the stream would set them back faster than the breeze would send them ahead, but they were too wise to be advised by simple American fishermen, and so persevered in their own course at a loss of from two to three weeks on every trip. By Franklin's request, Captain Folger made a sketch of the stream, with directions how to use or avoid its currents, and this sketch, made over a century ago, is substantially the same as is found on charts of the present day. 'The Nantucket whalemen,' says Franklin,‡ 'being extremely well acquainted with the Gulph Stream, its course, strength, and extent, by their constant practice of whaling on the edges of it from their island quite down to the Bahamas, this draft of that stream was obtained of one of them, Captain Folger, and caused to be engraved on the old chart in London for the benefit of navigators by B. Franklin.'

"Notwithstanding this information so kindly volunteered to them, and notwithstanding the fact that the Falmouth captains were furnished with the new charts, they still persisted in sailing their old course. There is a point where perseverance degenerates into something more ignoble; it would seem as though at this date these self-sufficient captains had about attained that point."

LOSS OF AMERICAN WHALING VESSELS.—"In 1772 two whaling sloops from Nantucket, with 150 barrels of oil each, were captured by a Spanish brig and sloop off Matanzas.§ In December of the same year, the brig Leviathan, Lathrop, sailed from Rhode Island for the Brazil Banks on a whaling voyage. On the 25th of January they lowered for whales, and in the chase the mate's boat (Brotherton Daggett) lost sight of the brig, but the crew were picked up at sea and brought home by another vessel.

"In 1773 quite a fleet of American whalers were on the coast of Africa, no less than fourteen being reported as coming from that ground, and probably there were as many more of whom no

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"* Boston News-Letter."

"† Works of Franklin, iii, p. 353. Probably Capt. Timothy Folger, a man who was prominent for many years in the history of Nantucket."

"‡ Works of Franklin, iii, p. 364. In a note Franklin says: 'The Nantucket captains, who are acquainted with this stream, make their voyages from England to Boston in as short a time generally as others take in going from Boston to England, viz, from twenty to thirty days.' Quite a number of Boston packets to and from England were at this time and for many years after commanded by Nantucket men."

"§ In May, 1770, according to the Boston News-Letter, no less than nineteen vessels cleared from Rhode Island, whaling. The Post-Boy for October 14, 1771, is responsible for the following: 'We learn from Edgartown that a vessel lately arrived there from a whaling voyage, and in her voyage, one Marshall Jenkins, with others, being in a boat which struck a whale, she turned and bit the boat in two, took Jenkins in her mouth, and went down with him; but on her rising threw him into one part of the boat, whence he was taken on board the vessel by the crew, being much bruised, and in a fortnight after he perfectly recovered. This account we have from undoubted authority.'"

report was made. One brig from Boston, while off the coast of Sierra Leone, sent a boat ashore with six men to procure water. The boat was seized and the crew all massacred by the natives. In the spring of the following year a sloop owned by Gideon Almy, of Tiverton, and another belonging to Boston, were seized, while watering at Hispaniola, by a French frigate, carried into Port au Prince and there condemned.*

"In 1774 a report came by the way of Fayal that a small American whaling brig was lying in the harbor of Rio Janeiro with only her captain and three men on board. It appears that, putting in there for refreshments,† in the summer of 1773, a portion of her crew were, 'by fair or foul means,' induced to ship on a Portuguese snow‡ for a three months' whaling voyage. The snow was provided with harpoons and other whaling craft, made after the English models, and was cruising for sperm whales, a business altogether new to the Portuguese, who had been hitherto ignorant of any but the right whale, and had never ventured even in the pursuit of them out of sight of land. The brig still lay there in October, 1773, waiting the return of her men.§"

CONDITION OF THE FISHERY AT OUTBREAK OF THE REVOLUTIONARY WAR.—"In 1774 the whale fishery in the colonies must have been in the full tide of success. There were probably fitted out annually at this time no less than 360 vessels of various kinds, with an aggregate burden of nearly 33,000 tons, and employing directly about 4,700 men, and indirectly an immensely greater number. Despite the depredations of French and Spanish privateers the fishery continued to flourish. The annual production from 1771 to 1775 was probably at least 45,000 barrels of spermaceti oil and 8,500 barrels of right-whale oil, and of bone nearly or quite 75,000 pounds.‖ In the

"* Boston News-Letter."

"† Some vessels never dropped anchor in a port from the day they sailed until their return; but scurvy was very apt to manifest itself where a crew was so long deprived of fresh provisions."

"‡ 'A snow is a vessel equipped with two masts resembling the main and foremasts of a ship, and a third small mast, abaft the mainmast, carrying a trysail. These vessels were much used in the merchant service at the time of the Revolution.' (Lossing's Field Book, ii, p. 846, note.)"

"§ Boston News-Letter."

"‖ *State of the whale fishery in Massachusetts, 1771 to 1775.*

Ports.	Vessels fitted annually for northern fishery.		Vessels fitted annually for southern fishery.		Seamen employed.	Sperm oil taken annually.	Whale oil taken annually.
	No.	*Tons.*	*No.*	*Tons.*		*Barrels.*	*Barrels.*
Nantucket	63	4,875	85	10,200	2,025	26,000	4,000
Wellfleet	20	1,600	10	1,000	420	2,250	1,250
Dartmouth	60	4,500	20	2,000	1,040	7,200	1,400
Lynn	1	75	1	120	28	200	100
Martha's Vineyard	12	720			156	900	300
Barnstable	2	150			26	240	
Boston	15	1,300	5	700	260	1,800	600
Falmouth (Cape Cod)	4	300			52	400	
Swanzey	4	300			52	400	
	183	13,820	121	14,020	4,059	39,390	7,650

"These statistics are from Jefferson's report, and were gathered for him by governor of Massachusetts.

"According to Pitkin, among the exports of the colonies, including Newfoundland, Bahamas, and Bermudas, were, for the year 1770:

	Great Britain.	Ireland.	South of Europe.	West Indies	Africa.	Total.
Sperm candles, pounds	4,865	450	14,167	351,625	7,905	379,012
Whale oil, tons	5,202	22	175	268		5,667
Whalebone, pounds	112,971					112,971

"Value, sterling: Sperm candles, £23,688 4*s.* 6*d.*; whale oil, £83,012 15*s.* 9*d.*; bone, £19,121 7*s.* *d.*"

various sea-port towns from which this pursuit was carried on, in Nantucket, Wellfleet, Dartmouth, Lynn, Martha's Vineyard, Barnstable, Boston, Falmouth, and Swanzey, in Massachusetts, in Newport, Providence, Warren, and Tiverton, in Rhode Island, in New London, Connecticut, Sag Harbor, on Long Island, the merry din of the 'yo heave ho' of the sailors was heard; the ring of the blacksmith's hammer and anvil made cheery music; the coopers, with their hammers and drivers, kept time to the tramp of their feet as round and round the casks they marched, tightening more and more the bands that bound together the vessels which should hold the precious oil; and the creaking of the blocks as the vessels unloaded their freight or the riggers fitted them anew for fresh conquests, and the rattle of the hurrying teams as they carried off the product of the last voyage or brought the necessaries for the future one, lent their portion of animation to the scene. Everywhere was hurry and bustle; everywhere all were employed; none that thirsted for employment went away unsatisfied. If a vessel made a bad voyage, the owners, by no means dispirited, again fitted her out, trusting in the next one to retrieve the loss; if she made a profitable one the proceeds were treasured up to offset a possible failure in some future cruise. On all sides were thrift and happiness.

"But a change was near. 'A cloud, at first no bigger than a man's hand,' was beginning to overshadow the whole heaven of their commercial prosperity. The colonies, driven to desperation by the heartless cruelty of their mother country, prepared to stay further aggression, and resent at the mouth of the cannon and the point of the bayonet the insults and injuries that for a decade of years had been heaped upon them; and the English ministry, against the earnest entreaty of British merchants on both sides of the Atlantic, prepared also to enforce its desires by a resort to arms.*

"The first industry to feel the shock of the approaching storm was the fisheries. Massachusetts, the center of this pursuit, was to the English ministers the very focus of the insurrectionary talk and action, and 'the first step,' says Bancroft, 'toward inspiring terror was to declare Massachusetts in a state of rebellion, and to pledge the Parliament and the whole force of Great Britain to its reduction; the next, by prohibiting the American fisheries, to starve New England; the next, to excite a servile insurrection.'†

"Accordingly on the 10th of February, 1775, the ministry introduced into Parliament a bill restricting the trade and commerce of Massachusetts Bay, New Hampshire, Connecticut, and Rhode Island to Great Britain, Ireland, and the British West Indies, and prohibiting the colonies from carrying on any fishery on the Banks of Newfoundland or any other part of the North American coast.‡ 'The best ship-builders in the world were at Boston, and their yards had been closed; the New England fishermen were now to be restrained from a toil in which they excelled the world. Thus the joint right to the fisheries was made a part of the great American struggle.'§ To this bill there was a small but active and determined opposition, both in the House of Lords and House of Commons. It was urged on the part of the ministry that the fisheries were the property of England, and it was with the English Government to do as they pleased with them. To this opinion the minority strenuously demurred. 'God and nature,' said Johnston, 'have given that fishery to New England and not to Old.'‖ It was also argued by the friends of America that if the American fishery was destroyed the occupation must inevitably fall into the hands of the natural rivals of Great Britain. Despite the efforts of the little band the bill was received

"* The colonial trade had become to many English merchants and manufacturers a matter of great importance, and the loss of it would be a serious misfortune. One of the industries which would feel the deprivation most strongly was the manufacture of cordage, of which the Americans were by far the chiefest purchasers in the English market."

"† Bancroft's United States, vii, p. 222, February, 1775."

"‡ Eng. Annual Reg., 1775, p. 78."

"§ Bancroft's United States, vii, p. 239."

"‖ *Ibid.*"

by a vote of 261 to 85, and passed through its various stages. As each phase was reached the act was fought determinedly but uselessly and hopelessly. The merchants and traders of London petitioned against it, and the American merchants secured the services of David Barclay to conduct the examination of those who were called to testify by the friends and opponents of the bill.* 'It was said that the cruelty of the bill exceeded the examples of hostile rigor with avowed enemies; that in all the violence of our most dangerous wars it was an established rule in the marine service to spare the coast-fishing craft of our declared enemies; always considering that we waged war with nations, and not with private individuals.'†

"It was claimed that by the provisions of the bill much hardship must fall upon many people who were already at sea, and who, from the very nature of their occupations, must be innocent. 'The case of the inhabitants of Nantucket was particularly hard. This extraordinary people, amounting to between five and six thousand in number, nine-tenths of whom are Quakers, inhabit a barren island, 15 miles long by 3 broad, the products of which were scarcely capable of maintaining twenty families. From the only harbor which this sterile island contains, without natural products of any sort, the inhabitants, by an astonishing industry, keep an 140 vessels in constant employment. Of these, eight were employed in the importation of provisions for the island and the rest in the whale fishery.' A petition was also presented from the English Quakers in behalf of their brethren at Nantucket, in which they stated the innocence of the inhabitants of that island, 'their industry, the utility of their labors both to themselves and the community, the great hazards that attended their occupation, and the uncertainty of their gains; and showed that if the bill passed into a law, they must in a little time be exposed to all the dreadful miseries of famine. The singular state and circumstances of these people, occasioned some attention to be paid to them. A gentleman on the side of the administration said, that on a principle of humanity he would move that a clause should be added to the bill to prevent the operation from extending to any whale ships which sailed before the 1st of March, and were at that time the property of the people of Nantucket.'‡

"'The bill,' says a reviewer of the time, 'was attacked on every ground of policy and government; and with the greatest strength of language and height of coloring. The minority made amends for the smallness of their numbers by their zeal and activity. * * * Evil principles,' they contended, 'were prolific; the Boston port bill begot this New England bill; this will beget a Virginia bill; and that again will become the progenitor of others, until, one by one, Parliament has ruined all its colonies, and rooted up all its commerce; until the statute book becomes nothing but a black and bloody role of proscriptions; a frightful code of rigor and tyranny; a monstrous digest of acts of penalty and incapacity and general attainder; and that wherever it is opened it will present a title for destroying some trade or ruining some province.'§

"It was during the debate upon this bill that Burke made that eloquent defense of the colonies which has rung in the ears of every boy born or bred in a sea-port town since the day it was uttered.

"* Among the evidence given was much tending to show the importance of the colonial trade. It appeared that in 1764 New England employed in the fisheries 45,880 tons of shipping and 6,002 men, the product amounting to £322,220 16*s.* 3*d.* sterling in *foreign markets;* that all the materials used in the building and equipping of vessels, excepting salt and lumber, were drawn from England, and the net proceeds were also remitted to that country; that neither the whale nor cod fishery could be carried on so successfully from Newfoundland or Great Britain as from North America, for the natural advantages of America could neither be counteracted nor supplied; that, if the fishery was transferred to Nova Scotia or Quebec, Government would have to furnish the capital, for they had neither vessels nor men, and these must come from New England; that it must take time to make the change, and the trade would inevitably be lost; and that American fishermen had such an aversion to the military government of Halifax, and 'so invincible an aversion to the loose habits and manners of the people, that nothing could induce them to remove thither, even supposing them reduced to the necessity of emigration.'—(Eng. Annual Reg.)"

"† Eng. Annual Reg., 1775, p. 80." "‡ *Ibid.*, p. 85." "§ *Ibid.*, p 85."

'For some time past, Mr. Speaker,' said Burke, 'has the Old World been fed from the New. The scarcity which you have felt would have been a desolating famine, if this child of your old age—if America—with a true filial piety, with a Roman charity, had not put the full breast of its youthful exuberance to the mouth of its exhausted parent. Turning from the agricultural resources of the colonies, consider the wealth which they have drawn from the sea by their fisheries. The spirit in which that enterprising employment has been exercised ought to raise your esteem and admiration. Pray, sir, what in the world is equal to it? Pass by the other parts, and look at the manner in which the people of New England have of late carried on the whale fishery. Whilst we follow them among the tumbling mountains of ice, and behold them penetrating into the deepest frozen recesses of Hudson's Bay and Davis' Straits, whilst we are looking for them beneath the Arctic Circle, we hear that they have pierced into the opposite region of polar cold, that they are at the antipodes, and engaged under the frozen serpent of the south. Falkland Island, which seemed too remote and romantic an object for the grasp of national ambition, is but a stage and resting-place in the progress of their victorious industry.* Nor is the equinoctial heat more discouraging to them than the accumulated winter of both the poles. We know that whilst some of them draw the line and strike the harpoon on the coast of Africa, others run the longitude, and pursue their gigantic game along the coast of Brazil. No sea but what is vexed by their fisheries. No climate that is not a witness to their toils. Neither the perseverance of Holland, nor the activity of France, nor the dexterous and firm sagacity of English enterprise, ever carried this most perilous mode of hardy industry to the extent to which it has been pushed by this recent people; a people who are still, as it were, but in the gristle, and not yet hardened into the bone, of manhood. When I contemplate these things; when I know that the colonies in general owe little or nothing to any care of ours, and that they are not squeezed into this happy form by the constraints of a watchful and suspicious Government, but that, through a wise and salutary neglect, a generous nature has been suffered to take her own way to perfection; when I reflect upon these effects, when I see how profitable they have been to us, I feel all the pride of power sink, and all presumption in the wisdom of human contrivances melt, and die away within me. My rigor relents. I pardon something to the spirit of liberty.'

"But eloquence, logic, arguments, facts availed nothing. The bill became a law. In the upper house of Parliament, where a minority fought the bill as determinedly as the minor part of the Commons, fifteen lords entered a protest against it. The island of Nantucket was, for the reasons enumerated, relieved somewhat from its extremest features, a fact which did not escape the surveillance of the provincial authorities, who in their turn restricted the exportation of provisions from any portion of the colonies, save the Massachusetts Bay, to that island, and the Provincial Congress of Massachusetts further prohibited any exportation from that colony, save under certain regulations.† But, like the mother country, the colonies yielded to the behests of humanity and relaxed their stringency in regard to this island.

"At an early day after the formal opening of the issue of battle between England and the plantations, the general court of Massachusetts passed a resolve, directing 'that from and after the fifteenth Day of August instant, no Ship or Vessell should sail out of any port in this Colony, on any whaling Voyage whatever, without leave first had and obtained from the Great and General

"*At this time the Falkland Islands were the subject of considerable acrimony between the English, Spanish, and Brazilian Governments. According to Freeman (Hist. Cape Cod, ii, p. 539, note), the people of Truro were the first of our American whalemen to go to the Falklands. In 1774 Capts. David Smith and Gamaliel Collins, at the suggestion of Admiral Montague, of the British navy, made voyages there on that pursuit, in which they were very successful."

"†Mass. Col. MSS., Provincial Congress, i, p. 300."

Court of this Colony, or from some Committee or committees or persons they shall appoint to grant such leave;' and on the 24th of August, the day for adjournment of the court being near at hand, it was further resolved, in view of possible damage liable to accrue to parties for want of these permits, 'that the Major part of the Council for this Colony be, and they accordingly are, hereby fully impowered to grant leave for any Vessell or Vessells to sail out of any port in this Colony, on any whaling Voyage whatever, as to them shall seem fit & reasonable for the Benefit of Individuals, and the Good of the Public, provided there be good & sufficient security given that the Oil & Bone, &c., obtained on said Voyage shall be brought into some Port in this Colony, except the port of Boston, & such Permits do not interfere with any Resolve or Recommendations of the Continental Congress—The power herein given to continue only in the recess of the general court.'*"

THE DEATH-KNELL OF AMERICAN WHALING.—"The bells that called the hardy yeomanry of New England to the defense of their imperiled liberties on the ever-memorable morning of the 19th of April rung the death-knell of the whale fishery, save that carried on from Nantucket; the rattle of musketry was the funeral volley over its grave.† Save from this solitary island, it was doomed to annihilation. A few vessels were fitted out early in the war from other ports, but the risk was so great and the necessity so small that the business was soon abandoned. With Nantucket it was simply a case of desperation; the business must be carried on, or the island must be depopulated; starvation or removal were the only alternatives of inaction. The receipt of the news of the battle at Lexington and Concord, glorious as it was to the colonies at large, and glorious as it may have been to the islanders whose religious principles were not rigidly opposed to war in any form and under any circumstances, was to the majority of the inhabitants the announcement of ruined fortunes, annihilated commerce, misery, privation, and suffering. Without the immediate circle of colonial assistance, knowing that they were cut off from aid in case they were attacked, open to and defenseless at all sides from the predatory raids of avowed enemies and treacherous, pretended friends, the only course left open to them to adopt was to be as void of offense as possible and strive to live through the desperate struggle just about to commence. Some of the people removed to New York and eventually established the whale fishery there. Some removed to North Carolina and there formed a community remarkable for thrift and hospitality; but the vast majority preferred to link their fortunes with those of their island home, and with her sink or swim. Vessels from abroad turned their prows toward home and speeded on their way, hoping to attain their port before English armed vessels could intercept them; those already arrived were most of them stripped of their sails and rigging and moored to the crowded wharves, or run high and dry ashore.

"The petitions of parties for permission to fit out their vessels for whaling were almost invariably complied with by the general court, bonds being given in about £2,000 that the cargo should be landed at some port in the colony, excepting Boston or Nantucket.‡

"* Mass. Col. MSS. Rev. Council Papers, series i, vol. ii, p. 17."

"† The shipping of Nantucket rendered important ante-revolutionary aid to the colonists in the importation of powder, a service that was continued at intervals during the war. The Earl of Dartmouth, in a letter to Lieutenant-Governor Colden, dated 7th September, 1774, says: 'My Information says that the Polly, Captn Benjamin Broadhelp, bound from Amsterdam to Nantucket, has among other Articles received on board, no less a quantity than three Hundred thousand pounds weight of Gunpowder, & I have great reason to believe that considerable quantities of that commodity, as well as other Military Stores, are introduced into the Colonies from Holland, through the channel of St. Eustatia.' (N. Y. Col. Rec., viii, p. 487.) St. Eustatia was captured by the English during the colonial war, the chief grounds of the capture being the alleged supply to the revolting colonies of contraband goods."

"‡ The following is the form of the bond:

"'Know all men by these presents that Nathaniel Macy & Richd Mitchell Jr both of Sherburn in the County of Nantucket, are holden & stand firmly bound unto Henry Gardner Esq of Stowe in the County of Middlesex Treasurer

"In 1776 the Continental Congress endeavored to induce France to engage in war against England, but in the proposed negotiations the fisheries on the banks of Newfoundland and the various gulfs and bays of North America were to be understood as not open to a question of division. Spain, too, was applied to. 'The colonies,' says Bancroft, 'were willing to assure to Spain freedom from molestation in its territories; they renounced in favor of France all eventual conquests in the West Indies; but they claimed the sole right of acquiring British continental America and all adjacent islands, including the Bermudas, Cape Breton, and Newfoundland. It was America and not France which first applied the maxim of monopoly to the fisheries. The King of France might retain his exclusive rights on the banks of Newfoundland, as recognized by England in the treaty of 1763, but his subjects were not to fish "in the havens, bays, creeks, roads, coasts, or places," which the United States were to win.'" *

THE ENGLISH WHALE FISHERY ENCOURAGED.—"In the mean time how was England affected by her American policy? The colonial fishery being abolished, it became essential that something should be done to replace it, 'and particularly to guard against the ruinous consequences of the foreign markets, either changing the course of consumption or falling into the hands of strangers, and those perhaps inimical to this country. The consumption of fish oil as a substitute for tallow was now become so extensive as to render that also an object of great national concern; the city of London alone expending about £300,000 annually in that commodity.'† The evidence taken on behalf of the ministry in support of their restraining bill, tending to show that there already existed sufficient capital in ships, men, and money for the immediate and safe transfer of the whale fishery to England, while well enough for partisan purposes, was not considered so reliable by the parties bringing it forward, and the Government was not at all desirous or willing to risk a matter of such extreme importance upon the testimony there given.

"Measures were accordingly taken to give encouragement to this pursuit to the fishermen and capitalists of Great Britain and Ireland.‡ The committee having the subject in charge were of the opinion that a bounty should extend to the fisheries to the southward of Greenland and Davis Strait, and at the same time that the duties on oil, blubber, and bone, imported from Newfoundland, should be taken off. It was found that the restraining bill worked serious damage to the people of Newfoundland, and also to the fisheries from the British islands to that coast, as, in order to prevent absolute famine there, it was necessary that several ships should return light from that vicinity in order to carry cargoes of provisions from Ireland to the sufferers there.§

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of the Colony of the Massachusetts Bay or his Successors in s^d^ office in the Lawful & Just sum of Two thousand pounds to the which payment well & truly to be made we bind ourselves our Heirs Exec^r^ or Administrators, firmly by these presents sealed w^th^ our seal Dated this fourteenth day of September Anno Dom: 1775.

"'The Condition of this obligation is such that whereas the above-said Nathaniel Macy is about to Adventure to sea on a whale Voyage the schooner Dighton Silas Paddack Master—if then the s^d^ Silas Paddock or any other person who may have the Command of s^d^ schooner Dighton, during s^d^ Voyage shall well & truly bring or Cause to be brought into some port or harbour of this Colony except the port of Boston or Nantucket all the oil & whale Bone that shall be taken by s^d^ schooner Dighton in the Course of s^d^ Voyage & produce a Certificate under the hands of the Selectmen of s^d^ Town Adjoining to such port or harbour that he there Landed ye same then the above Obligation to be Void & of none Effect otherways to stand and remain in full force & virtue.

"'NAT^AL^ MACY,

"'RICH^D^ MITCHELL, JR.

"'Signed, Sealed, & did in presence of us.'

"C.

"(Mass. Col. MSS. Misc., iii, p. 64.)

"The colonial papers of March 28, 1776, mention that the English frigate Renown, on her passage to America, took ten sail of American whalemen, which were sent to England to avoid the danger of recapture."

"* Bancroft's U. S., ix, p. 132." "† Eng. Annual Reg., 1775, p. 113."

"‡ Speech of the Earl of Harcourt to the Irish Parliament, October 10, 1775." "§ Annual Reg., 1776, p. 131."

"The English fishery, even under the encouragement given, did not, however, answer the expectations or hopes of its friends. It was not so easily transferred as had been imagined. A few more vessels sailed from Great Britain, employing, of course, a few more men, but the extra supply was a mere trifle in comparison to the deficiency that the restraining bill had caused."

RETALIATION BY THE AMERICAN COLONIES.—"The colonies, in turn, passed a bill cutting off supplies to the English fleet from the plantations,* a course entirely unforseen by the sage adherents of the British bill. As a natural consequence, the fishery, which promised so well on paper, and upon which the majority in Parliament had founded so many hopes, failed to yield them the solace for the evil done to America that they so fondly anticipated. Many ships, instead of bearing to England supplies, only returned there for provisions to relieve the distress they found on the coast, both on the sea and the land. Indeed, it was estimated that the colonial restraining act caused a loss to England in the fishery in these parts alone of fully half a million of pounds sterling.† To add to the calamities caused by man, the very elements seemed combined against them, for a terrible storm arose, and the center of its fury was the shores and banks of Newfoundland. 'This awful wreck of nature,' says a chronicler of the time, 'was as singular in its circumstances as fatal in its effects. The sea is said to have risen 30 feet almost instantaneously. Above seven hundred boats, with their people, perished, and several ships, with their crews. Nor was the mischief much less on the land, the waves overpassing all mounds, and sweeping everything before them. The shores presented a shocking spectacle for some time after, and the fishing-nets were hauled up loaded with human bodies.'‡ These misfortunes the opposers of the bill attributed to the vengeance of an indignant Providence."

AMERICAN SEAMEN "IMPRESSED."—"But Parliament went further than this, and added to the atrocity of this measure another none the less barbarous. It was decreed that all those prisoners who should be taken on board of American vessels should be compelled, without distinction of rank, to serve as common sailors on British ships of war. This proposed measure was received with great indignation by those gentlemen in Parliament whom partisan asperity had not blinded to every feeling of justice to or compassion for the colonies. This clause in the bill which contained this provision was 'marked by every possible stigma,' and was described by the lords, in their protest, as 'a refinement in tyranny' which, 'in a sentence worse than death, obliges the unhappy men who shall be made captives in this predatory war to bear arms against their families, kindred, friends, and country; and after being plundered themselves, to become accomplices in plundering their brethren.'§ And, by the articles of war, these very men were liable to be shot for desertion."

CONDITION OF ENGLISH WHALE-FISHERY IN 1779.—"By the action of this measure large numbers of Nantucket whaling captains with their crews and a few from other ports were captured by the English, and given their choice either to enter the service of the King in a man-of-war or sail from an English port in the same pursuit to which they had become accustomed.‖ In September (13th), 1779, John Adams, writing from Braintree¶ to the council of Massachusets, says:

"* The 'Restraining' bill." "† Eng. Annual Reg., 1776, p. 49."

"‡ English Annual Reg., 1776, p. 43. There was also much distress at the Barbadoes. It was thought at one time to draw supplies for beleaguered Boston from these islands, but cut off as they were from supplies from the colonies, with 80,000 blacks and 20,000 whites to feed, the project was deemed in the highest degree dangerous."

"§ Annual Reg., 1776, p. 118."

"‖ To his captors Capt. Nathan Coffin, of Nantucket, nobly said: 'Hang me, if you will, to the yard-arm of your ship, but do not ask me to be a traitor to my country.'—(Bancroft, ix, p. 313.)"

"¶ Adams, vii, p. 63. This is almost identical with the letter in Mass. Col. MSS., Resolves, vi, p. 216."

"'May it please your Honours:* While I resided at Paris I had an opportunity of procuring from London exact Information concerning the British Whale Fishery on the Coast of Brazil, which I beg Leave to communicate to your Honours, that if any advantage can be made of it the opportunity may not be lost.

"'The English, the last year and the year before, carried on this Fishery to very great advantage, off of the River Plate, in South America in the Latitude Thirty-five south and from thence to Forty, just on the edge of soundings, off and on, about the Longitude sixty-five, from London. They had seventeen vessells in this Fishery, which all sailed from London, in the Months of September and October. All the officers and Men are Americans.

"'The Names of the Captains are, Aaron Sheffield of Newport, ———, Goldsmith† and Richard Holmes from Long Island, John Chadwick, Francis May,‡ Reuben May,§ John Meader, Jonathan Meader, Elisha Clark, Benjamin Clark, William Ray, Paul Pease, Bunker Fitch, Reuben Fitch, Zebbeedee Coffin‖ and another Coffin, ——— Delano,¶ Andrew Swain, William Ray, all of Nantucket, John Lock, Cape Cod;** four or five of these vessels went to Greenland. The fleet sails to Greenland yearly, the last of February or the Beginning of March. There was published, the year before last, in the English Newspapers, and the same Imposture was repeated last year, and no doubt will be renewed this, a Letter from the Lords of Admiralty to Mr. Dennis De Beralt, in Colman street, informing him that a Convoy should be appointed to the Brazil Fleet. But this, I had certain Information, was a Forgery calculated mainly to deceive American Privateers, and that no Convoy was appointed, or did go with that Fleet, either last year, or the year before.

"'For the Destruction or Captivity of a Fishery so entirely defenceless, for not one of the Vessells has any arms, a single Frigate or Privateer of Twenty-four, or even of Twenty guns, would be sufficient. The Beginning of December, would be the best Time to proceed from hence, because the Frigate would then find the Whaling Vessells nearly loaded. The Cargoes of these Vessells, consisting of Bone and Oyl, will be very valuable, and at least four hundred and fifty of the best kind of seamen would be taken out of the Hands of the English, and might be gained into the American service to act against the Enemy. Most of the officers and Men wish well to this Country, and would gladly be in its service if they could be delivered, from that they are engaged in. Whenever an English Man of war, or Privateer, has taken an American Vessell, they have given to the Whalemen among the Crew, by order of Government, their Choice, either to go on Board a Man of war, and fight against their Country or go into the Whale Fishery. Such Numbers have chosen the latter as have made up the Crews of these seventeen Vessells.

"'I thought it my Duty to communicate this Intelligence to your Honours, that if so profitable a Branch of Commerce, and so valuable a Nursery of Seamen, can be taken from the English it may be done. This State has a peculiar Right and Interest to undertake the Enterprise, as almost the whole fleet belongs to it. I have the Honour to be, with the highest Consideration, your Honours most obedient & most humble servant

"'JOHN ADAMS.'

"* In 1778 the commissioners (Franklin and Adams) in France wrote to the President of Congress in nearly the same words, urging the destruction of the English whale fishery on the coast of Brazil and the release of the Americans there, who were practically prisoners of war, compelled to aid in supporting the enemy. In the letter of the commissioners, dated Passy, ———, 1778, Messrs Franklin and Adams write that three whalemen have been taken by French men-of-war and carried into L'Orient. The crews of these whaling vessels are Americans.—(Works of John Adams, vii, p. 63.)"

"† William Goldsmith, who sailed from Nantucket for London with a cargo of oil in April, 1775."

"‡ Francis Macy." "§ Reuben Macy." "‖ Zebdiel Coffin."

"¶ Abisha Delano (probably.)" "** From Nantucket. Twenty names are given in this list."

"This letter was referred to a committee, who reported that a copy of it should be sent to the President of the Continental Congress, which report was adopted, and thus Massachusetts let slip through her fingers the identical golden opportunity which the General Government had neglected the year before. The suggestions of Mr. Adams, who of all our Revolutionary statesmen seems most to have understood and appreciated the importance of this industry, were practically disregarded.* It is difficult to calculate how much the American whale fishery was affected by this failure to act on this suggestion of Mr. Adams. Many of these captains and men, and others captured at other times during the war, had at its close sailed so long from British ports that the extraordinary inducements held out by the English, and the depression in their business in the United States, immediately succeeding the close of the war, operated to transfer to that country their skill and, measurably, their capital."

FORAYS BY ENGLISH NAVAL VESSELS: TREATY OF 1778.—"In the years 1778–'79 the English navy made several forays upon the sea-coast towns of New England, destroying much property at Warren, R. I., Dartmouth, Martha's Vineyard, and Nantucket in Massachusetts.† Indeed, these predatory raids were frequent throughout the war, and liable to occur at any time, consequently the unfortunate inhabitants were kept in a continual ferment. During the same time the Government of France was continually intriguing for the exclusive possession of the North American fisheries. On the 6th of February, 1778, a treaty of amity and commerce was arranged between France and the United States. Upon this point each side was to retain the exclusive right to its own. The Americans conceded to the French the rights reserved by the treaties of Utrecht‡ and Paris,§ even to the French interpretation of them, which were the right to fish upon the Banks, and the exclusive use of one-half the shores of Newfoundland upon which to dry their fish.‖ In regard to what disposition should be made of that island in case it should be captured, nothing was said; the sentiment of New England, however, upon that point was unmistakable. Later in the same year Samuel Adams, in a letter from Philadelphia, wrote: 'I hope we shall secure to the United States, Canada, Nova Scotia, Florida, too, and the fishery, by our arms or by treaty.' He writes further, and every year of the past century has borne witness to the soundness of his views: 'We shall never be on a solid footing till Great Britain cedes to us, or we wrest from her, what nature designs we should have.'¶

"* An exception to the general apathy in this respect occurred late in the fall or early in the winter of 1776, when boats from the Alfred, man-of-war, were sent ashore at Canso and destroyed the whaling interest there, burning all the materials for that industry, together with all the oil stores with their contents."

"† 'Return of vessels and stores destroyed on Acushnet River the 5th of September, 1778: 8 sail of large vessels, from 200 to 300 tons, most of them prizes; 6 armed vessels, carrying from 10 to 16 guns; a number of sloops and schooners of inferior size, amounting in all to 70, besides whale-boats and others; amongst the prizes were three taken by Count D'Estaign's fleet; 26 store-houses at Bedford, several at McPherson's Wharf, Crans Mills, and Fairhaven; these were filled with very great quantities of rum, sugar, molasses, coffee, tobacco, cotton, tea, medicines, gunpowder, sail-cloth, cordage, &c.; two large rope-walks.

"'At Falmouth, in the Vineyard Sound, the 10th of September, 1778: 2 sloops and a schooner taken by the galleys, 1 loaded with staves; 1 sloop burnt.

"'In Old Town Harbor, Martha's Vineyard: 1 brig of 150 tons burden, burnt by the Scorpion; 1 schooner of 70 tons burden, burnt by ditto; 23 whale-boats taken or destroyed; a quantity of plank taken.

"'At Holmes's Hole, Martha's Vineyard: 4 vessels, with several boats, taken or destroyed; a salt-work destroyed, and a considerable quantity of salt taken.'—(Ricketson's New Bedford, p. 282.)

"At Sag Harbor Long Island, property was taken or destroyed to a large amount; Newport suffered greatly; Nantucket lost twelve or fourteen vessels, oil, stores, &c., to the value of £4,000 sterling. Warren, R. I., suffered during the war to the extent of 1,090 tons of shipping, among them two vessels loaded with oil, and a large amount of other property. Sag Harbor also lost one or more vessels by capture."

"‡ April 11, 1613." "§ February 10, 1763."

"‖ Bancroft's U. S., ix, 481. The fact must be kept in mind that whaling and fishing for cod were both carried on on nearly the same waters, and often by the same vessels."

"¶ Bancroft's U. S., x, 177."

"France also sought the aid of Spain, and that power was given to understand that in the final treaty of peace between the United States and England, they, too, would necessarily have some voice. Vergennes, in October (1778), stated, as the only stipulations which France would require, that in the final negotiations the treaty of Utrecht must be either wholly continued or entirely annulled; that she must be allowed to restore the harbor of Dunkirk; and that she must be allowed 'the coast of Newfoundland, from Cape Bonavista to Cape St. John, with the exclusive fishery from Cape Bonavista to Point Riche.'* By a treaty made with Spain, April 12, 1779, France bound herself to attempt the invasion of Great Britain or Ireland, and to share only with Spain the North American fisheries, in case she succeeded in driving the English from Newfoundland.

"These discussions (as to the terms to be embraced in the final treaty of peace) were necessary pending the question of an alliance with France and Spain against England. When the subject of frontiers was brought up, France, while yielding all claim to the provinces of Canada and Nova Scotia, which for years had been hers, joined heartily with Spain in opposing the manifest desire of the Americans to secure them. Two States persisted in the right and policy of acquiring them, but Congress, as a body, deferred to the French view of the subject. 'With regard to the fisheries, of which the interruption formed one of the elements of the war, public law had not yet been settled.' By the treaty of Utrecht, France agreed not to fish within 30 leagues of the coast of Nova Scotia; and by that of Paris, not to fish within 15 leagues of Cape Breton. Moreover, New England at the beginning of the war had, by act of Parliament, been debarred from fishing on the banks of Newfoundland. * * * 'The fishery on the high seas,' so Vergennes expounded the law of nations, 'is as free as the sea itself, and it is superfluous to discuss the right of the Americans to it. But the coast fisheries belong of right to the proprietary of the coast. Therefore the fisheries on the coasts of Newfoundland, of Nova Scotia, of Canada, belong exclusively to the English; and the Americans have no pretensions whatever to share in them.'† In vain the United States urged that the colonies, almost exclusively, had improved the coast fisheries, and considered that immemorial and sole improvement was practical acquisition. In vain they insisted that New England men, and New England money, and New England brains had effected the first conquest of Cape Breton, and were powerful aids to the subsequent conquest of Nova Scotia and Canada, and hence they had acquired at least a perpetual joint propriety. To their arguments Vergennes replied that the conquests were made not for the colonies but for the crown, and when New England dissolved its allegiance to that crown she renounced her right to the coast fisheries. In the end the United States were obliged to succumb; they had asked aid from foreign powers, and they must yield, so far as was practicable, to the demands those powers made. These concessions were a portion of the price of independence.

"A committee‡ was appointed by Congress to definitely arrange upon what terms the future treaty of peace with England should be finally consummated, and in February, 1779, they reported that Spain manifested a disposition to form an alliance with the United States, hence independence was an eventual certainty. On the question of fishing they reported that the right should belong properly to the United States, France, and Great Britain in common. This portion of the report was long under discussion in Congress, and it was finally voted that the common right of the United States to fish 'on the coasts, bays, and banks of Newfoundland and Gulf of Saint Lawrence, the Straits of Labrador, and Belle Isle should in no case be given up.'§ Under a vote to

"* Bancroft's U. S., x, p. 184."

"† Bancroft's U. S., x, pp. 210–11."

"‡ Gouverneur Morris, of New York; Burke, of North Carolina; Witherspoon, of New Jersey; Samuel Adams, of Massachusetts, and Smith, of Virginia.—(Bancroft's U. S., x, p. 213.)"

"§ Bancroft's U. S., x, p. 213."

reconsider this subject on the 24th of March, Richard Henry Lee proposed that the United States should have the same rights which they enjoyed when subject to Great Britain, which proposition was carried by the votes of Pennsylvania, Delaware, and the four New England States, New York and the Southern States opposing. New York, under the leadership of Jay and Morris, peremptorily declined to insist on this right by treaty, and Morris moved that independence should be the sole condition of peace. This was declared out of order by the votes of the New England States, New Jersey, and Pennsylvania, against the unanimous vote of New York, Maryland, and North Carolina; Delaware, Virginia, and South Carolina being equally divided.

"But France had a vital interest in this matter, and the French minister interposed his influence, and on the 27th of May Congress returned to its original resolve, 'that in no case, by any treaty of peace, should the common right of fishing be given up.'

"On the 19th of June the equanimity of the French minister was suddenly and rudely disturbed by Elbridge Gerry, who being from Marblehead, was the steady and persistent champion of the claims of New England, and who, in the prolonged discussions, always came to the front in defense of those rights. Entirely unexpectedly, Gerry, avoiding 'a breach of the rules of Congress by a change in form, moved resolutions, that the United States have a common right with the English to the fisheries on the banks of Newfoundland, and the other fishing-banks and seas of North America. The demand was for no more than Vergennes confessed to belong to them by the law of nations; and Gerry insisted that unless the right received the guarantee of France, on the consent of Great Britain, the American minister should not sign any treaty of peace without first consulting Congress.'* A most stormy and bitter debate ensued. The friends of France resisted strenuously. Four States declared if the resolution was adopted they should secede. The matter, however, was somewhat compromised, and the common right of fishing on the Grand Banks affirmed; Congress asking for that right the guarantee of France by means of a supplementary article explanatory of former treaties.

"The French minister became alarmed, and sought an interview with the President of Congress and two other members known to be equally favorably disposed to the policy he represented. The vigor and zeal with which New England had pressed the matter had disposed them to concede to the desires of this section. He assured them 'that disunion from the side of New England was not to be feared, for its people carried their love of independence even to delirium,' and continued: 'There would seem to be a wish to break the connection of France with Spain; but I think I can say that, if the Americans should have the audacity to force the King of France to choose between the two alliances, his decision would not be in favor of the United States; he will not certainly expose himself to consume the remaining resources of his Kingdom for many years only to secure an increase of fortune to a few ship-masters of New England. I shall greatly regret, on account of the Americans, should Spain enter into war without a convention with them.' Five hours of discussion failed to induce the members to undertake to change the views of Congress, and a new interview was held on the 12th of July, between Gerard and Congress, in a committee of the whole. As a final result the question was left to be settled when a treaty of peace was formally arranged with Great Britain.*

"In the mean time how fared it with the whale fishery? The people of Nantucket, with whom alone it was still encouraged, though in the face of the most terrible discouragements, were reduced to the severest straits. To live, they must eat; to eat, they must have provisions; to obtain provisions, they must give in exchange money or its equivalent; to obtain the exchangeable commodity, some business must be pursued. The whale fishery was the only business available to

"* Bancroft's U. S., x, pp. 216 to 219."

them. Long practice had made them familiar with it, and a singleness of pursuit had kept them comparatively ignorant of any other occupation. But the great problem was how to carry it on, even in the limited way to which, by the destruction of their vessels, they were restricted. If they sailed under American protection, the English captured and destroyed their vessels and imprisoned their men; if they cleared with the sanction of English safeguards, the Americans performed for them the same kindly offices. Between the upper and the nether millstones of war they were quite ground to powder. In their extremity they learned that the English were inclined to be lenient toward them in the matter, and they had quite reliable assurance that the leading men of the American Government looked compassionately upon the distressed situation of the unfortunate islanders.

"Influenced by these considerations, the inhabitants sent Timothy Folger, esq., to New York, to represent the condition they were in, and solicit permission to carry on whaling without danger of capture from British cruisers. They asked permits for twenty fishing boats to fish around the island, for four vessels to be employed in the whale fishery, for ten small vessels to supply the inhabitants with wood, and for one to go to New York for some few supplies not obtainable elsewhere.* Their petition was not so successful as they had wished."

AMERICAN VESSELS GRANTED PERMITS FOR WHALING.—"In 1781 Admiral Digby succeeded Admiral Arbuthnot in the command of the English fleet in these waters, and permission to whale was asked of him,† and permits were issued for twenty-four vessels to pursue the business unmolested by English armed cruisers.‡ 'This privilege,' says Macy, 'seemed to give new life to the people. It produced a considerable movement in business, but the resources of the island had so diminished that but a small number of vessels could take the benefit of these permits. Those who had vessels, and were possessed of the means, fitted them out on short voyages, and, had there been no hindrance, it is probable that they would have done well; for the whales,

"*Macy, 113."

"†Mr. Macy gives us to understand that no permits were granted, but this must be an error; for Mr. Rotch (*vide* MS.), who was one of the committee the succeeding year to obtain grants from the English, mentions an accusation made by Commodore Affleck, of abuse of confidence in regard to the permits which were granted the year before, and that scarcely a vessel could be found but had one of these documents. To this Mr. Rotch replied: 'Commodore Affleck, thou hast been greatly imposed upon in this matter. I defy Capt. ——— to make such a declaration to my face. Those Permits were put into my hands. I delivered them, taking receipts for each, to be returned to me at the end of the voyage, and an obligation that no transfer should be made or copies given. I received back all the Permits except two before I left home, and should probably have received those two on the day that I sailed. Now if any duplicity has been practiced, I am the person who is accountable, and I am here to take the punishment such perfidy deserves.' Mr. Rotch's character as a man and a merchant stood too high to be questioned, and the commodore, who a moment before was so violent, became more genial, and replied, 'You deserve favor,' and assisted Mr. Rotch to obtain it. The termination of this difficulty is but one example of the manner in which all these slanders, from both English and Americans, were disposed of when the accused could have an opportunity of confronting the accusers or those in authority."

"‡The following is a copy of one of these permits, from Macy, p. 115:

"'[L. S.] By Robert Digby, Esquire, Rear Admiral of the Red, and Commander-in-chief, &c., &c.

James Chase
Obadiah Folger
George Coleman
Silvanus Swain
Charles Russell
Peter Pollard
Andrew Coleman
Obed Barnard
Jonathan Briggs

"Permission is hereby given to the Dolphin brig, burthen sixty tons, Walter Folger owner, navigated by Gilbert Folger as master and the twelve seamen named in the margin, to leave the island of Nantucket and to proceed on a whaling voyage,—to commence the first of January, 1782, and end the last day of ——— following, provided that they have on board the necessary whaling craft and provisions only, and that the master of said brig is possessed of a certificate from the selectmen of the said island, setting forth that she is *bona fide* the property of the inhabitants of the island, with the names of the master and seamen in her; and that she shall not be found proceeding with her cargo to any other port than Nantucket or New York.

"'Dated at New York, the first day of December, 1781.

"'ROBERT DIGBY.

"'To the commissioners of his majesty's ships and vessels of war, as well as of all privateers and letters of marque.

"'By command of the Admiral:

"'THOMAS M. PALMER.'"

having been unmolested for several years, had become numerous, and were pretty easily caught. To carry on the whale fishery under permission of the Government of Great Britain was a proceeding somewhat novel, and could not pass unnoticed. Although it was not publicly known, yet it was generally believed that some kind of indulgence had been shown by the enemy to the people of Nantucket. This caused some clamor on the continent; but our Government well knew the situation of the place, and its large participation in the calamities of the war, and was, consequently, rather inclined to favor than to condemn the acceptance of favors from the English. Although the Government could not grant an exclusive privilege to any particular part of the Union, yet such encouragement was given by the leading men of the nation, in their individual capacity, as to warrant the proceeding. Several vessels whaling under these permits were taken by American privateers and carried into port, but in every instance they were soon liberated. Whenever it was found that the permits were used for no other purpose than that for which they had been granted, and that the vessels using them had not been engaged in illicit trade, there was no hesitation in releasing them.'

"Nevertheless a great risk attended this mode of proceeding, and the islanders became satisfied that to make the business reasonably safe permits must be obtained from both contending powers and permission also to make use of each license against the other's vessels of war. Accordingly, a town meeting was convened on the 25th of September, 1782, and a memorial prepared and adopted which was sent to the general court of Massachusetts.* This petition recited the unfortunate situation the people were in, exposed to the inroads of English and Americans, with neither side able or willing to protect them against the other, and powerless, because of the defenseless character of the island and the religious convictions of the vast majority of the inhabitants, to suitably guard their own firesides. They urged that people in continental towns, where the broad country opened to them a place for retreat, could have but faint ideas of the suffering of those who were constantly liable to hostile invasion and whose insular position precluded all thoughts of escape, and they indignantly resented the calumnies which had been spread broadcast through the State in regard to alleged actions of theirs. Regarding the prosecution of their business, they said:

"'We now beg leave to throw a few hints before you respecting the Whalefishery, as a matter of great importance to this Commonwealth. This place before the War, was the First in that branch of business, & employed more than One Hundred Sail of good Vessels therein, which furnish'd a support not only for Five Thousand Inhabitants here, but for Thousands elsewhere, no place so well adapted for the good of the Community at large as Nantucket, it being destitute of every material necessary in the Business, and the Inhabitants might be called Factors for the Continent rather than Principals; as the war encreased the Fishery ceased, until necessity obliged us to make trial the last Year, with about seventeen sail of Vessels, Two of which were captured & carried to New York,† & one was burnt the others made saving voyages. The present Year we employed about Twenty Four sail in the same business, which have mostly compleated their Voyages, but with little success; & a great loss will ensue; this we apprehend is greatly owing to the circumscribed situation of the Fishery; we are now fully sensible that it can no longer be pursued by us, unless we have free liberty both from Great Britain & America to fish without inter-

"* By a very disastrous fire at Nantucket, in 1846, the records both of the town and custom-house were destroyed, hence there arises much difficulty in getting many interesting details. Many of the custom records of New Bedford were destroyed by fire in 1825; the corresponding documents of Newport, prior to 1779, were carried away by the English, and the vessel containing them being sunk, they were, when recovered, in a very damaged condition; the similar records of Sag Harbor (the older ones) were stored in a damp place, and are mildewed and illegible."

"† New York, at this time, was in possession of the English."

ruption; As we now find One of our Vessels is captured & carried to New York, but without any Oil on board, and Two others have lately been taken & carried into Boston & Salem, under pretense of having double papers on board, (Nevertheless we presume the captors will not say that any of our Whalemen have gone into New York during the season as such a charge would have no foundation in Truth). And if due attention is not paid to this valuable branch, which if it was viewed in all its parts, perhaps would appear the most advantageous, of any possess'd by this Government, it will be entirely lost, if the War continues: We view it with regret & mention it with concern, & from the gloomy prospect now before us, we apprehend many of the Inhabitants must quit the Island, not being able even to provide necessaries for the approaching Winter: some will retreat to the Continent & set down in the Western Governments; and the most active in the Fishery will most probably go to distant Countries, where they can have every encouragement, by Nations who are eagerly wishing to embrace so favourable an opportunity to accomplish their desires; which will be a great loss to the Continent in general, but more to this Government in particular. We beg leave to impress the consideration of this important subject, not as the judgment of an insignificant few, but of a Town which a few Years since stood the Third in Rank (if we mistake not) in bearing the Burthens of Government; It was then populous and abounded with pleuty, it is yet populous but is covered with poverty. Your Memorialists have made choice of Samuel Starbuck, Josiah Barker, William Rotch, Stephen Hussey and Timothy Folger, as their Committee who can speak more fully to the several matters contain'd in this Memorial, or any other thing that may concern this County, to whom we desire to refer you. Signed in behalf of the Town by—

"'FREDERICK FOLGER,

"'*Town Clerk.*'

"This memorial was referred to a committee consisting of George Cabot, esq., on behalf of the senate, and General Ward and Colonel McCobb on the part of the house, which committee on the 29th of October made the following report:

"'That altho' the Facts set forth in said Memorial are true and the Memorialists deserve Relief in the premises, yet as no adequate Relief can be given them but by the United States in Congress assembled, therefore it is the opinion of the Committee that the said Memorial be referr'd to the consideration of Congress, and the Delegates of this Commonwealth be required to use their Endeavours to impress Congress with just Ideas of the high worth & Importance of the Whale fishery to the United States in general, & this State in particular.'*

"This report was accepted, and it was ordered that the delegates be furnished with a copy of the memorial, and be required to take the action indicated in the report.

"In addition to the action of the general court, the town also sent William Rotch and Samuel Starbuck to Philadelphia to intercede personally in the matter. After conferring with General

"*Mass. Col. MSS., Petitions, i, pp. 124-5-6-7-8-9. A memorandum accompanies this, which various circumstances seem to indicate is the work of Mr. Rotch, and which says: 'Perhaps some of those reports may have originated from this—a Committee of our Island in the fore part of the year 1781 applied to some of the Members of the General Court and spread before them the peculiar circumstances wherein the Island was involved, one whereof was that our Vessels whenever they passed in or out were perfectly under the controul of the Britons and it was therefore necessary that permits should be obtained from them for our Vessels to proceed on the Whale-fishery—since which time some of them have been taken by the American Privateers for having such Permits—and we are thereby reduced to this difficulty that if we carry our Vessels over the bar without permit from the British Admiral they are made prize to the Britons—if they have such permits they are taken by our own Countrymen—and our harbour is therefore completely shut up—and all our prospects terminate in poverty and distress—what gives us great concern is that our people who understand the Whale fishery will be driven to foreign neutral Countries and many years must pass away before we shall again be enabled to pursue a branch of business which hath been in times past our support and hath yielded such large aids to the Commerce of this Country.'"

Lincoln, Samuel Osgood, Nathaniel Gorham, Thomas Fitzsimmons, and James Madison, they approached one of the Massachusetts delegation who was a resident of Boston, and who was greatly prejudiced against Nantucket. After an interview of about two hours with no apparent relaxation of the bitterness of feeling on his part, Mr. Rotch questioned him as to whether the whale fishery was 'worth preserving to this country?' He replied, 'Yes.' 'Can it be preserved in the present state of things by any place except Nantucket?' 'No.' 'Can we preserve it unless you and the British will both give us permits?' 'No.' 'Then, pray,' continued Mr. Rotch, 'where is the difficulty?' Thus this interview ended. Messrs. Rotch and Starbuck then drew up a memorial and presented it to the consideration of the above named gentlemen, desiring them to review it, at the same time telling them of the conversation between Mr. Rotch and the delegate from Boston. By advice of these friends they waited again upon the member from Massachusetts, and he accepted the charge of bringing the subject before Congress, where, after deliberation, it was determined to grant permits for thirty-five vessels to sail on whaling voyages, and these were accordingly granted and delivered. The very next day a vessel arrived from Europe bringing the rumor of the signing of a provisional treaty of peace.*

"This was early in 1783.† The passage from the provisional to the definitive treaty was long, circuitous, and at times dark. One of the chief sources of difference was the settlement of the question of the fisheries, England with an apparent feeling of magnanimity conceding favors, and America with a sense of justice claiming rights. Against what the United States considered her just dues the diplomacy of the English, their late enemies, and the French, their recent allies, was arrayed, and nothing but firmness, sagacity, and skill on the part of the American commissioners saved the day. The English guarded their assumptions with all possible jealousy; the French sought a loose place in the armor to insert the diplomatic sword, and gain by treaty what they had been unable to sustain with force. The Americans were ever on the alert to overcome the prejudices of a power from whom they had conquered a peace, and to propitiate the supersensitiveness of a power which had rendered them so valuable assistance. They could not, however, depart from certain propositions. The articles which must be inviolate were those guaranteeing to America full and unconditional independence, and the withdrawal from the thirteen States of all British troops; the Mississippi as a western, and the Canadian line as it was prior to the Quebec act of 1774, for a northern boundary; and a freedom in the fishery off Newfoundland and elsewhere as it had been enjoyed prior to the commencement of hostilities. In vain Great Britain sought to evade the latter clause; the United States tenaciously, as in a vice, held her to it, and she yielded."

Effects of the Revolutionary war.—"But the announcement of peace came to a people whose commerce was sadly devastated. Save such of the interest as had been preserved by what Mr. Jefferson termed the Nantucketois, the business of whaling was practically ruined and required rebuilding. To Nantucket the war had, despite its holy necessity and its glorious conclusion, been a heavy burden. Of the little over 150 vessels owned there in 1775, 134 had fallen into the hands of the English and 15 more were lost by shipwreck; many of the young men had perished through the rigors of war;‡ in about 800 families on the island there were 202 widows and 342 orphan children; the direct money loss far exceeded $1,000,000 in times when a

"* Memoranda of William Rotch—unpublished."

"† On the 22d of March, 1783, an order was passed in Congress granting 35 licenses to Nantucket vessels to whale and to secure them from the penalty attached to double papers. (Madison Papers, p. 405.)"

"‡ It is estimated that no less than 1,200 seamen, mostly whalemen, were captured by the English or perished at their hands during the Revolution, from Nantucket alone!"

man's pay was 67 cents per day; one merchant alone lost over $60,000.* And as it was with Nantucket, so it was in a degree with all the whaling ports.† With an energy characteristically American, they sought, on the return of peace, to retrieve their losses. Scarcely had the echo of the hostile guns died away, scarcely had the joyful news of peace reached their ports, when the whalemen began to equip anew for their fishery. The Bedford, just returned to Nantucket from a voyage, was immediately loaded with oil and dispatched to London, arriving in the Downs on the 3d of February. Her appearance was thus chronicled by an English magazine of that day: 'The ship Bedford, Captain Mooers,‡ belonging to the Massachusetts, arrived in the Downs the 3d of February, passed Gravesend the 4th, & was reported at the Custom-House the 6th instant. She was not allowed regular entry until some consultation had taken place between the commissioners of the customs & the lords of council, on account of the many acts of parliament yet in force against the rebels in America. She is loaded with 487 butts of whale oil; is American built;§ manned wholly by American seamen; wears the rebel colors & belongs to the Island of Nantucket in Massachusetts. This is the first vessel which displayed the thirteen rebellious stripes of America in any British Port. The vessel lies at Horseley down a little below the Tower, and is intended immediately to return to New England.' Immediately after, almost simultaneously with her, arrived another ship from Nantucket—the Industry, Capt. John Chadwick, while the sloop Speedwell, James Whippey, master, was sent to Aux Cayes.‖ Those at Nantucket who had capital left resumed the whale fishery with as many vessels as they could procure. Long comparative immunity from capture had caused the whaling-grounds to become repopulated, and the whales themselves had become less shy and hence more easily killed. Directly succeeding the war the products of the fishery commanded good prices, and soon other ports entered into competition. New London, Sag Harbor, Hudson, N. Y., Boston, Hingham, Wellfleet, Braintree,¶ Plymouth, Bristol, each sent out one or more whale hunters. For a brief time the business promised much profit, but the fever was a fitful one. The excessive prices which the commodity commanded immediately after the war** rapidly became reduced; Great Britain, the only market for the sperm oil, had, by an alien duty of £18 sterling per ton, practically precluded its shipment from America. Oil which before the war was worth £30, now scarcely brought £17, while to cover expenses and leave a reasonable margin for profit, £25 were required.†† The situation was indeed desperate—almost hopeless."

ESTABLISHMENT OF BOUNTY SYSTEM BY MASSACHUSETTS.—"In the discussion of means for relief many of the people of Nantucket expressed the opinion that if the island could be made neutral commercial affairs might assume a more healthy tone. A memorial was finally sent to the legislature of Massachusetts praying relief, and the agents presenting it were instructed to have the subject of neutrality acted upon. As may be readily supposed, however, the invidious legislation that Nantucket was unable to obtain during the war, she would scarcely be likely to get on its conclusion, and the subject of neutrality was very properly dismissed. That the depression in the whaling business needed some alleviation was, however, too evident to require discussion, and

"* William Rotch, esq."

"† Warren, R. I., suffered a loss of 12 vessels (about 1,100 tons), of which at least two were whalemen.—(Hist. of Warren, p. 101.)"

"‡ Capt. William Mooers, who sailed for many years in the employ of Messrs. Rotch & Co. It is related that one of the crew of the vessel first showing the American flag in the Thames was hump-backed. One day a British sailor meeting him clapped his hand upon the American's shoulder, saying, 'Hilloa, Jack, what have you got here?' 'Bunker Hill and be d——d to you,' replied the Yankee, 'will you mount?'"

"§ The Bedford was built in 1765, by Ichabod Thomas, at North River. She was built a brig."

"‖ Letter of William Rotch, esq." "¶ One small schooner of 38 tons burden hailed from Braintree."

"** Macy's Nantucket, 121." "†† See Mr. Rotch's MS."

in 1785 the legislature passed the following preamble and resolution: 'Whereas this court, having a due sense of the high worth and importance of the whale fishery, are desirous of its preservation not only to this State, but to the United States in general; therefore, *Resolved*, That there be paid, out of the treasury of this Commonwealth, the following bounties upon whale oil of the different qualities hereafter mentioned, viz: For every ton of white spermaceti oil, five pounds; for every ton of brown or yellow spermaceti oil, sixty shillings; for every ton of whale oil (so called), forty shillings, that may be taken or caught by any vessel or vessels that are or may be owned and manned wholly by the inhabitants of this Commonwealth, and landed within the same, from and after the first day of January next, until the further order of the general court.' The selectmen of the various towns were further empowered to appoint sworn inspectors to inspect all oil so landed, and mark on the head of each cask so inspected the initital letters of his name, and a description of the oil by the initials W. B., or Y. W. O., and deliver to the selectmen a sworn certificate thereof. To obtain the bounty, a certificate from the selectmen must be presented to the governor and council,* detailing the kind, quality, and amount of oil, and where landed. To this certificate the owners were to make oath or affirmation.

"But, although the bounty seemed at first beneficial, the ultimate effect was not so good. The business became unduly stimulated and an overproduction prevented to a great degree the desired advance in profit. The demand was greatly limited. A long suspension in the use of oil had accustomed the people in general to the use of tallow candles, and but little oil was required either for towns or for light-houses."

Transfer of whaling interests from Nantucket to France and England.—"In the mean time, seeing no chance for any amelioration in their condition, unable to carry on a business at a prospective loss, and accustomed from early childhood only to this pursuit, hence unable and unwilling to adventure another, some of the prominent merchants of Nantucket resolved to transfer their business to some place where the demand for their products and the advantageous bounty offered would make it far more remunerative. Among these was William Rotch. On the 4th of July, 1785, Mr. Rotch sailed from Nantucket in the ship Maria, bound for London, arriving there on the 27th. At as early a day as practicable he opened negotiations with the chancellor of the exchequer (William Pitt) for a transfer to England of such of the whale fishery at Nantucket as he could control.† The subject was laid before the privy council, and Mr. Rotch waited four months for their summons. Finally, in deference to a request of his that some one be appointed to close the matter, he was referred to Lord Hawksbury, a gentleman not very favorably disposed toward America. Mr. Rotch gave him his estimate of the sum necessary to induce a removal, viz, '£100 sterling transportation for a family of five persons, and £100 settle-

"* Macy, 129."

"† Capt. Alexander Coffin was of those who looked upon the whale fishery as a peculiarly American pursuit, and who denounced any effort looking to a transfer of it to any foreign government. On the 8th of June, 1785, he addressed from Nantucket a vigorous letter to the Hon. Samuel Adams. He wrote in severe terms against the measures being adopted to remove to England, and says Mr. Rotch 'is now taking on board a double stock of materials, such as cedar boards (commonly called boat-boards), of which they have none in England, a large quantity of cooper's stuff for casks, &c. Neither does it stop here; the house of Rotch have been endeavoring to engage an acquaintance of mine to go to Bermudas to superintend the business at that place.' In a postscript he adds, 'Since writing the above I have been favored with the original scheme of establishment of the fishery at Bermudas, copies of which are here inclosed. One of the company is now at Kennebec, contracting with some persons for an annual supply of *hoops*, staves, and other lumber necessary for the business.' This letter was laid before the senate of Massachusetts, and the result was the passage of an act prohibiting the export to Bermudas of the articles enumerated, and the transfer in this direction was prevented."

ment; £20,000 for a hundred families.' Lord Hawksbury demurred to this as a large sum.* At a subsequent interview Mr. Rotch added to his previous position the demand to bring with him thirty American ships, which demand also met with remonstrance from Lord Hawksbury, who seemed to be of the 'penny wise pound foolish' order of statesmen. Mr. Rotch finally took leave of Lord Hawksbury without obtaining any satisfaction, and, embarking on board his vessel, sailed for France.† Landing at Dunkirk, he drew up proposals to the French Government and forwarded them to Paris. These proposals were eagerly entertained, and the preliminaries were speedily arranged for a transfer of the interest of Mr. Rotch and his family and friends to Dunkirk, from which port, for several years, a very successful fishery was carried on. Contemporary with the negotiations with Mr. Rotch, a letter was dispatched to the people of Nantucket by Capt. Shubael Gardner, from L——— Coffin, who resided at Dunkirk, stating that his sympathy for the people of that island had led him to apply to the French Government in their behalf, and with excellent success. Every request he had made had been granted, and the unlimited freedom, the abundance and cheapness of provisions, the absence of custom-houses, the small taxes, the regularity of the town, the manners and industry of the inhabitants, and its situation, rendered it, in his opinion, 'the most eligible place in the universe for the people of Nantucket to remove to.‡

"*'And what,' queried Lord Hawksbury, 'do you propose to give us in return for this outlay of money?' 'I will give you,' returned Mr. Rotch proudly, 'some of the best blood of the island of Nantucket.' At this interview Hawksbury presented his own figures, where, says Mr. Rotch (see MS.), 'he had made his nice calculation of £87 10*s.* for transportation and settlement of a family,' and, says he, 'I am about a fishery bill, and I want to come to something that I may insert it,' &c. My answer was, 'Thy offer is no object; therefore go on with thy fishery bill without any regard to me.' I was then taking leave and withdrawing. 'Well, Mr. Rotch, you'll call on me again in two or three days.' 'I see no necessity for it.' 'But I desire you would.' 'If it is thy desire perhaps I may call.' However, he let me rest but one day before he sent for me. He had the old story over again, but I told him it was unnecessary to enter again into the subject. I then informed him that I had heard a rumor that Nantucket had agreed to furnish France with a quantity of oil. He stepped to his bureau, took out one of a file of papers, and pretended to read an entire contradiction, though I was satisfied there was not a line there on the subject. I said, 'It was only a vague report that I had heard, and I cannot vouch for the truth of it, but we are like drowning men, catching at every straw that passes by; therefore I am now determined to go to France and see what it is. If there is any such contract, sufficient to retain us at Nantucket, neither you nor any other nation shall have us, and if it is insufficient, I will endeavor to enlarge it.' 'Ah,' says he, 'Quakers go to France?' 'Yes,' I replied, 'but with regret.' I then parted with Lord Hawksbury for the last time.—(Rotch MS.)"

"†His lordship sent once more for Mr. Rotch to call on him, but Mr. Rotch returned answer, 'If Lord Hawksbury desires to see me he will find me on board my vessel up to the hour when she takes her anchor.' When Mr. Rotch was once gone, Hawksbury became alarmed and sent to him by letter, informing him that he had made provision in the fishery bill for him, with liberty to bring forty ships instead of thirty, 'he having forgotten the number;' but it was too late. This unexpected ending of his hopes was far from pleasing either to his lordship or the Government. After the interview with the King of France, Mr. Rotch returned to England, and was importuned to remove to Great Britain. In his memoranda he says he was waited upon by one of the officials, who told him he was 'authorized by Mr. Pitt to tell you that you shall make your own terms.' 'I told him,' continues Mr. Rotch, 'he was too late. I made very moderate proposals to you, but could obtain nothing worth my notice. I went to France, sent forward my proposals, which were doubly advantageous to what I had offered your Government; they considered them but a short time, and on my arrival in Paris were ready to act. I had a separate interview with all the ministers of state necessary to the subject, five in number, who all agreed to and granted my demands. This was effected in five hours, when I had waited to be called by your privy council more than four months.' All attempts on the part of the English Government to reopen the subject were politely but firmly rejected by Mr Rotch. 'In the beginning of 1793,' the account continues, 'I became fully aware that war between England and France would soon take place; therefore it was time for me to leave the country in order to save our vessels if captured by the English. I proceeded to England. Two of them were captured, full of oil, and condemned, but we recovered both by my being in England, where I arrived two weeks before the war took place. My going to France to pursue the whale fishery so disappointed Lord Hawksbury that he undertook to be revenged on *me* for his own folly, and I have no doubt gave directions to the cruisers to take any of our vessels that they met with going to France. When the Ospray was taken by a King's ship, the officer sent on board to examine her papers called to the captain and said, "You'll take this vessel in, sir; she belongs to William Rotch."' Mr. Rotch returned to the United States with several of his vessels in 1794, and, after residing in Nantucket about a year, removed to New Bedford, where he lived until his death, in May, 1828."

"‡The following is a list of advantages secured to Nantucket whalemen by Mr. Coffin:

"'1st. An entire free exercise of their religion or worship within themselves.

"What effect this state of affairs may have had in the arrangement of treaties of commeree with Great Britain is somewhat uncertain, but the attempt to a consummation of this plan was intrusted to a man not only thoroughly imbued with New England principles, but of sufficient statesmanship to realize of how much national importance this matter was. None knew better than John Adams that the secret of the commercial greatness which should be developed lay in the codevelopment of the fisheries; that herein was the nursery for seamen who would be a source of wealth in peaee and of power in war. It was desirable to make duties and courtesies more reciproeal, and one of the first duties intrusted to Mr. Adams on his appointment to the court of St. James in 1785 was the arrangement of some treaty which should be mutually satisfaetory. Naturally, one of the prineipal points was the importation of the products of our fishermen, since that industry, perhaps more than any other, was in danger of serious injury from the existing eondition of things.

"In a letter to the Marquis of Carmarthen, dated July 29, 1785, Mr. Adams refers to the trouble aecruing from the alien duties laid by England in these words: 'The course of eommeree sinee the peaee, between Great Britain and the United States of America, has been such as to have produeed many inconveniences to the persons eoncerned in it on both sides, which beeome every day more and more sensible. The zeal of Amerieans to make remittanees to British merchants has been such as to raise the interest of money to double its usual standard, to increase the priee of bills of exchange to 8 or 10 percentum above par, and to advanee the price of the produee of the eountry to almost double the usual rate. Large sums of the circulating eash, and as much produee as could be purchased at almost any rate, have been remitted to

"'2d. The concession of a tract of ground to build their houses and stores.

"'3d. All tho privileges, exemptions, and advantages promised by the King's deelaration in 1662, eonfirmed hy letters patent of 1784, to all strangers who come to establish there, which are the same as those enjoyed by the natif subjects of his majisty.

"'4th. The importation into the Kingdom, free from all duties whatever, of the oil proceeding from their fishery, and the same premiums and encouragement granted for the cod and other fisheries to natif snbjects.

"'5th. A premium per ton on the burthen of the vessels that will carry on the whale fishery, which shall be determined in the course of the negotiation either with Mr. Rotch or with the select men of the island.

"'6th. All objects of provisions and victnals for their ships shall be exempted from all duties whatever.

"'7th. An additioual and heavier duty shall be laid on all foreign oil, as a further encouragement to them, in order to facilitate the sale of their own.

"'8th. The expenses of removing those of the inhabitants who are not capable of defraying themselves shall be paid by the Government.

"'9th. A convenient dock shall be built to repair their ships.

"'10th. All trades-people, such as smiths, boat-builders, coopers, and others shall be admitted to the free exercise of their trade without being liablo to tho forms and expense usually practiced and paid by the natif subjects for their admittance to mastership.

"'11th. They shall have liberty to command their own vessels, and havo the choico of their own people to navigate them.

"'12th. They shall bo freo from all military and naval service, as well in war as in peace, in tho same manner and extent as expressed by tho King's ordinance of the 16th of February, 1759.'—(Macy, 257, 258.)

"These were probably essentially the same coucessions made to Mr. Rotch in person. How many American captains pursued the fishery from the various British and French ports subsequently to the Revolution it would he difficult to determine. Nantucket alone furnished eighty-three captains for the French and one hnndred and forty-nine captains for the English fishery; probably the bulk of the total number came from this ono port, thongh in the course of the prosecution of whaliug by these nations, New Bedford furnished a very considerable number. In a 'Journal of a Voyage to Greeuland' from Dunkirk in the ship Penelope, Capt. Tristram Gardner (a Nantucket man), he records, under the head of Friday, Juno 6, 1788, in latitude 70° north, '100 *ships in sight.*' On the 22d of the same month he states, as a mere matter of fact not worthy of extended comment, 'Wind at South; A Ruged sea; Plenty of Snow. Later Part Saw Ise to ye S. W. of us a 4 ye wind Shifted to ye Northward, bnt Still thick weather. Saw A Number of ships, hut No whale. So euds this 24 hours. Lat. 79.02.' And yet this is within ahout 175 miles of the highest northern point attained by any of our splendidly equipped expeditions nndertaken with the express pnrpose of pushing as far north as possiblo in vessels armored and strengthened and equipped in the most completo manner, while the whaling voyages were pursued in small, not uncommonly strong ships, not even having the feeble protection of coppered bottoms. As early as 1753, a schooner was fitted from Boston for the discovery of the northwest passage. She sailed in the spring and returned in October of the same year."

England; but much of this produce lies in store here, because it will not fetch, by reason of the duties and restrictions on it, the price given for it in America. No political arrangements having been made, both the British and American merchants expected that the trade would have returned to its old channels, and nearly under the same regulations, found by long experience to be beneficial; but they have been disappointed. The former have made advances, and the latter contracted debts, both depending upon remittances in the usual articles, and upon the ancient terms, but both have found themselves mistaken, and it is much to be feared that the consequences will be numerous failures. Cash and bills have been chiefly remitted; neither rice, tobacco, pitch, tar, turpentine, ships, oil, nor many other articles, the great sources of remittances formerly, can now be sent as heretofore, because of restrictions and imports, which are new in this commerce, and destructive of it; and the trade with the British West India Islands, formerly a vast source of remittance, is at present obstructed. * * * There is a literal impossibility, my lord, that the commerce between the two countries can continue long to the advantage of either upon the present footing.'* He continues, that these evils will increase, and asserts that it is the desire of the United States to be on good terms commercially with England, and not be driven to other markets with their goods, and he closes by proposing the arrangement of a treaty of commerce between the two countries.

"It would be interesting, though not necessary in this connection, to follow the negotiations through each step; to see how the English administration felt compelled to cater to those who upheld the British navigation laws; to see how jealousy of our incipient naval power procrastinated the treaty which it was inevitable must come; to see how self-confident and secure the English felt that our trade must unavoidably come to them; to see how an attempt was made to throw the influence of Ireland against America by ostentatious concessions, and how the attempt failed; to see how, finally, the fear of American reciprocity in restrictions led to English reciprocity in concessions; but those things can be more satisfactorily learned from the diplomatic correspondence of the day.†

"On the 24th of August Mr. Adams had a conference with Mr. Pitt for the first time in this connection. Passing by the matter of the interview, so far as it relates to the other portions of the proposed treaty, we find that when the treaty of commerce was proposed, Mr. Pitt inquired what were the lowest terms that might be satisfactory to America. Mr. Adams replied that he might not think himself competent to decide that question; that, because of the rapidly increasing feeling in America, affairs had already culminated in Massachusetts in the passage of an act of navigation by that State, showing the tendency of the times, and that the action of England would have much to do in arresting that prejudice; that the five hundred ships employed in the commerce of the United States in 1784 might easily be compelled to become the property of American citizens and navigated wholly by American seamen; that the simple passage of an old English statute, 'that none of the King's liege people should ship any merchandise out of or into the realm, but only in ships of the King's liegance, on pain of forfeiture,' modified to suit the American form of government, would effect this; that the nation had the legal right to govern its own commerce; that the ability of the Americans to build ships and the abundance of material they had for that purpose could not be doubted; and that whatever laws England might make, she would be glad to receive and consume considerable American produce, even though imported through France or Holland, and sell us as many of her manufactures as we could pay for, through the same channels. The conversation finally introduced the subject of ships and oil, and Mr. Pitt said to Mr. Adams the Americans 'could not think hard of the English for encouraging their own shipwrights, their manufacturers of ships, and their own whale fishery.' To which

"* Works of John Adams, viii, p. 288." "† *Ibid.*, p. 307."

Mr. Adams replied, 'By no means, but it appeared unaccountable to the people of America that this country should sacrifice the general interests of the nation to the private interests of a few individuals interested in the manufacture of ships and in the whale fishery, so far as to refuse these remittances from America in payment of debts, and for manufactures which would employ so many more people, augment the revenue so considerably, as well as the national wealth, which would, even in other ways, so much augment the shipping and seamen of the nation. It was looked upon in America as reconciling themselves to a diminution of their own shipping and seamen, in a great degree, for the sake of diminishing ours in a small one, besides keeping many of their manufacturers out of employ, who would otherwise have enough to do; and besides greatly diminish the revenue, and, consequently, contrary to the maxim which he had just acknowledged that one nation should not hurt itself for the sake of hurting another, nor take measures to deprive another of any advantage without benefiting itself.'* From the questions of comparative gains or losses to either power, and the relations in which France would stand to both, Mr. Pitt led Mr. Adams into a lengthy and useless conversation on the whale fisheries of the three countries, referring specially to the efforts of M. de Calonne to introduce this pursuit into France, asking suddenly the question 'whether we had taken any measures to find a market for our oil anywhere but in France.' To this Mr. Adams replied, 'I believed we had, and I have been told that some of our oil had found a good market at Bremen; but there could not be a doubt that spermaceti oil might find a market in most of the great cities in Europe which were illuminated in the night, as it is so much better and cheaper than the vegetable oil that is commonly used. The fat of the spermaceti whale gives the clearest and most beautiful flame of any substance that is known in nature, and we are all surprised that you prefer darkness, and consequent robberies, burglaries, and murders in your streets to the receiving, as a remittance, our spermaceti oil. The lamps around Grosvenor Square, I know, and in Downing street, too, I suppose, are dim by midnight, and extinguished by two o'clock; whereas our oil would burn bright till 9 o'clock in the morning, and chase away, before the watchmen, all the villains, and save you the trouble and danger of introducing a new police into the city.'†

"But despite the fact that Mr. Pitt appeared more favorable than was anticipated, Mr. Adams did not expect any immediate response to his propositions. The English ministers in their individual capacity seemed singularly timorous, and manifested much fear of committing themselves before joint cabinet action. Adams inclined to the opinion that nothing short of the convincing eloquence of dire necessity would drive the English ministry from the positions they had assumed in regard to the navigation act, and that an answer to his propositions, even at a late day, was doubtful, without Congress authorized similar acts with the United States, and these counter-irritants were actually put in force, to determine on which side the inconvenience was greatest. The great cry in the United Kingdom was, 'Shall the United States be our ship-carpenters? Shall we depend upon a foreign nation for our navigation? In case of a war with them, shall we be without ships, or obliged to our enemies for them?' How much this nightmare of inability to cope with their late colonies in anything like a fair field was stimulated by the Government is uncertain, but the authorities evidently used no efforts to allay it.‡

"* 5th Richard, ii, ch. 3." "† Works of John Adams, viii, pp. 308–309."

"‡ In negotiation with the Portuguese ministers in November, 1875, Mr. Adams asked (viii, p. 340) if they did not want our sperm oil. He replied that they had olives and made oil from them; they had no use for their own sperm oil and sold it to Spain. 'They had now,' he said, 'a very pretty spermaceti-whale fishery, which they had learned of the New Englanders, and carried on upon the coast of Brazil.' According to the Boston News-Letter of April, 21, 1774, the method of obtaining their knowledge was somewhat open to objections. In 1805 the Portuguese attempted to carry on the whaling business from Mozambique, and Timothy Folger, Francis Paddack, William Hull, and John Hillman, of Nantucket, went there to take charge of the fishery; but early in 1810 accounts were received at Nantucket stating that they had all been taken sick and died there."

"The effort to bring about the desired compromise continued, as Mr. Adams had judged it would, all the succeeding fall and winter. In January, 1786, Bowdoin wrote to Adams, in reply to a letter from him, that the navigation act of Massachusetts had been so modified as to be only operative against Great Britain, and copies of the repealing act had been sent to the executives of the other States in order to secure harmony of action upon this point. In regard to the effect the existing English laws would have upon the interest which is under consideration here, he wrote: 'It is very true, their encouragement of their whale fishery, by suffering the alien duty on oil to depress ours, will increase their shipping in this branch, increase their seamen, and, in several other ways, be advantageous to them. To a person that looks no further, it would appear that this was good policy; and the goodness of it would be inferred from the advantages arising. But when he should extend his view, and see how that stoppage of the American whale fishery, by depriving the Americans of so much capital a means of paying for the woolen goods they used to take of Britain, must, at the same time, occasion the American demand to cease, or be proportionately diminished, not to mention the risk of a change or deviation of the trade from the old channel, he will calculate the national profit and loss that arises from that stoppage.

"'Three thousand tons of oil was the usual annual quantity produced by the whalemen at Nantucket, all of which was shipped to England, at an average price of £35 per ton, making about £105,500. The whole of which went to pay for and purchase a like amount of woolens and other British goods; nine-tenths of the value of which are computed to arise from the labor of the manufacturer, and to be so much clear gain to the nation. The other tenth, therefore, being deducted, gives the national gain arising from the industry of the Nantucket whalemen, and the capital employed in that business, namely £94,500, without the nation's paying a shilling for the risk of insurance, or any other risk whatever.

"'On the change of trade, pursuant to the new regulations, the British merchants must employ a large capital in the whale fishery, whose products we will suppose equal to that of the Nantucket, £105,000. They will have made an exceeding good voyage if the whole of that sum should be equal to one-half of the cost of the outfits; though, from many of the vessels not meeting with fish, and from a variety of accidents to which such a voyage is subject, it probably would not be a quarter. The whole of the product goes towards payment of the outfits and charges of the voyage, and a large sum must be advanced for the second voyage, &c.

"'Now, although this mode of commerce would be productive of some national benefits, yet, considered in a comparative view with the benefits arising from the former mode, they would be found of little importance. A like comparison may be made with other branches of commerce, particularly the British West Indian, and the result will be found the same. For the sake, then, of gaining pence and farthings, Britain is sacrificing pounds by her new regulations of trade. She has a right to see for herself; but, unhappily, resentment and the consequent prejudices have so disordered her powers of vision that it requires the skillful hand of a good political optician to remove the obstructing films. If she will not permit the application of your couching instruments, or, if applied, they can work no effect, the old lady must be left to her fate, and abandoned as incurable.'*

"* Adams, viii, 363–4. In his reply to Mr. Bowdoin, under date of May 9, 1786, Mr. Adams, after expressing surprise that such reasoning as his (Bowdoin's) has no effect on the English cabinet, writes: 'Mr. Jenkinson, an old friend of the British empire, is still at his labors. He is about establishing a bounty upon fifteen ships to the southward, and upon two to double Cape Horn, for spermaceti whales. Americans are to take an oath that they mean to settle in England before they are entitled to the bounty.' In September, 1786, Mr. Adams writes to Mr. Jefferson from London (viii, 414): 'The whalemen, both at Greenland and the southward, have been unsuccessful, and the price of spermaceti oil has risen above £50 per ton.'"

"On the 21st of January, 1786, Mr. Adams, in a letter to Secretary Jay, writes: 'It will take eighteen months more to settle all matters, *exclusive of the treaty of commerce.*'* And thus it continued. Argument and persuasion had no effect. Convinced in spite of themselves, they still clung fondly, obstinately, perhaps foolishly, to their obnoxious laws. As late as November, 1787, Mr. Adams writes to Mr. Jay: 'They are at present, both at court and in the nation at large, much more respectful to me, and much more tender of the United States, than they ever have been before; but, depend upon it, this will not last; they will aim at recovering back the western lands, at taking away our fisheries, and at the total ruin of our navigation, at least.'† Mr. Adams's position at the court of St. James was terminated, by his urgent request, soon after this, and the question of commercial relations between the two countries was still unsettled.‡

"This state of affairs was scarcely such as would occasion the utmost harmony. The United States naturally resented this frigid manner of treating our overtures for friendship. In August, 1786, Mr. Jefferson, in a letter from Paris to Mr. Carmichael, writes: 'But as to every other nation of Europe,§ I am persuaded Congress will never offer a treaty. If any of them should desire one hereafter, I suppose they will make the first overtures.'"‖

THE AMERICAN WHALE FISHERY DECLINING.—"But while America was exerting herself so unsuccessfully to be allowed to live on terms of civility with England, the whale fishery carried on from within her borders was languishing.

"Like the effect of the heat of the sun on the iceberg, so was the effect of foreign bounties upon the American fishery, dissolving it, breaking off a fragment here and a fragment there. Lured by the promise of English bounties, discouraged with the prospect in America, where the price for oil would scarcely repay the cost of procuring it, and where there was no market for their chief staple, several of the people of Nantucket removed to the vicinity of Halifax, in Nova Scotia. There, in 1786 and 1787, they settled, building dwellings, wharves, stores, manufactories for sperm candles, and such other structures as were connected with their fishery, and calling their new settlement Dartmouth.¶ There they carried on the pursuit for several years prosperously, and gave promise of considerable commercial importance. But the disintegration which commenced at Nantucket continued at Dartmouth, and just as the settlement seemed about to become thrifty and important it began to become divided, pieces again split off, and the village, as a whaling port, soon became a thing of the past. Those who were the earliest to remove from Nantucket soon grew uneasy of their new location, and having greater inducements offered them if they removed to England, again migrated, and settled in Milford Haven, from whence for many years they carried on the business with very considerable success. The parent died in giving birth to the child; Milford Haven flourished, but at the expense of Dartmouth's existence.

"*Adams, viii, 363–4, 389."

"† *Ibid.*, 463."

"‡ Works of Jefferson, ii, 18. See also article on Jefferson, by Parton, in Atlantic Monthly for February, 1873."

"§ Referring to Russia, Portugal, Spain, France, Sweden, Tuscany, and the Netherlands."

"‖ Jefferson, ii, 18."

"¶ Works of Jefferson, ii, 518. Mr. Jefferson says, referring to a further hegira of the islanders: 'A vessel was already arrived from Halifax to Nantucket, to take off some of those who proposed to remove; two families had gone on board, and others were going, when a letter was received there which had been written by Monsieur le Marquis de Lafayette to a gentleman in Boston, and transmitted by him to Nantucket. The purport of the letter was, to dissuade their accepting the British proposals, and to assure them that their friends in France would endeavor to do something for them. This instantly suspended their design; not another went on board, and the vessel returned to Halifax with only the [two] families.' In 1796 William Rotch & Son petitioned Congress to remit the excess of duties and tonnage charged them on two whale ships by the collector of New Bedford, in consequence of their not being provided with United States registers. These were ships which sailed from Nantucket in 1787 and 1789, under registers from the State of Massachusetts, and were used in the Dunkirk fishery, returning to the United States in 1794, some years after the National Government had been in operation. The committee which was appointed to consider the petition reported favorably upon it, and the prayer was granted.—(State Papers, vii, p. 411.)"

"France did not view this transfer with indifference. The scheme for the building up of the fishery at Dunkirk by emigration from Nantucket having proven only partially successful,* it was desirable to inaugurate some other measures to prevent further increase of the business in England. A committee of gentlemen well informed in such matters was instructed to investigate and report on the subject of encouragement of a general commerce with the United States. It was evident that the American whalemen could not be induced to leave their native country if they could support themselves there. The natural inference was, if a market could be opened to their products which would replace the one closed, they would not emigrate. Accordingly upon this point the committee reported in favor of an immediate abatement of the duty upon oil and a promise of a further abatement after the year 1790. The letter of M. de Calonnes (who was in treaty with the Nantucket whalemen) recommending this, was immediately sent to America, and after careful investigation of the subject, the *arret* of the 29th of December, 1787, ratifying the abatement and promising a further one if the French King found such a proceeding of mutual benefit, was passed.

"But the measure in this form had a contrary effect from what was intended. 'The English,' says Jefferson,† 'had now begun to deluge the markets of France with their whale oils; and they were enabled, by the great premiums given by their Government, to undersell the French fisherman, aided by feebler premiums, and the American, aided by his poverty alone. Nor is it certain that these speculations were not made at the risk of the British Government to suppress the French and American fishermen in their only market. Some remedy seemed necessary. Perhaps it would not have been a bad one to subject, by a general law, the merchandise of every nation and of every nature to pay additional duties in the ports of France, exactly equal to the premiums and drawbacks given on the same merchandise by their own Government. This might not only counteract the effect of premiums in the instance of whale oils, but attack the whole British system of bounties and drawbacks, by the aid of which they make London the center of commerce for the whole earth. A less general remedy, but an effectual one, was to prohibit the oils of all *European* nations; the treaty with England requiring only that she should be treated as well as the most favored *European* nation. But the remedy adopted was to prohibit all oils, without exception.'‡ And this on the 20th of September, 1788, only nine months from the passage of the former law.§

"Through the exertions of Jefferson this error, political as well as commercial, was remedied, and in December, 1788, the abatement of duties on oils was so arranged as to make the American

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"* 'Nine families only, of thirty-three persons in the whole, came to Dunkirk.'—(Jefferson, ii, 519.)"

"† Jefferson, ii, 520."

"‡ Jefferson, ii, 521. 'The annual consumption of France, as stated by a person who has good opportunities of knowing it, is as follows:

	Tons.
"'Paris, according to the registers of 1786	1,750
"'Twenty-seven other cities, lighted by M. Sangrain	500
"'Rouen	312½
"'Bordeaux	375
"'Lyons	187½
"'Other cities, for leather and light	1,875
	5,000'"

"§ Jefferson states (ii, 523) that before the war Great Britain had less than 100 vessels engaged in whaling, while America employed 309. (This does not take into account Sag Harbor, New York, nor the very important fishery from Newport, Providence, and Warren, in Rhode Island, which Mr. Jefferson seems to have overlooked in his report.) In 1788 these circumstances were reversed, America employing 80, and Great Britain 314."

and the French on the same footing, and cut off all danger of overstocking from European rivals, and in January, 1789, this arrangement received its legal ratification.*"

REVIVAL OF AMERICAN WHALING IN 1789.—"The revival of the business in the United States, and the growing scarcity of whales in the waters heretofore mostly frequented, made the equipping of larger vessels a necessity, and from the sloops and schooners which formerly composed the greater portion of the whaling fleet an advance was made to brigs and ships and the field still further extended.† The sperm whale being of the most value, the effort to encompass his capture was greater; and he was pursued, as he fled from his old haunts, till the Pacific Ocean was attained.‡ At Nantucket the number of vessels soon increased to such an extent that it became necessary to go abroad for men to man them, and some Indians and a large number of negroes were brought from the main-land to aid in filling the crew-lists. Ups and downs the business had then, as it ever has since. A presumed prosperity induced competition, the markets became glutted, and oil was sold at less than the cost of production. The price of whalebone became reduced to 10 cents per pound and less, instead of commanding a dollar, as it did prior to the Revolution. The disturbances between England and France, and the internal commotions to which the latter country was subjected, effectually annuled the effect of the French *arret* of 1789. So disastrously did these things affect whaling that the quarrels of France and England forced many Nantucket men to sell their vessels, others to dismantle and lay theirs up, while a few still held on, some making a little profit, the majority suffering a severe loss."

TROUBLE WITH FRANCE.—"In 1798§ came the threats of disturbance between France and the United States. French privateers, in the excess of their zeal, preyed upon American commerce as well as upon that of the powers with whom they were in direct conflict. A large number of vessels fell victims to these depredators, and the friendly relations existing somewhat precariously between France and the United States became nearly supplanted by a state of actual warfare. The whaling interest, as usual, was among the earliest sufferers. Early in 1799 many parties in Nantucket sold their ships rather than fit them out at the risk of capture. News began to reach the island that vessels were already captured, and the business of the islanders, both in fishing and trading, almost ceased. Instead of fitting out a dozen ships for whaling but two or three were fitted, and sadness and gloom shrouded every face. The difficulties were finally adjusted and business resumed its old channels, but the losses which the unfortunate Nantucketers sustained by the unjustifiable, piratical depredations, though settled to the satisfaction of our Government and duly receipted for, with others, by the United States, have never been remunerated, while some of the unlucky owners, officers, and underwriters, in comfortable circumstances at the commencement of these troubles, lost their little property, the accumulations of years, and died in poverty.‖

"* Jefferson, ii, 539. When the *arret* of 29th December, 1787, was drawn up, the first draft was so made as to exclude *all European oils*, but at the very moment of passing it, they struck out the word 'European,' so that our oils became involved. 'This, I believe,' says he, 'was the effect of a single person in the ministry.'"

"† Sag Harbor re-entered the business in 1785: New Bedford in 1787 or 1788."

"‡ In the Pacific the Americans had been preceded by the Amelia, Captain Shields, an English-fitted ship, manned by the Nantucket colony of whalemen, and sailing for that ocean from London in 1787, her first mate, Archelus Hammond, killing the first sperm whale known to have been taken in that ocean.

"In Jefferson's report he enumerates three qualities of oil: 1, the sperm; 2, that from the ordinary right whales; 3, that from the right whales on the Brazil Banks, which was darker in color and of a more offensive odor when burned than from No. 2."

"§ The Boston papers of 1796 reported that the Carisford frigate had arrived at the Cape of Good Hope from England with credentials constituting General Graig governor of the colony, the limits of which were to be so arranged as to cut off other nations from participation in the Delago Bay fishery."

"‖ The subject of the French spoliation is one to which the people of Nantucket have been particularly sensitive. Isolated communities are more liable to feel that the injustice done to one is an injustice to all; hence, although comparatively few of the islanders suffered from the depredations of the French, or rather from the apparent breach of faith

These unauthorized captures were not confined exclusively to the French, for in 1800 the Spanish authorities at Valparaiso, emulating the hostility to a power ostensibly at peace with them which the French had shown, seized and condemned the whale ships Miantonomah, of Norwich, and Tryal, of Nantucket."*

THE WAR OF 1812 AND ITS EFFECTS ON THE WHALE FISHERY.—"From this time till the opening of the second war with England whaling was pursued with a gradually-augmenting fleet. And this in the face of the uncertainties which the increasingly critical state of affairs between the United States and England occasioned. In 1802 Nantucket added five ships to her fleet, and New London sent her first large vessel,† and in 1806 the quantity of oil imported into the country was considerably in excess of the consumption.

"The embargo act of 1807 almost suspended the pursuit, not so much by actual proscription as because of the impossibility of effecting insurance upon the vessels, but it soon received another impetus on account of the prospect of a general peace throughout Europe.

"The commencement of the war of 1812 found a large portion of the whaling fleet at sea. Trusting that the causes of contention between England and America would be removed without the necessity of a final appeal to arms, many owners had fitted out their ships. This was particularly the case at Nantucket, from which port a large proportion of the fleet had sailed for the Pacific Ocean on voyages varying from about two years to two years and a half.‡ With the reception of the news of the declaration of war a large portion of the vessels in the North and South Atlantic, and some of those in the Pacific, turned their prows homeward, hoping to make the home port before the seas swarmed with letters-of-marque and national vessels of war. Many of these vessels from Nantucket, on arriving home sailed thence immediately for Boston, Newport, New Bedford, or some other fortified port, where they could ride out the storm of war in security. After the month of July, 1812, was ushered in, reports of the capture of whaling vessels came thick and fast to Nantucket.§ First came the news of the taking and burning of the schooner

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on the part of a Government bound to protect them and their interests, all felt that seeming injustice as a personal matter. In a letter to the Hon. George McDuffie, giving an account of the claims of Nantucket in this behalf, published in the Warder of May 20, 1846, the following is described as the actual condition of the claimants and character of the demands:

"'Ship Joanna, Coffin, taken with 2,000 barrels of oil on board; value of ship and cargo, $40,000; one of the original owners still living—seventy-five years old and *poor;* one of the crew also living, *poor;* the master and mate died recently, *poor;* children still surviving; *claim never sold.* Ship Minerva, Fitch, 1,500 barrels of oil on board; value, $30,000; one of the original owners living—sixty-eight year old, *poor;* master still alive—seventy-eight years old, with small means and many dependents; one of the crew alive, *poor; claims never sold.* Ship Active, Gardner, 3,000 barrels of oil on board; value, $50,000; same owners as Minerva with captain; Captain Gardner died two years ago, at the age of eighty-five, leaving a large family and grandchildren; *claims never sold.* Ship Ann, Coffin (in merchant service); loss of ship, $10,000; the captain left a large family in slender circumstances; one of the underwriters died a few years since in the almshouse, who, at the time of the capture, stood high among Nantucket merchants; *claims never sold.*'

"Speaking in the interest of the whale fishery, it may be safely asserted that the people of Nantucket view with regret and disappointment what they consider the gross injustice showed to them (with others) in putting off, upon untenable pretexts, the settlement of these demands. The stern logic of poverty and the almshouse is keener than the sophistries of politicians. The Fox, of New Bedford, Capt. Coffin Whippey, captured in 1796 with 1,500 whale and 500 sperm, was another case. In 1853 Captain Whippey—captured a second time in 1798—was living, but dependent upon charity."

"* The Miantonomah was a new ship, on her first voyage."

"† In 1794 the ship Commerce, of East Haddam, was fitted for a whaling voyage, and sailed from New London on February 6 of that year. In 1770 Capt. Isaiah Eldridge, of the sloop Tryall, of Dartmouth, spoke, among other whalemen on the Davis Strait ground, Thomas Wiccum (Wiggin?), of New London."

"‡ See Macy, 161–2–3."

"§ When war seemed inevitable the ship-owners of Nantucket held a meeting to take into consideration the subject of how to best secure the fleet from capture. It was proposed to request the British minister at Washington to use his influence with his Government to obtain from them immunity from capture of whale ships belonging to the island. This plan was ultimately abandoned, the majority of the owners being of the opinion that 'the prospect of success was too faint to warrant the attempt.'—(Macy, 165.)"

Mount Hope, David Cottle master. In quick succession they learned of the capture of the Alligator, Hope, Manilla, Ocean (brig), Ranger, Fame,* Rose, Renown,* Sterling, Edward, Gardner, Monticello, Chili, Rebecca, and others, and it may be easily imagined that the prospect for the islanders had but little in it that appeared encouraging. New Bedford, too, although at this time her interest in this business was far less than that of Nantucket, suffered from the capture of her whaling vessels.†

"Again did war put an effectual stop to the pursuit of whaling from every port of the United States save Nantucket, and again were the inhabitants of that town, knowing no business except through their shipping, compelled to strive to carry their commercial marine through the tempest of fire as free from complete destruction as possible. A new source of danger presented itself. Prior to the declaration of war between Great Britain and America our whalemen on the coast of Peru‡ had often suffered from piratical acts of the Peruvian privateers, being continually plundered and cut out from Chilian ports, whither they had gone to recruit. The chronic state of affairs on this coast being one of war, the Government of the United States had sent the Hon. Joel R. Poinsett, of South Carolina, to those parts to see that American commerce was suitably protected, but for several months his remonstrances had been worse than useless. The declaration of war between England and the United States gave the Peruvian corsairs a fresh pretext for the exercise of their plundering propensities. They claimed that they were the allies of England, and as such were entitled to capture the vessels of any power with which she was at war. An expedition was equipped by the authorities of Lima and sent on its marauding way. This army succeeded in capturing the towns of Conception and Talcahuano. In the latter port was a large number of American ships, many of them whalemen, who, having obtained their cargoes of oil, had put in to recruit with provisions and water before making the homeward voyage. Among these were the ships Criterion, Mary Ann, Monticello, Chili, John and James, Lima, Lion, Sukey, Gardner, President, Perseverance, and Atlas, of Nantucket.

"This was in April, 1813. These vessels were detained in the harbor by the Limian armament, which consisted of two men-of-war, with about 1,500 troops. Having found a bag containing about $800 on board the President, they carried her captain, Solomon Folger, ashore under a guard and imprisoned the remaining officers and crew, excepting the mate, one boat-steerer, and the cook.

"Learning of this condition of affairs, Poinsett immediately joined the Chilian army and directed its movements. On the 15th of May a battle was fought between the contending forces near the town of San Carlos, but when the day had closed neither side could claim the victory. Taking advantage of the cover of the night, Poinsett put himself at the head of four hundred picked men, with three pieces of light artillery, and, leaving the main body, marched directly to Talcahuano, whither the enemy had withdrawn. The town was immediately carried by storm and the detained whalemen were released.§ Some of the ships having had their papers destroyed, Poinsett furnished them with consular certificates. The friendly regard for the United States which diplo-

"* The Fame was used in the English fishery, and the Renown, under the name of 'Adam,' while engaged in the same pursuit under the same flag, went ashore on Deal beach and bilged in 1824 or 1825.

"In 1812 the brig Nanina, Capt. Valentine Barnard, of New York, sailed to the Falkland Islands on a sealing and elephant-oil cruise. The British ship Isabella having become wrecked, her crew were rescued by the Nanina, and showed their gratitude to Captain Barnard by seizing his vessel and setting him, with Barzillai Pease, Andrew Hunter, and E. Pease, of his crew, ashore on New Island, one of the group. A protest signed by the four was published in the Hudson Bee, and also in the supplement of Niles's Register for 1814."

"† The ship Sally, Clark master, was captured while homeward bound with 1,200 barrels of sperm oil on board. Value of vessel and cargo, $40,000. The Triton also was captured, involving a loss of $16,000."

"‡ These vessels belonged almost exclusively to New Bedford and Nantucket."

"§ See Nantucket Inquirer, August 9, 1824; also Inquirer and Mirror, September 14, 1872. In the latter paper is an account of the affair written by Capt. Nathaniel Fitzgerald, one of the crew on one of the detained whalers."

matic address and persuasion had been unable to obtain, were secured in a much shorter time and probably far more efficaciously by force of arms, and Lima yielded to muskets and cannon the respect she had been unwilling to concede to the seal of the Department of State. Her depredations on American commerce did not, however, entirely cease until the advent of Captain Porter in those waters.* Soon after this the United States Government, realizing the defenseless condition of our commerce in the Pacific, dispatched Porter to that locality to protect our interests, Up to the time of the capture of his vessel he had not only done all in his power in this direction, but had effectually destroyed the English whale fishery in those seas, and so turned the tables upon the enemy who had sent out his whale ships well armed and manned to perform the same kindly office toward our whalemen.‡

"Up to the latter part of the year 1813 the people of Nantucket had fished unmolested both for codfish and for humpback whales on the shoals at the eastward of the island, and by this means eked out a livelihood which was beginning to be quite precarious, but this resort was now taken from them. An English privateer, during the fall, appeared among the fleet, capturing one Nantucket vessel and driving away the remainder. In this dilemma a town meeting was assembled and a petition prepared and forwarded to Congress representing the situation there, and praying that some arrangement might be entered into 'whereby the fisheries may be prosecuted, without being subject to losses by war.' But no adequate relief was afforded, and the people found the history of their sufferings during the Revolution repeating itself with a distressing pertinacity and fidelity, and they bade fair to perish of starvation and cold. They eventually succeeded in obtaining permission to import provisions, but attempts to get leave to sail on whaling voyages, coupled with immunity from capture, were unsuccessful.

"The return of peace effected for them the protection that all negotiations had failed to secure. Early in February, 1815, news came to Nantucket that the war was over, and immediately all was hurry and bustle. The wharves, lately so deserted, teemed with life; the ships, lately dismantled, put on their new dress; the faces of the people, lately so disconsolate, were radiant with hope. In May two ships fitted and sailed on their voyages; by the last of June this number was increased to nine; by the 1st of August eighteen had gone, and by the 31st of December over thirty ships, brigs, schooners, and sloops were pursuing the leviathans in the North and South

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"* The Walker, of New Bedford, was captured by an English armed whale ship, but recaptured by Porter. The Barclay, of New Bedford, also was captured by the Peruvians, and recaptured by Porter."

"† So far as operations in the Pacific were concerned, the English went out to shear but 'returned shorn.' Wherever our sailors went ashore in foreign ports and met English seamen, a melee was a frequent occurrence. An amusing instance is related of the officer of a whaling vessel incurring the displeasure of an English naval officer in one of the South American Pacific ports by his zeal in behalf of his country. A challenge was the result. The American being the challenged party, had, of course, the right to a choice of weapons, and being most familiar with the harpoon, chose that. They met according to the preliminaries and took their positions. For a moment the English officer stood before the poised harpoon of our whaleman, then gave in, and the proposed combat was deferred."

"‡ November 26, 1813. Macy, 177. In an official report Captain Porter gives the following list of his captures, chiefly vessels, as he says, engaged in the British sperm-whale fishery:

	Tons.	Men.	Guns.
Montezuma	270	21	2
Policy	175	26	10
Georgiana	280	25	6
Greenwich	388	25	10
Atlantic	355	24	8
Rose	220	21	8
Hector	270	25	11
Catharine	270	29	8
Seringapatam	357	31	14
Charlton	274	21	10
New Zealander	259	23	8
Sir A. Hammond	301	31	12"

Atlantic, the Indian and Pacific Oceans. On the 9th of July, 1815, the first returning whaling vessel arrived at Nantucket; in all probability this was the first arrival at any port in the United States after the war. This vessel was the sloop Mason's Daughter, which, after a six weeks' voyage, returned with 100 barrels of oil."

8. WHALE FISHERY OF PROVINCETOWN.

By Capt. N. E. Atwood.

In early days the whale fishery was prosecuted off along the north shore of Cape Cod with small boats, and whales were very plenty in the first part of the present century. In 1820, owing to the scarcity of codfish on the Grand Bank, Provincetown ship-owners were casting about for new fields of industry to employ their vessels, and five schooners were fitted out to engage in the sperm-whale fishery. In most cases experienced whalers were engaged at Wellfleet and elsewhere, but one vessel, the Nero, sailed without having on board a man who had ever seen a sperm whale. These vessels left Provincetown about the 1st of April and went directly to the Azores, where they cruised for a month or two. In June they went to the northwestern ground, as it was called (situated from 100 to 200 miles northwest of Cowo and Flores), and staid there through the remainder of the cruise, coming home in the fall. These vessels did rather better than the codfishermen. In 1821 the codfishery was still low and the whaling fleet was increased to twelve vessels, quarter-deck schooners mostly, the largest of which measured 98 tons (about equivalent to 70, new measurement), and several were over 90 tons. There were the Neptune, the Nero, the Minerva, the President, the Mary, the General Jackson, the Charles, the Four Brothers, the Hannah and Eliza, the Vesta, the brig Ardent, and the brig Laurel. The fleet went on the same grounds as in the previous year, and in August went into the islands to recruit and afterwards cruised about the islands. They came home in September and October, having done a fair business, a little better than the cod fleet. The Nero had the best fare, obtaining 260 barrels of sperm oil, valued at $1 a gallon. In 1822 the fleet was increased to eighteen vessels, the Fair Lady, the Sophronia, the Olive Branch, the Seventh Son, and the Betsey being added. They accomplished very little, and all returned in the fall except the Laurel, which went to the West Indies, and the Fair Lady to the Gulf of Guinea. In 1823 the two vessels returned in March from the south, and the brig Ardent went to the Azores, obtaining 200 barrels of sperm oil, and was wrecked at sea on her return. The schooner Seventh Son went to Africa, obtaining very little.

In 1824 no whalers were sent out, nor in succeeding years, until 1830, when the schooner Fair Lady and the schooner Vesta went to the old ground about the Azores, the former getting 300 and the latter 140 barrels. In 1832 the brig Imogene, 170 tons, was bought in Boston for sperm whaling. She went into the Indian Ocean and was absent two years, obtaining 400 barrels of sperm oil. In 1835 the Imogene went another voyage to some of the Western Islands and the Gulf of Mexico. In 1836 the schooner Louisa (Flora?) was added to the fleet. They went to the West Indies, where they got some humpback whales, then to the Gulf of Mexico, and later to the Western Islands; the Louisa obtaining 175 barrels and the Imogene 560. In 1837 the Imogene got 450 barrels in the Atlantic and the schooner Louisa 100. In 1838 the Imogene went to the Gulf of Mexico, getting 400 of sperm and 200 barrels of whale oil. In 1839 the Imogene cruised in the Atlantic, getting 350 barrels of sperm and 250 of whale oil. In 1837 the Edward and Rienzi was bought for black fishing and went on the ground south of the Georges Banks and toward Cape Hatteras. No whaling vessels had ever been there before, and she found sperm whales abundant, and since that time the Hatteras ground and the Charleston

ground (the latter farther south) have been favorite cruising grounds for the Provincetown fleet. In 1840 the Imogene was condemned and four vessels were added to the fleet, the brigs Franklin, Fairy, and Phœnix, and a schooner (probably the Belle Isle). The Phœnix went to the Gulf of Mexico (where she obtained 300 barrels of sperm oil), the others to the Western Islands, where the Phœnix followed them. From that time the whale fishery began to increase. In 1841 there were nine vessels, one schooner, one bark, and seven brigs. In 1842 there were thirteen. In 1869 the fleet had increased to fifty-four vessels, at which time the whale fishery was larger than ever before or since. Ever since 1837 the Hatteras ground has been much visited. At one time many vessels went to the eastward of the Grand Banks, principally for black fish. Three or four went year after year. They would be gone from May to October, and sometimes got 250 to 300 barrels. During the war the whaling business prospered, but began to fall off from 1869 to 1871 as the whales became scarcer.

9. STATISTICAL REVIEW OF THE AMERICAN WHALE FISHERY.

The American whaling fleet was smaller in 1880 than at any time within the past sixty years, except in 1875 and 1876. The decrease in the number of vessels has been going on since the year 1846, when there were seven hundred and twenty-two vessels, measuring 231,406 tons, in the fleet. Accurate statistics for the period prior to 1840 are wanting. Just before the Revolutionary war a fleet of over three hundred and fifty sail was engaged in this business, but after the war the number was very greatly reduced. There was a gradual growth in the fleet from this time until the war of 1812, which proved another disaster to whaling commerce. After the war the business again revived and there was a steady increase in the size of the fleet.

On January 1, 1844, the fleet belonging to the United States numbered six hundred and seventeen vessels, valued at $19,430,000 at the time of sailing, and their entire value at that date, including the catchings at sea, was estimated at $27,784,000. The annual consumption by the fleet for outfits at that time was $3,845,000, and the value of the production of oil and bone in the year 1844 was $7,875,970. In 1846 the fleet of vessels had increased in number to seven hundred and twenty-two, the highest number ever employed in the fishery at one time, and was valued at about $21,000,000. The entire capital invested in the industry and its connections at this time was $70,000,000, and the number of persons deriving from it their chief support was 70,000.

After 1846 there was a rapid decrease till 1850, when the tonnage was 171,484 and the number of vessels five hundred and thirty-nine; then an increase till 1854, when there were six hundred and fifty-two vessels, measuring 208,399 tons; from 1854 till the present time the decrease has been almost constant, the tonnage in 1865 being reduced to 79,696 tons, and the vessels to two hundred and seventy-one; in 1875 the decrease was still greater, when there were only one hundred and fifty-two vessels, measuring 37,733 tons, and on the 1st of January, 1880, the fleet numbered one hundred and seventy-three vessels, of 39,433 tons measurement.

The most valuable production of the fleet was in 1854, when the value of the oil and bone was $10,766,521.20, against $2,056,069.08 in 1879, which was the lowest since the year 1828, when the production yielded $1,995,181.15. The year ending December 31, 1880, was somewhat more profitable than 1879 because of the success of the Arctic fleet, the yield this year reaching $2,659,725.03.

The largest fleet in the North Pacific and Arctic Oceans was in 1846, when two hundred and ninety-two ships were there, and obtained 253,800 barrels of whale oil, averaging 869 barrels to a vessel. The largest quantity of sperm oil was produced in 1837, 5,329,138 gallons, averaging in

price $1.24\frac{3}{4}$ per gallon. The largest quantity of whale oil was produced in 1851, 328,483 barrels, or 10,347,214 gallons, averaging $45\frac{5}{16}$ cents per gallon. The largest quantity of whalebone was produced in 1853, 5,652,300 pounds, averaging $34\frac{1}{2}$ cents (gold) per pound.

(*a*) TRADE REVIEWS.

The following extracts, taken from the Whalemen's Shipping List, published at New Bedford, Mass., showing the yearly condition of the whaling industry from 1868 to 1880, are kindly furnished by Messrs. I. H. Bartlett & Sons.

The words "imports" and "importations" in these reviews mean the receipts of oil from the American fleet, and do not mean imports of foreign production, but the catch of American vessels in the various oceans.

Review of the whale fishery for 1868.—The present year has witnessed the return of the usual number of whalers, and generally with satisfactory catches, and quite as favorable results as anticipated. The price of sperm oil ruled steady through the year, while in whale a generally advancing market was maintained, and in September (owing to telegraphic advices from the fleet as late as the middle of August, announcing a failure of the fishery up to that date) a marked advance was established, and holders of the small stock (17,500 barrels) demanded $1.25 and upwards. Whalebone, being similarly affected, sold in the summer as low as 85 cents, currency, but upon the unfavorable news advanced to $1.42\frac{1}{2}$, with sales, and a further advance was demanded. A month later more favorable reports came to hand from the fleet in the Arctic, which cast a new feature over the prospects of prices and supply. The season up to August 23 was a failure, but a few whales having been taken up to that time, some of the ablest masters having taken no oil, and many vessels left for other grounds; those that remained were successful in taking extraordinary cuts of oil; in one instance, the bark John Howland, taking 1,000 barrels of oil in four days in the latter part of September, and many other vessels took an average of 1,000 barrels in thirty days, the largest catches being the ships Reindeer, 1,550 barrels, and the Florida, 1,700 barrels.

Owing to the low prices ruling for whale oil and whalebone, in the early and middle part of the year many of the ships returning from the North Pacific were put into the sperm and right whale fishery in the Indian and Southern Oceans, which will account in part for the small fleet to go north in 1869, and many ships will return home this spring, having completed three or more seasons. So that, as the whale fishery now stands, there will not probably be over fifty ships of all nationalities cruising in the North Pacific in 1869, a smaller number than since 1863; leaving the rest of the whale fleet, about two hundred and thirty-nine ships to pursue sperm whaling in whole or in part in every other ocean and sea.

We have no changes to note of employment of ships in the fishery, but add the port of San Francisco to our list as one of the ports of the United States engaged in the fishery.

The number of vessels from the Atlantic ports engaged in the fishery January 1, 1869, is 220 ships and barks, 23 brigs and 87 schooners, with 73,105 tonnage, showing an increase of only one vessel as compared with last year, but a falling off of 1,489 tons, of which 878 tons grows out of remeasurements by the new system, to which we add 6 vessels from the port of San Francisco, with 1,414 tonnage, making the total number of vessels from the United States, January 1, 1869, 336, with a tonnage of 74,519, being within 75 tons of that of 1868.

The schooner Etta G. Fogg, of Provincetown, and Money Hill, of Boston, are missing, and are supposed to have foundered at sea, the former not having been heard from since sailing, and the latter when only a short time out. The brig Georgiana, of New London, with 700 barrels of oil on freight from Cumberland Inlet whalers for New London, has not been heard from since sailing from the inlet in October, 1868, and it is feared is lost.

The Atlantic whale fishery has been carried on by about as many whalers as in 1867, with quite as favorable returns. The vessels from Provincetown and ports eastward, comprising nearly one-half the fleet, averaged about the same quantity of oil as in 1867, but owing to the increased cost of the vessels added, and the reduced price of sperm oil, the business was not, on the whole, as remunerative.

The "Commodore Morris Ground" proved a failure, but whales were found quite plenty on other grounds, though very wild, and several vessels were very fortunate; nine vessels averaging 400 barrels sperm oil.

The fleet in the Pacific Ocean was nearly as successful as in 1867, those that met with extraordinary luck in that year having continued to take large quantities of oil, more especially those cruising in the South Pacific, while some of the vessels cruising on the west coast of South America took good cuts of oil. The fleet will be somewhat increased the present year, being about sixty American ships, including some of the most successful which are expected to return home.

Panama has proved a convenient port for transshipment of oil home, there having been quite a number of whalers there the past year to receive supplies and to ship their oil, amounting to 3,250 barrels of sperm. The reduced price of freight to 6 cents, gold, per gallon, with prospects of a further deduction, will probably induce more vessels to visit there in future.

The sperm-whale fleet for 1869 will be distributed about as follows: In the North and South Atlantic about 150 vessels, the usual number for the past three years, exclusive of homeward bound vessels. In the Indian Ocean, 35 vessels, against 31 in 1868. In the Pacific Ocean, 54 vessels, against 46 in 1868. Total, 239 vessels.

The fleet cruising in the North Pacific consisted of 58 vessels, of which 7 were foreign, against 101 vessels in 1867; 2 vessels were lost, the Corinthian and the Hao Hawaii, the former having taken 1,050 barrels oil and 15,000 pounds bone, which were saved, and the latter, 1,200 barrels oil and 15,000 pounds bone, which were lost with the vessel. There were also 4 trading vessels that visited those waters and returned with 185 barrels oil and 22,590 pounds bone.

The Arctic Ocean fleet comprised 37 American and 4 foreign vessels, and caught 35,005 barrels whale oil and 575,200 pounds bone, an average of 854 barrels oil and 14,030 pounds bone; whereas, in 1867, 77 vessels caught 50,115 barrels whale oil and 807,800 pounds bone, an average of 651 barrels oil and 10,492 pounds bone.

The Ochotsk fleet comprised 7 American and 1 foreign vessel, and caught 4,960 barrels whale oil and 50,500 pounds bone, an average of 620 barrels oil and 6,312 pounds bone: whereas, in 1867, 14 vessels caught 9,320 barrels whale oil and 117,500 pounds bone, an average of 665 barrels oil and 8,393 pounds bone.

The Kodiac and Bristol Bay fleet comprised 17 American and 2 foreign vessels, and caught 7,635 barrels whale oil and 68,800 pounds bone; whereas, in 1867, 10 vessels caught 5,465 barrels whale oil and 47,700 pounds bone, an average of 546 barrels oil and 4,770 pounds bone.

The entire fleet of 68 vessels caught 47,600 barrels whale oil and 694,500 pounds bone, an average of 700 barrels oil and 10,213 pounds bone, showing a better average than in 1867, when 101 vessels caught an average of 642 barrels oil and 9,633 pounds bone.

The Cumberland Inlet fleet comprised 12 American vessels, of which 4 returned, bringing 2,250 barrels whale oil and 36,000 pounds bone. The bark Andrews was totally lost, having no oil on board. The fleet for 1869 will number about the same as in 1868; 7 vessels are wintering there, and had taken, up to the latest dates, but five whales.

The year opened with sperm oil dull at $2, and continued about the same for six months, when it dropped to $1.75 @ $1.80, at which it stood for nearly three months, when it was put to $2, where it remained for a brief period, and when wanted for export in October declined to $1.78 @ $1.75, at which 10,000 barrels were sold.

Whale oil opened at 65 cents, and steadily improved to 82 cents 1st of August, when, under unfavorable news from the northern fleet, rapidly advanced to $1.10, and, in consequence of the absence of further reports from the fleet, was still further advanced, with sales at $1.15 @ $1.25. After the news of the great success was received, in October, it was very dull, and closed with sales of 400 barrels at about $1.

Whalebone opened at 70 cents, gold, steadily declined until July, with sales at 60 cents, gold, when an improvement was established and the market, under the unfavorable reports, rose rapidly to $1.40 @ $1.42½, at which but few sales were made, and later, upon full reports from the fleet, the market became demoralized, and receded to 75 @ 80 cents, gold, at which large sales were made at the close of the year.

The imports in 1868 were 47,174 barrels sperm, 65,575 barrels whale oil, and 900,850 pounds bone, against 43,433 barrels sperm, 89,289 barrels whale oil and 1,001,397 pounds bone, in 1867, showing an increase of sperm oil, but a considerable decrease of whale oil and bone.

The exports for 1868 were 18,916 barrels sperm, 9,885 barrels whale oil, and 707,882 pounds whalebone, against 25,147 barrels sperm, 18,253 barrels whale oil, and 717,796 pounds whalebone in 1867, showing a marked decrease especially of sperm and whale oil, but it should be stated that about 4,500 barrels sperm oil purchased in December for export have not been cleared at the New York custom-house.

The home consumption of sperm oil in 1863 was 19,055 barrels; of whale oil, 72,390 barrels, and of whalebone, 246,968 pounds. In 1867 it was 22,986 barrels sperm; 58,836 barrels whale oil, and 181,600 pounds whalebone, showing a decrease of sperm oil, but a very satisfactory increase of whale oil and whalebone.

The stock of oils and whalebone on hand January 1, 1869, was 13,000 barrels sperm, 16,700 barrels whale oil, and and 200,000 pounds bone, against 8,000 pounds sperm, 33,400 barrels whale, and 274,000 pounds bone same time 1868.

TRADE REVIEW FOR 1869.

Review of the whale fishery for 1869.—The year 1869 has not proved a satisfactory one to those engaged in the whale fishery. It opened with good prices for oils and bone, which were well sustained through the summer, since which time, owing to increased stocks, depression in business everywhere, caused by the New York gold panic in September, and the favorable news from the Arctic Ocean, there has been a general decline to present quotations of $1.55 for sperm, 70 cents for humpback, 85 cents for Arctic oil, and 85 cents, gold, for Arctic bone, equal to about $1 currency, the decline for the year being about 25 per cent. During the summer about 25,000 barrels refined seal oil were imported from the provinces and brought here by our manufacturers, thereby displacing from consumption an equal quantity of whale oil, which is now held by our importers, and which accounts for the excess of the present stock over that of a year ago. The seal oil, which is of inferior consistency to whale, is said to have been largely mixed with whale and lard oils, thereby prejudicing the reputation of pure whale and lard oils. The increased import of whale oil in 1869 over 1868 was mainly owing to the sending home from the Sandwich Islands of oil caught in the previous years, only about 3,000 barrels having been carried north by the fleet in 1869, against 14,000 barrels in 1868. The generally unprofitable results of voyages terminated during the year, coupled with the low prices now ruling, are not favorable to the present fitting of the vessels in port which constitute over one-sixth of our small fleet.

Of the one hundred and two whalers that have arrived during the year, only about one quarter may be said to have made profitable returns; even these, at present prices, would barely have saved their owners from a loss.

The new year opens with another reduction in the fleet, both in number of vessels and tonnage. The whole number of American vessels engaged in the whale fishery January 1, 1870, is 218 ships and barks, 22 brigs, 81 schooners,

with 73,137 tons, against 223 ships and barks, 25 brigs, 88 schooners, with 74,519 tons same time in 1869, showing a decrease of 15 vessels and 1,382 tons, only 25 of which grews out of remeasurement. As showing the extraordinary falling off in ten years, we give the following figures:

	Ships and barks.	Brigs.	Schooners.	Tonnage.
1870	218	22	81	73,137
1860	508	19	42	176,842

This is an apparent difference of 103,705 tons, but owing to loss by remeasurement, the actual loss in tonnage is 93,095 tons; showing in the ten years a decrease of 55 per cent. We predict a further deduction in the fleet the present year, unless prices materially improve. At present there are eight whalers at this port for sale, and a large number of schooners at Provincetown and other ports.

The Atlantic fishery, taken as a whole, was less successful than in former years, the average catch being 12 per cent. less than for three years previous, while the instances of good catches have been largely reduced.

We give below a statement of the Atlantic sperm fishery for the past four years:

	Number of vessels.	Total catch.	Average.
		Barrels.	*Barrels.*
1866	150	20,594	137
1867	154	18,809	123
1868	150	18,206	122
1869	158	17,672	112

About one-fourth of the catch was taken in the South Atlantic.

The fleet to cruise in the North and South Atlantic will not probably exceed one hundred and twenty-five vessels, against an average of three years previously of one hundred and fifty-four vessels; this being brought about by the reduced average catch and reduced prices, and is chiefly shown in the Provincetown fleet, where seven have already been withdrawn and fifteen others are in port there, a number of which it is contemplated withdrawing.

The Indian Ocean, New Holland, and Soloo Sea grounds have been visited by the usual number of vessels, but only a few have been more than moderately successful.

The Pacific fleet has been well distributed on New Zealand and the West Coast, but has not been as successful as for a few years past; some have done well but the average has been moderate. Five of the New Zealand fleet changed their cruising grounds and went humpbacking, and were successful in taking an average of 750 barrels. A single vessel, the bark Camilla, has been cruising on the old Japan ground with fair success.

The North Pacific fleet of 1869 comprised forty-four American and six foreign ships, fifty in all, the number anticipated in our last review, against sixty-eight vessels in 1868. Owing to the scarcity of whales in the Arctic early in the season, many gave their attention to the capturing of walrus, and about 4,000 barrels of oil were taken from them, and, as in the previous year, it was not until late in August that the whales were found in abundance at Point Barrow, where all present got good fares of oil, the only barrier thereto being the extreme cold. The catch was large for the small fleet engaged, and gave an average of 990 barrels oil and 14,000 pounds bone. The fall short in bone is owing to the walrus oil (which has no bone with it) being included in the whale. Only one vessel went to Bristol Bay, where she got 500 barrels whale oil and 2,000 pounds bone, and but six to the Ochotsk Sea, where whales were scarce, the entire catch being 2,575 barrels oil and 21,800 pounds bone, the average being smaller than for many previous years. The bark Eagle, of New Bedford, was totally lost in the Arctic in September, having taken 1,600 barrels oil and 25,000 pounds bone, the only serious disaster to the fleet. For a number of years the coast whaling has been neglected, but it is expected that several whalers will this winter visit the bays there, which in former years have furnished good whaling. The entire fleet visited the Sandwich Islands last fall, except the Florida, which belongs at San Francisco. In this connection we would invite attention to the following article from the San Francisco Commercial Herald:

"Of the large whaling fleet engaged in the Ochotsk and Arctic Seas, but a single one visited this port last year, all the rest having rendezvoused at the Hawaiian Islands. A good many of them found fault with the treatment accorded by the American consul, and expressed a determination to come here next season. At least twenty-five will adopt that course, and it would be good policy to pass some stringent law by which the contracts made with their crews could be enforced. The Florida is the only vessel that entered the harbor from the Polar Seas. Her oil sold at a high figure, say 65 @ 70 cents. The bone was forwarded by rail to New York at a merely nominal rate, say 3½ cents per pound, currency. It is said by returned whalemen who passed through this city for New Bedford overland, in December last, that a considerable number of the whaling fleet will in future resort to this harbor for supplies, &c., presenting, as it does, advantages of markets and home advices by telegraph, besides monetary exchanges and facilities that are not elsewhere attainable."

The Cumberland and Hudson Bay fishery was very unsatisfactory, but one fair catch having been made of 650 barrels, after an absence of nearly eighteen months. Of the six vessels wintering there, five are owned at New London, the other at this port. The brig Oxford, of Fairhaven, was totally lost in the inlet, and the bark Odd Fellow, of New London, on her passage to the inlet.

The Desolation sea-elephant fishery has been satisfactory to those who have pursued it, it being a specialty at New London.

The Tristan, Crozettes, and Desolation grounds were visited by several of our whalers last winter, where they found few whales and bad weather, and in two instances only were good catches made.

The fleet the present year will be distributed about as follows: In the North and South Atlantic, 125 vessels; Indian Ocean, 41 vessels, and Pacific Ocean, 65 vessels, making 231 vessels, which are chiefly sperm whaling. In Hudson Bay and Cumberland Inlet, 6 vessels; on Desolation, elephanting, 5 vessels; and in the North Pacific, 44 American and 7 foreign vessels, a total of 62 vessels, exclusively right whaling. There are 13 vessels outward bound, and 11 homeward bound; and of the number to go north the coming season, 18 vessels will be on the fourth, fifth, and sixth seasons, an unusual number, involving a larger outlay than if fitted at home ports.

The year opened with a good demand for sperm oil at $1.75, and rose before the close of January to $2, and the market continued steady into June, when the price gradually receded to $1.75, after which there was a steady decline to the close of the year, sales being made at $1.55 per gallon.

Whale oil opened at $1 per gallon, and rapidly rose to $1.20, when, upon the spring arrivals with a large supply, the price gradually receded to $1 and $1.05, for northern, at which price it continued steady until the fall months, when it further receded to 85 @ 90 cents, which were the ruling prices at the close.

Whalebone opened at 75 cents, gold, for new, and 80 cents, gold, for old, Arctic, with considerable sales, and promptly advanced from 85 cents to $1, gold, early in March. During the summer months the market remained steady, at about $1.30, currency, until October, when sales were made at $1, gold, for Arctic, and 82 @ 83 cents, gold, for South Sea. Since then there has been a general decline, closing at 85 cents, gold, for Arctic, and 75 cents, gold, for South Sea.

The English review of their oil market for 1869 is encouraging, as it foreshadows a good demand for our staples. At the commencement of the year the stock of sperm oil was 5,300 barrels, and there was in transit from this side 10,000 barrels, whereas at the opening of this year their stock was but 6,000 barrels and nothing going forward. The import into London in 1869 was 7,200 barrels from the colonies and 25,500 barrels from the United States, a total of 32,700 barrels, all of which was cleared for consumption excepting 700 barrels. The information received here from their colonies as well as the Talcahuano fleet (from which they have drawn considerable supply) lead us to believe that their increased supply for the past two years of colonial oil cannot be relied upon for the future. About 4,500 barrels whale oil were imported during the year, and the market closed very firm at £39 @ £40 per tun, with but little remaining in first hands. We think we can safely anticipate a good demand for sperm oil the present year.

The imports in 1869 were 47,936 barrels sperm, 85,011 barrels whale oil, and 603,603 pounds bone, against 47,174 barrels sperm, 65,575 barrels whale oil, and 900,850 pounds bone in 1868, showing a marked increase in whale oil, owing to the sending home of oil taken in previous years, but a decrease in whalebone of about one-third.

The exports in 1869 were 18,645 barrels sperm, 3,842 barrels whale oil, and 311,605 pounds bone, against 18,619 barrels sperm, 9,885 barrels whale oil, and 707,882 pounds bone in 1868, showing a large decrease in whale oil and whalebone.

The home consumption of sperm oil in 1869 was 17,239 barrels, of whale oil 56,236 barrels, and of whalebone 197,098 pounds, when in 1868 it was 19,055 barrels sperm, 72,390 barrels whale oil, and 246,968 pounds whalebone. The decrease in the consumption of whale oil was consequent upon the large import (and consumption) of seal oil, which we have reason to believe will not be repeated.

The stock of oil and whalebone on hand January 1, 1870, was 25,052 barrels sperm, 41,633 barrels whale oil, and 294,900 pounds whalebone, against 13,000 barrels sperm, 16,700 barrels whale oil, and 200,000 pounds whalebone same time in 1869.

TRADE REVIEW FOR 1870.

Review of the whale fishery for 1870.—The year 1870, like its predecessor, has been one of poor returns to those engaged in the whale fishery. The prices for our staples, which at the opening were considered unremunerative, steadily declined throughout the year, closing at the lowest quotations of any year since 1861. The decline in sperm oil was owing to the limited consumption of the article, together with a large stock on hand at the beginning of the year, and the unexpected large import, being about 10,000 barrels in excess of the estimate for the year, while whale oil and whalebone were similarly effected by the introduction largely of cotton-seed oil, and a closed foreign market, caused by the European war, to which we export largely, especially of bone. We note that while the importation of seal oil has been restricted by a higher tariff, that cotton-seed oil has stepped into its place, and claims its share of consumption, which is by no means limited, 75,000 barrels, it is estimated, having been marketed the present year. But few of the returned whalers made profitable voyages, whereas most of the voyages were unremunerative, and many very much so.

Because of the poor results and low prices, combined with the high cost of outfits, many were deterred from fitting out their ships again, and the fleet at home ports on the new year was largely in excess of former years. Our merchants do not look upon the future of whaling with encouragement, and seem disposed to distrust it as to its pecuniary results, induced more by extraneous causes than inherent, having to add to the list of competitors lard, petroleum, and seal oil, that of cotton-seed oil, said by its advocates to be but in its infancy.

The decline in the number of the fleet foreshadowed a year ago has been realized, and we have not only a smaller number now engaged, but of that small number fully one-fourth are at home ports.

The Atlantic fishery has furnished less sperm oil than in former years, chiefly owing to the small number prosecuting the business there, though, as in former years, some good fares were taken, six vessels in the North Atlantic having averaged 350 barrels. The fleet to cruise there the present year will be much reduced from that of last year, and will probably not exceed one hundred vessels.

The whole number of American vessels engaged in the fishery January 1, 1871, is 216 ships and barks, 18 brigs, 54 schooners, with 69,372 tons, against 218 ships and barks, 22 brigs, 81 shooners, with 73,137 tons same time in 1870, showing the large decrease for the past year of 33 vessels, with 3,765 tons, which proceeds from the withdrawal of vessels from Newburyport, Wellfleet, Groton, and largely from Provincetown, the entire fleet at the latter port being 27 vessels against 49 a year ago, and of that number it is thought 7 will not be fitted.

We fear that a continuation of the present low prices for our staples will deter our merchants from fitting many of the whalers in port and to arrive, by which the vessels disengaged throughout the year will be larger than for many years past.

On the various sperm-whaling grounds the cases of marked success in 1870 were few. Whales were very scarce upon the grounds around New Zealand, which have been more largely visited the past year because of the previous marked success there. Many of the sperm whalers visited the several right-whaling and humpback grounds, and met with good success, more particularly in humpbacking. The Tristan and Crozettes grounds were poor, with heavy weather, the best cut being 780 barrels on Crozettes, while the average was not probably over 250 barrels.

The North Pacific fleet of 1870 consisted of forty-eight American and ten foreign vessels, of which two American, the Hibernia and Almira, and one foreign, the Japan, of Sidney, New South Whales, were totally lost, the latter supposed, with all her officers and crew, in the Arctic. As in the two years previous, the whaling was done in August and September, and the average catch was larger than for many years. Whales were small but very unmerous, and it is said were never more abundant. The catch of walrus oil was very large, being nearly 10,000 barrels.

But one whaler visited the Ochotsk Sea, the Monticello, and took 200 barrels, and Bristol Bay, the George, and took 400 barrels.

Coast whaling seems to have been abandoned. Ten whalers visited San Francisco, the balance of the fleet going to Honolulu. A new feature in the transshipment of bone is that of sending it "across the continent" by rail, direct to New Bedford, at the small cost of 2 cents per pound, currency.

At Honolulu three foreign right whalers have been withdrawn, the business not proving remunerative, but in San Francisco there is a corresponding increase, and a disposition manifested to extend further in this branch of whaling.

The Hudson Bay and Cumberland Inlet fishery was fair, the Milwood doing the best, having come out with 1,000 barrels. The schooner Quickstep, of New London, is supposed to have been lost in coming out, with all on board.

The fleet is now distributed about as follows: North and South Atlantic, 51 vessels; Indian Ocean, 41 vessels; Pacific Ocean, 65 vessels, principally sperm whaling; Hudson Bay and Cumberland Inlet, 5 vessels; the remaining 51 vessels comprise the North Pacific fleet, 8 of which are outward and 20 homeward bound. The North Pacific fleet for 1871 will comprise about 40 ships of all nationalities. The total number of vessels now at sea is 213.

The export of sperm oil to foreign countries in 1870 was 22,773 barrels, mostly to London, against 18,645 barrels in 1869, showing an increase of 4,328 barrels; but the stock on hand at London, 1st instant, was 200 tons in excess of the previous year. The foreign consumption of this article has not increased under low prices, as was anticipated, which it would seem was owing to the European war, causing a large falling off in the demand for manufactured goods, but which we think an early peace will restore. The home demand has materially increased, and we think will be maintained under present prices.

The year opened with sperm oil at $1.50 @ $1.55, and advanced in February to $1.60, when, becoming in large supply, it steadily declined throughout the year to $1.20, closing at $1.23 @ $1.25.

Whale oil opened at 70 @ 72½ cents, and advanced to 80 cents in February, and in July the price had declined to 67 @ 68 cents, when it again advanced to 70 cents in August, after which it gradually declined to 65 cents, which was the nominal price at the close.

Whalebone was in good demand early in the year at 85 cents per pound, gold, for Arctic, when in May and June large sales were made at 80 cents, gold, and since July, when war was declared in Europe, the price has gradually declined to 65 cents per pound, gold, the decline in price and demand being consequent upon the two large and only consumers, France and Germany, being at war. The export to July 18, when the war broke out, was 285,000 pounds, being nearly equal to the entire previous year, and but for this interruption we should have probably had a large increased foreign demand, and soon after the declaration of peace we shall expect to see the foreign dealers in oils and bone turning their attention to our staples at the attractively low prices ruling here.

The imports in 1870 were 55,183 barrels sperm, 72,691 barrels whale oil, and 708,365 pounds bone, against 47,936 barrels sperm, 85,011 barrels whale oil, and 603,603 pounds bone in 1869, showing a large increase in sperm oil and whalebone, but a large decrease in whale oil. Of the imports of whale oil, 4,013 barrels, and of whalebone, 66,000 pounds, were the catch of San Francisco vessels.

The export in 1870 was 22,773 barrels sperm, 9,872 barrels whale oil, and 347,918 pounds bone, against 18,645 barrels sperm, 3,842 barrels whale oil, and 311,605 pounds bone in 1869, showing an increase in each article.

The home consumption of sperm oil in 1870 was 28,812 barrels and of whale oil 64,812 barrels, and of whalebone 226,947 pounds, when in 1869 it was 17,239 barrels sperm, 56,236 barrels whale oil, and 197,098 pounds bone, showing a gratifying increase the past year.

The stock of oil and bone on hand January 1, 1871, was 26,650 barrels sperm, 36,000 barrels whale oil, and 400,000 pounds bone, exclusive of 3,750 barrels whale oil and 27,500 pounds bone held in San Francisco, against 25,052 barrels sperm, 41,633 barrels whale oil, and 294,000 pounds bone same time in 1870.

TRADE REVIEW FOR 1871.

Review of the whale fishery for 1871.—We have to record another year of poor success in the whale fishery, both as concerns oil taken and pecuniary results, only about twenty-four vessels out of ninety-one returned having met with good success in taking oil, and scarcely ten of the whole fleet having left their owners any gains in the net results of the voyages terminated; the average low prices ruling for oil and bone for the first ten months of the year, when most of our arrivals occurred, tending to this result, and the large advance brought about by the almost total disaster to our Arctic fleet coming too late to change such results. Sperm oil from its own weight of heavy stock on hand at the opening of the year, and the frequent arrivals during the first half of the year, continued to sag from $1.40 in February to $1.22 in July and August, when, under a good foreign demand and some speculative inquiry, it reacted in September and advanced in October to $1.30, and with a good home demand, stimulated by erroneous views of consumers in the manufacturing districts, as to the kind of disaster we had met with, it was put up to $1.60, where it stood at the closing day of the year. An impression gained credence with some consumers in this country and Europe that our sperm-whale fishery was the sufferer, and the whaling business severely crippled; whereas our wharves had thirty ships lying at them for sale, and which the loss of ships in the Arctic simply made a partial market for. With so great a loss of vessels, we have with us for sale at least ten good ships, the owners not feeling willing to embark in new voyages with them.

The consumption of sperm oil has been rather more than last year, say 56,000 barrels, of which 22,000 barrels were exported to Great Britain, more than usual going to Glasgow. The London market received from the colonies 800 tuns, which was more than for either of the three preceding years. The stock on hand in London, December 31, was 630 tuns, an average of the stocks for the three preceding years, and 200 tuns were also being landed from New York for refiners. The home consumption in 1871 was about 34,000 barrels, against 29,000 barrels in 1870, showing the increased consumption of 1871 over 1870 to have been in this country.

The import of sperm oil was 8,000 barrels less than was looked for at the beginning of the year, which is due rather to the poor whaling, and not to delay of the whalers out in returning home. We have a much smaller stock than for 1871 to open the year with, say 14,500 barrels, and can hardly expect as large an import in 1872 as in 1871, as the fleet is much smaller, and must so remain for the present, while some few sperm whalers may go to the Arctic Ocean and some whalers here may be sent to the same place this year. With the low prices ruling in 1871 for lard, cotton-seed, and petroleum oils, it would seem that sperm oil has its own place to fill at a fair price, regardless of substitutes, and better success in finding sperm oil would no doubt encourage some owners of vessels to fit them again at present prices. The sperm oil on board of whalers, already caught, is about 33,000 barrels, against 36,000 barrels the year previous.

There will be an increase in Provincetown whalers fitted this spring, several of them having been temporarily engaged in the coasting business.

The destruction of thirty-three Arctic whalers out of forty cruising in the Arctic in 1871 will work a new experience to us in the way of importation in 1872, as but two Arctic whalers will arrive this year, the ships Daniel Webster here, and Europa at Edgartown, and the arrival of Arctic oil will be only about 2,300 barrels. We can hardly hope to import more than 30,000 barrels whale oil from all quarters in 1872, which would only give a supply of 60,000 barrels for the year, against 110,000 in 1871. The market will be cleared before another import of Arctic oil can be caught, unless the extreme views of holders may lead to the importation of seal oil to be caught this spring, and a supply of cotton-seed oil, which shall make up for our large deficiency. Since the news was received of the Arctic disaster we have fitted and sent to the Arctic six ships, and one from New London, of which four were formerly sperm whalers. Of the eleven whalers fitted and which sailed for the Arctic previous to the news of the loss, five were sperm whalers; three sperm whalers have been ordered to the Arctic from sperm-whale grounds. The Faraway, owned in Sydney, New South Wales, has sailed from Honolulu, under command of Captain Herendeen, formerly of the Mary, of Edgartown, for the Arctic. The fleet of 1872 will comprise twenty-six vessels, of which only three Americans and one Hawaiian were there in 1871. San Francisco will probably have no whalers there, underwriters in San Francisco declining to insure on them; their past experience seeming to them almost a fatality, they having had to pay for every Arctic whaler that has heretofore fitted from that port.

Whale oil has been in good demand, both for home use and export, though the market was a declining one, from 65 cents in January to 50 @ 54 cents in July, and until the November news of the loss of the Arctic whalers, when the market was entirely demoralized, more from insurance and other questions pending solution than any other pressing want to buy or anxiety to sell at the advance. When the excitement was allayed sales were made of Arctic at 75 @ 80 cents, which is the current price. The consumption has equaled the previous year, 64,000 barrels being used here, and 18,000 barrels exported to France.

Seal oil has not interfered with us during the year, only one cargo American catch coming to this country. Cotton-seed oil has been in the market, but the low prices have unquestionably discouraged the manufacturers of it, with similar results in their experience as by our whaling owners.

Whalebone has contiuued in good demaud during the year, although at low prices, the prices ranging from 65 cents, gold, early in the year, to 79 ceuts, gold, iu October, when tho ten months' sales having more than aggregated our imports, and the disastrous Arctic news having come to haud, holders beiug few in number, put their prices to $2 per pound. Sales were made of South Sea at $1.70 and Arctic at $1.75 @ $1.85, aud the year closed with a stock of 290,000 pounds, held at $1.90 @ $2. There can be no import of bone in 1872 except of South Sea and Cumberland, and possibly an early arrival of Arctic, all nucaught as yet.

There has been a large reduction in our small whaliug fleet, aud of the thirty-four vessels now in port half are for sale, and some to arrive will probably chauge hands before being fitted again. Could present prices be assured for three years to come probably nearly every vessel would go to sea, but with tho uncertaiuty in prices, partly from substitutes and low prices of them, only good prices can be hoped for and not couuted upon. There were no whalers in Ochotsk Sea or on Kodiac last season. Tho Arctic fleet had doue well up to the time of their having beeu lost; whales were plenty and the prospects good for a large average. The oil abandouod with the ships was about 12,000 barrels, and about 100,000 pouuds of boue. The natives were at work saving the boue wheu last seen, and it is expected that by trading with them that at least 50,000 pouuds may be got of them within three years. It is not improbable that some of the ships may be fouud uear where abandoued, but not at a time nor in such condition as to make it an object to save them. The salvors would hardly expect to save moro than half to themselves of the property recovered, and good whaling would offer better results.

The Atlantic fishery has been a fair one to the small fleet cruising there. The weather has been rugged late in the season. The best catch was made by the Commodore Morris, of New Bedford, 1,200 barrels sperm oil in nineteen months, 550 barrels this season; others have done well. The South Atlantic fleet have done well sperm whaling and humpbacking. The fleet took 3,000 barrels hnmpback oil on the coast of Africa. The Nautilus, of New Bedford, took 800 barrels, the best catch.

The Indian Oceau aud Crozettes have furnished nothing extraordinary; nor have the Soolo Sea and New Holland given their usual share of oil. The New Zealand fleet has doue well sperm whaling and hnmpbacking, nearly 5,000 barrels of humpback oil haviug been taken on Brampton Shoals; the Cleone, of New Bedford, having taken 1,000 barrels. The West Coast whaling has been only fair sperm whaling, while in humpbacking somo good cuts have been made, aggregatiug nearly 5,000 barrels. Panama Bay was alivo with humpbacks in the season of them, and one coast whaler took 1,000 barrels. Margueritta Bay has not been visited, though iu former years it furnished great attractious to our Arctic fleet betweeu seasons.

Hudson Bay and Cumberlaud Iulet has barely sustained its average, though the Ansel Gibbs, of New Bedford, returned with 1,300 barrels of oil and 22,000 pounds of bone—the ouly good catch, and paying one, and perhaps the best payiug one of the year in its percentage. The Scotch Greenland fishery was very successful; they report some catchos of 2,000 barrels to a vessel—steamers.

The Desolation voyages have been a sharer with all the other kinds of whaling in having loss oil taken and less price received than the owners found profitable. The year in a geueral viow outside the Arctic disaster, which was unforeseeu and unexpected, has been fully as discouragiug as any former, and if extreme prices, caused by our loss, do not raise up enemies to our futnre interest in substitutes, then we may hope for better days to those whose courage keeps them in the way of whaling because thoy believe we shall see a return of prosperity in this branch of creative industry.

The promptness with which the Commercial Mutual Marine and Uuion Mutual Marine Insurance Companies havo had their resonrces reinforced by stock notes, the former by $110,000 and the lattor by $300,000, shows that our present and former owuers in whaling, who have come to the rescue to replenish the euormous losses by the Arctic disaster, believe in a future of whaling, if not as extensive as in the past at least partially as remuuorative.

TRADE REVIEW FOR 1872.

Review of the whale fishery for 1872.—The year just closed has beon but a coutinuauco of the former one in results, few prizes and many blanks. With a small and steadily decliniug fleet, we have been nuable to proportionately gaiu in average quantity of oil taken or in reaching more satisfactory results. Thoso who began the year with the intention of selling whalers have seen nothing so eucouraging in the business as to iuduco them to change their minds, and though only seven of the fourteen ships theu for sale were sold during the year, yet others since arrived havo been sold, and we have now at home ports some sevonteen more good whaleships known to be for sale, their owners not intending to fit them again. Tho great loss of whalers in the Arctic in 1871 has becu followed by the sale of twenty and loss of four whalers in 1872, exclusive of ships that have changed hands in the busincss, aud still we begin the year 1873 with about one-third of the whalers at home ports for sale, or about seventeen out of forty-eight vessels. The continued purpose to sell whalers after so great a depletiou iu little more thau a year shows the judgmeut of those who have long and successfully been engaged iu the business, viz, that it has become too hazardous, and its results too uucertain to continue it, when capital is promised a safer employment aud suror rewards in enterprises on the land, and in our own city, where the products of two large cotton mills equal very uearly the aggregate value of the imports of the fishery yearly. There are those who thiuk that the Arctic whaling will be given up in a few years becanse of the perils attendant ou whaling there, where ice has to be encouutered, with extreme cold and sovere storms, and from which canses shipwrecks and damage to hulls aro very common. This view is confirmed by tbe recent action of our insurance companies in charging 3 per cent. extra each season on whalers visiting that ocean, a step long contemplated but now felt necessary by the insurance companies.

The fleet starts to-day with two hundred and three vessels in the business, against two hundred and eighteen a year ago, and two hundred and eighty-eight two years ago, showing a decrease of 15 per cent. per annum for two years past. Another installment of 15 per cent. in sale of ships during 1873 we think would reconcile interested parties for the time to the present condition of the business. Of nine vessels (schooners) added to the fleet in 1872 seven had previously been temporarily withdrawn, and two were bought to engage in the South Shetland whaling and sealing business, which was revived last year with considerable profit, the skins being the finest fur seals known.

The 24 whalers sold and lost represented 5,192 tons, while the 9 schooners added show only 766 tons. The fleet at sea January 1, 1873, numbers 155 vessels, against 165 a year ago. We had employed in 1853 571 vessels, with a tonnage of 200,286, averaging 350 tons; in 1863, 357 vessels, with a tonnage of 103,146, averaging 288 tons; in 1873, 203 vessels, with a tonnage of 47,996, averaging 236 tons. The comparison shows a large reduction in number of vessels, also a reduction in the average size of the ships employed. The largest fleet in the Arctic Ocean was in 1854, when 232 ships were there and obtained 184,063 barrels whale oil, averaging 794 barrels. The largest quantity of sperm oil was imported in 1853, 103,077 barrels, averaging in price $1.24. The largest quantity of whale oil was imported in 1851, 328,483 barrels, averaging 45 cents. The largest quantity of whalebone imported was in 1853, 5,652,300 pounds, averaging 34 cents, gold.

These figures serve to show how great a change the whale fishery has undergone at home and among consumers. Our entire import of sperm and whale oil in 1872 was about three-fourths of our import of sperm in 1853 and about one-fourth of our import of whale in 1851; and our import of whalebone in 1872 was about one twenty-eighth of the import of 1853.

In twenty years the consumption of sperm oil has reduced one-half, at same prices, 103,000 against 45,000 barrels. In whale it is reduced five-sixths, at an increased price of 20 per cent., 328,000 barrels against 50,000 barrels; and in whalebone it is reduced nine-tenths, with an increased price of 100 per cent., 5,652,300 pounds against 500,000 pounds. We do not get oil and whalebone enough in the average to get our money back, and those who get the largest catches at competition prices have failed to make money. And so our oldest and most successful ship owners are willing to sell their ships. But there are a few firms who, having fine ships and good and skillful masters, are resolute and determined not to succumb to the untoward elements in the business until they have tested the matter thoroughly, and to such we believe success will come and should come.

No whaling grounds have been abandoned; every sea and ocean is at present explored by our whalers. The Hudson Bay and Cumberland Inlet whaling was a failure, some seven vessels being there and obtaining only about 1,500 barrels oil. The bark Milwood was lost there, the crew being saved, also her cargo of 150 barrels oil and 1,600 pounds of bone. Three whalers are wintering in Hudson Bay and three in Cumberland Inlet.

The Arctic Ocean was visited by twenty-eight American and four foreign whalers, and though the September whaling, which is usually the best, was a failure, still the fleet averaged 700 barrels oil and 10,000 pounds of bone. Nearly 5,000 barrels walrus oil was taken in the Arctic, though some masters, who were disposed to give up walrusing, abstained from it. The bark Roscoe was totally lost, crew saved. The Helen Snow and Sea Breeze were abandoned; the former was found by the Jireh Perry, and a crew put on board of her, and sent to San Francisco, where she has since been sold to the Alaska Sealing Company. The latter ship was recovered again by her crew, and continued her whaling. The Live Oak, Joseph Maxwell, and Arnolda were badly stove, but reached port safely. The bark Florence went up to the wrecked whalers and secured the Minerva, also 250 barrels sperm, 1,200 barrels whale oil, and 15,000 pounds of bone, and brought them all to San Francisco. Other bone was traded for and came to San Francisco; in all about 50,000 pounds.

Humpbacking has been successfully carried on everywhere. In Panama Bay 10,000 barrels were taken; at Harper's and Tonga Islands and Chesterfield Shoals, 8,000 barrels; on the coast of Africa, 2,000 barrels; and around the West Indies, 2,000 barrels; in all 22,000 barrels and equal to the entire Arctic catch. Not much was done on Crozettes and Desolation. Only two whalers arrived from the Arctic Ocean in 1872, being of the seven saved from the fleet of 1871. A fair catch was made sea elephanting and sealing.

The Arctic fleet for 1873 will number about thirty-two vessels. Two whalers only return home, and one goes to New Zealand. Six ships left this port in 1872 to join the Arctic fleet. One or two ships may go to the Ochotsk Sea this year, which has not been visited by whalers since 1870. One firm, who lost all three ships in the Arctic in 1871, has sent out three to replace them in the season of 1873. There were no whalers on Kodiac in 1871 or 1872. It is possible Margueritta Bay may be visited this winter by one or two of our Arctic fleet.

Sperm whaling has been but partially successful in the Atlantic. Several good cuts were obtained, and the whaling was very fair, but it was poor in the South Atlantic. In Indian Ocean, on New Zealand, and the west coast of South America, with few exceptions, the sperm-whale fleet has been largely engaged in humpbacking between seasons, with good fares, as before stated. As nearly three-fourths of the fleet is sperm whaling, there is a reasonable prospect of having a good supply, at least so long as whales can be found; and this branch of our business promises to survive, as substitutes are not so readily found as for whale oil, and the fleet is well distributed on all the known grounds for sperm whaling. Some good catches have been secured during the year, and in most cases were needed to put their respective vessels in creditable position.

The stock of sperm oil on board of whalers now is about 27,000 barrels, against 33,000 barrels a year ago.

Last fall twenty-two out of thirty-two ships from the Arctic came to San Francisco and seven went to Honolulu, and two home to Sydney; fourteen of the San Francisco fleet were met there by their agents, comprising some ten of our merchants, part of them taking their wives with them. In part owing to difficulties in shipping oil home from there, five ships were ordered to Panama to land and ship home their cargoes; four were ordered direct to Honolulu,

and two, after refitting for the north, sailed to cruise and touch at the islands in the spring. The high rate offered for grain freights absorbed all the available ships. The whaler Minerva, saved from the wreck of 1871, was bought by two of our merchants, and loaded with oil for home. Also the Lagoda and Tamerlane took freight for home.

Sperm oil has been in good demand during the year. The import was 45,000 barrels, 5,000 to 7,000 barrels more than was anticipated. We consumed the entire amount, and drew on stock at the commencement of the year for 3,000 barrels. Yet there was a falling off of 7,000 barrels in the consumption as compared with the previous year. The price opened high at $1.60, and during the summer declined to $1.35, when in the fall it strengthened to $1.50, where it stood at the opening of this year. A few sales were reported at $1.52½ @ $1.55. The consumption has been about equally divided between home and foreign demand, and the fall off has been in this country, probably induced by the abundance and low price of lard oil. With the oil caught and at home we have promise of a good supply this year.

Messrs. Bowes, Game & Co.'s Annual Market Report, reports the importation of sperm oil into the United Kingdom in 1872 at 3,423 tons, against 3,811 tons in 1871. During the demand from January to April the price advanced from £91 to £100, and when that fell off it declined in September to £85. The consumption was 3,595 tuns in 1872, against 3,823 tuns in 1871. The stock on hand January 1, 1873, was 669 tuns against 849 tuns January 1, 1872. The consumption fell off in 1872 228 tuns, and the stock to open the year with was reduced 180 tons. Messrs. Maclean, Maris & Co.'s circular shows the imports from the colonies in 1872 to be 722 tuns, being nearly one-half of the import of the United States.

Whale oil has been in moderate demand with small supply. The import was very small, 31,075 barrels, consequent upon the loss of the Arctic fleet in the fall of 1871. Only two right whalers returned during the year, and the import was little more than one-third that of the previous year, when it was 75,000 barrels. The supply was 61,000 barrels whale, and consumption 45,000 barrels, against 80,000 barrels in 1871. The consumption of whale oil has not been reduced by seal oil, for none has come here from the provinces, nor from fish oils, for the catch has been a small one, not over two-thirds that of previous years, but rather from lard and petroleum, which have been plenty, good, and cheap.

The year opened at 73 cents for Arctic oil, and eased during the summer to 66 @ 68 cents, when humpback oil arrived in large quantities, and was taken in preference, because of its lower cost, say 60 @ 62½ cents. Since the Boston fire, in which 8,000 barrels fish oil were lost, causing tanners to buy some of our oil, rather better figures were obtained closing at 68 cents for Arctic, and a small stock of 16,500 barrels of all kinds. There was but little whale oil exported in 1872, say 1,528 barrels.

The London circulars call the import of whale oil there 80 tuns, and the stock on hand January 1, 1873, 47 tuns. Also, imports of seal oil there 822 tuns, and the stock on hand January 1, 1873, 152 tuns.

Whalebone was in good supply at the opening of the year, about 285,000 pounds; but with little to come during the year, or until the new Arctic arrivals late in the year, and which amounted to 132,000 pounds. Only about 60,000 pounds came from all other sources, including South Sea and Cumberland. Small sales were made early in the year, at $1.90 per pound and then it declined to $1.75 and $1.50 by May, and in June it was sold at $1, gold, to $1.20, currency, since which it has been steady at $1.15 @ $1.20, closing the year at $1.18 for old. The first six months the sales were about 50,000 pounds, but when prices got down to $1, gold, the sales for the remaining six months were about 200,000 pounds, of which consumption of 250,000 pounds about 180,000 pounds were exported. A circular issued by J. A. Sevey, of Boston, a large bone-cutter, shows that he lost by being burnt out in the Boston fire some 10,000 pounds of bone, but was at work again in twenty-two days cutting bone with tools patented by him, and which he claims are a great improvement on the old method of cutting. Some 60,000 pounds of bone were brought into San Francisco last fall, which was picked up from the wrecked whalers or traded for with the natives.

London circulars, aforesaid, report the importation, including the catch of Davis Strait and Greenland whalers, as 90 tons, against 101 tons in 1871. Stock in London, 357 tons, against 56 tons in 1871. Consumption 111 tons, against 91 tons in 1871, 107 tons in 1870, and 122 tons in 1869. The import of humpback bone was 22 tons, and the stock on hand January 1, 1873, was 27 tons.

TRADE REVIEW FOR 1873

Review of the whale fishery for 1873.—The opening paragraph of our last year's review might be copied and would be equally appropriate in commencing our present, for it has been a year starting with a small fleet, steadily reducing through the year by sales and losses of vessels, with moderate catches, meager net results, no change of purpose to sell whalers now here, and no new signs of encouragement in the business. A proposition for the sale of a whaler is more tempting than a proposal to fit one. Of the nineteen whalers in the port of New Bedford January 1, 1873, four were sold, five fitted for whaling, and ten still remain in port; of the seven at New London January 1, 1873, one has been sold and broken up, and the remaining six are still for sale. Of the eleven whalers now in this port that arrived in 1873, six are for sale; and of the twenty-one whalers now wintering here not over seven are likely to be fitted. Of forty whalers to arrive in 1874 probably about thirty will be sent to sea again.

The striking features in the business have been the steadiness of prices during the year, except during the panic, the absence of many good catches of oil in sperm and Arctic whaling, the good success in humpbacking in Panama Bay and coast of Africa, the loss of three whalers in Hudson Bay and Cumberland Inlet, and immunity from disaster in the Arctic Ocean, not a ship being lost or seriously damaged.

Our present fleet is 171, against 203 a year ago, 218 in 1872, and 288 in 1871. The 15 per cent. reduction which has been going on for three years, and which a year ago we ventured to think would relieve us of an anxiety to

further sell, has not been realized; for of the fifty-one whalers at home, we now want to sell twenty-five at least, which is still another 15 per cent. discount we would make on our fleet, and unless we get better catches and better results in 1874 than in 1873, we can now safely apply for another reduction in 1875 of nearly 15 per cent. The thirty-two whalers withdrawn, &c., represented 6,912 tons, and the one schooner added at Provincetown was 117 tons.

The fleet at sea January 1, 1874, was one hundred and twenty-three vessels, against one hundred and fifty-five a year ago.

FLEET.

Year.	No. of vessels.	No. of tons.
1854	668	208,399
1864	304	88,785
1874	171	41,191

ARCTIC FLEET.

Year.	No. of vessels.	Oil.	Average.
		Barrels.	*Barrels.*
1853	108	146,800	1,349
1863	42	36,010	857
1873	28	19,400	700

IMPORTED.

Year.	Sperm oil.	Whale oil.	Bone.
	Barrels.	*Barrels.*	*Pounds.*
1853	103,077	260,114	5,652,300
1863	65,055	62,974	488,750
1873	42,053	40,014	206,396

We have given these comparative figures to show the inclined plane down which whaling is at present going. Right whaling is not remunerative, and cannot be unless larger catches can be made with smaller expenses attending them.

The Arctic Ocean had in 1873 thirty-two whalers, and the Ochotsk Sea two, and yet the aggregate catch was about 21,000 barrels of oil and 250,000 pounds of bone, or an average of 600 barrels of oil and 7,500 pounds of bone, worth about $20,000, one-half of which is used up in drafts, refitting for another season, and the expense of getting oil and bone home. The past season was a poor one for whaling, being open, free from ice, whales very scarce until very late in the season, when they were plenty, but the weather became bad; the remaining fleet, after a week of good work, came out with a fair catch. Six whalers did not take a whale in the Arctic, and two got not even a walrus. In 1854 fifteen whalers out of forty-eight got nothing, and the season was a failure. The Progress found whales outside and took seven, making 750 barrels oil; also the Louisa found whales on Kodiac, and got five, making 550 barrels; and the Live Oak found whales in Japan Sea, and got nine, making 900 barrels. About 6,000 barrels walrus oil was taken in the Arctic in July. Whalers went farther north this season than ever before. Four Arctic whalers will return home, and not one has been fitted out during the past year to go to the Arctic, nor will there be during the year 1874. From present appearances, with the present feeling existing about Arctic whaling, we should doubt if any one of the fleet now out, upon their return home, would be fitted again to go there. About one-half of the fleet went to San Francisco to refit and the balance to Honolulu, it having become evident that the gains at San Francisco are not equivalent for advantages the Sandwich Islands have for getting and keeping crews and freighting home catchings. In the fall of 1872 five whalers went to Panama to ship their catchings home; owing to unavoidable circumstances the oil was long delayed at the Isthmus, and was, on arrival here, found to have much leaked. Panama Bay has been as good whaling ground the past year for humpbacks as in previous years, about 10,000 barrels being the catch there, some vessels getting 1,000 to 1,400 barrels each. But little has been heard from the sperm whalers humpbacking at the shoals and grounds in the Pacific Ocean. On the coast of Africa there were good catches of humpbacks, some vessels taking 500 to 700 barrels each.

The Crozette whaling was good, but two vessels visited the ground, the China and John P. West, taking 750 and 800 barrels, respectively. Cumberland Inlet and Hudson Bay whaling was disastrous; the schooner Abbie Bradford returned with a good catch, and brought news of the loss of the barks Ansel Gibbs and Orray Taft, of this port. The schooner S. B. Howes, of New London, was also lost there. Many seamen died with scurvy. The bark Glacier, of this port, returned with only about 70 barrels. South Shetland sealing and whaling was very successful, and another fleet has gone to complete the work of extirpation.

Sperm whaling has had hardly a better average result than right whaling, but while its catches are perhaps less in value, its expenses of continuing a voyage are also less. In the North Atlantic many good fares were taken, the largest being about 300 barrels, whereas in former years 500 to 700 barrels have been reached in a single cruise. In the South Atlantic less oil has been taken than formerly, though several good catches were made, one vessel taking 600 barrels in six weeks. In the Indian Ocean and on New Holland, with few exceptions, the whaling has been slim; whales were quite plenty early in the year, but the weather was bad; for the greater part of the year but few whales were seen. The New Zealand ground has been dry and deserted by whales, only a few ships having done fairly, while one or two have been fortunate in seeing and getting them. The fleet is small there. The West Coast has but few sperm cruisers there, and several have done quite well, others poorly. The bark Courser, with 700 barrels of sperm oil on board, was run down by an English steamer.

All around, the sperm-whaling grounds have not been up to former years in takings, and it would seem that a small fleet does not increase the chances of a great catch. At present prices for sperm oil, say $1.50, we think sperm whaling will outlive all other kinds, though even with a reduced catch we find a reduced consumption.

The fleet for the coming year will be distributed about as follows: North and South Atlantic, 50 vessels; Indian Ocean, 17 vessels; Pacific Ocean, 31 vessels; Hudson Bay and Cumberland Inlet, 3 vessels; North Pacific, 27 vessels.

The demand for sperm oil was good during the year. The import exceeded but very little the highest estimate, and by reference to the comparative statement of consumption of oils, it will be seen that the supply was 53,300 barrels, against 59,700 barrels in 1872, and that the home consumption was equal to that of the preceding year, while the export fell off about 8,000 barrels, a little more than the reported decrease in consumption of this kind of oil in the United Kingdom. The price opened at $1.50 and advanced to $1.57 in February, fluctuated between $1.52 and $1.55 until May, after which it gradually declined until June, when it touched $1.40, and remained steady until the middle of August, when it advanced to $1.45 @ $1.50, remaining at these figures until October 1, when, under the pressure of the panic, a small parcel of ordinary oil was sold at $1.31, but upon the return of an easier money market in November sales were made at $1.39 @ $1.42, and in December at $1.50, with a good demand and closing firm at this price.

The demand for whale oil seems to be affected by the large supply of other cheap oils, such as menhaden, cotton-seed, and petroleum which is unprecedentedly low. The home consumption was about 9,000 barrels less than in 1872, while the average price was lower. There has been very little life to the market, the cheap oils, such as humpback and South Sea, seem to be preferred at the lower prices which they can be bought at, Arctic of good quality being neglected in consequence, the rule seeming to be that the poorest oil is sought after because of the low prices. A demand sprung up at the close of the year for the cheaper oils, humpback, South Sea, and coast for export, 50 cents per gallon being paid for all qualities, in or out of bond, and the same price was offered for the poorest Arctic oil, but no sales were made. The year opened at 68 cents for Arctic and — cents for humpback, the market being steady until June, when 63 cents per gallon was the quoted price for Arctic, at about which the market ruled the rest of the year. The price for humpback ranged from 55 @ 60 cents per gallon during the year for manufacturing. The stock of this kind of oil on hand January 1, 1874, was about 2,000 barrels. The export the past year was 2,150 barrels, against 1,500 in 1872.

Whalebone opened at $1.15, currency, with a good demand, which continued into February and March, with a slight reduction to $1.10, currency, ruling at this price until May, when the demand was good at $1.08 @ $1.12, currency, for Actic, and 95 cents for South Sea. During the summer months the demand was good, sales reaching in August 51,000 pounds, when the price advanced from $1.08 to $1.20, currency; for the remainder of the year the demand was light, and prices receded to $1.10, currency, for old, and $1 for new Arctic. The home consumption was very good, reaching 155,000 pounds, against 74,500 pounds the previous year. The Scotch whalers did very well taking bone the last season, and the entire import has been sold, showing the trade in this article in England and on the continent to be in a healthy condition. About 25,000 pounds of new unculled bone, including 10,000 pounds Japan Sea bone, was sold in San Francisco at 87½ cents, gold, per pound for export.

TRADE REVIEW FOR 1874.

Review of the whale fishery for 1874.—Although the past year has not been one of large profits to our whalemen, we are able to state to-day that the business wears a more cheerful aspect, with a promise of a brighter future.

The number of profitable voyages arriving was not greater than during the previous year, but, with better prices prevailing, a more hopeful feeling has been engendered.

The decrease of the fleet (about 3,400 tons during the year) is gradually resulting in a better average catch, experience showing that any decided increase in the number of vessels engaged in the business must eventually bring about lower prices and small average catches.

Of the twenty-five vessels in the port of New Bedford January 1, 1874, three were sold, fourteen fitted for whaling, and eight still remain in port, of which five are for sale. Of the seven at New London January 1, 1874, four have been sold for whalers and three are still in port. Of the nineteen whalers now in this port thirteen will probably be fitted before the close of spring, and of the thirty-five vessels to arrive in 1875 nearly all will be sent to sea again.

The absence of any unusual features in the business is noticeable. There have been but few losses at sea, and vessels in the Arctic regions have been quite free from disasters.

Our present fleet is 163 vessels, against 171 a year ago, 203 in 1873, and 218 in 1872, and the number at sea January 1, 1875, was 119 vessels, against 123 a year ago and 155 in 1873.

The fleet in the Arctic Ocean the past summer met with good success during the latter part of the season, fifteen ships taking an aggregate of 17,480 barrels of oil and 189,500 pounds of bone, being an average of 1,165 barrels of oil and 12,633 pounds of bone, about double that of the previous year. Three vessels on Kodiak and in Bristol Bay took 2,625 barrels of oil, an average of about 875 barrels each, and 7,667 pounds of bone.

The Ochotsk Sea whaling was a failure, nine vessels taking unitedly but 2,805 barrels of oil and 34,600 pounds of bone, the whales, formerly plenty in that locality, apparently having been exterminated or gone to other parts. Although occasionally a season in the Arctic Ocean is partly a failure, judging from the present and past it would seem reasonable that a moderate number of ships could continue to prosecute their voyages in that ocean for many years to come, and considering the advancing price of the products obtained, particularly of whalebone, we do not believe our merchants will allow this branch of our business, once so remunerative, to be entirely given up.

Right whaling on Desolation and the Crozettes has been neglected during the past year, and the number of vessels in Cumberland Inlet and Hudson Bay has been very small, with a moderate catch.

Humpbacking has been prosecuted on the coast of South America, in Panama Bay, about the islands of the South Pacific Ocean, and on the coast of Africa, with about the usual success.

Sperm whaling has made rather a better exhibit than for two or three years previous, although good catches have been confined rather to certain localities, than general throughout the different oceans. The best account came to us from the North Atlantic, where a number of vessels took large fares, while many others on the same or adjacent grounds were not fortunate in finding whales, the distribution of catches being quite unequal. On the west coast of South America and the off-shore ground whales seem plentier again and vessels have done well. In the South Atlantic and in the Indian Ocean the fleet have met with average success, while on New Holland and the grounds in that vicinity whales have been unusually scarce. New Zealand has yielded but poorly during the past year, and but few vessels in that locality are doing well, which leads us to remark that at present there appear to be no whaling grounds that will support a large fleet for any great length of time; and in this respect our errors in the past should be guides for our future.

The fleet during the coming year will be distributed nearly as follows: North and South Atlantic, 68 vessels; Indian Ocean, 17 vessels; Pacific Ocean and New Zealand, 33 vessels; Cumberland Inlet and Hudson Bay, 4 vessels; North Pacific, 18 vessels.

The demand for oil and whalebone has continued good throughout the year, the markets having been without marked fluctuations, and with prices slowly but steadily advancing. With an increased importation of sperm oil during the coming year it would be natural to look for a decrease in price, but whale oil, considering the present prospects of lard and other oils, seems quite low; while whalebone, with a constantly reduced importation, ought to command good figures.

The price of sperm oil January 1, 1874, was $1.50, having been depressed by the recent panic. It rapidly recovered, however, and in a few weeks advanced to $1.67½ (the highest prices for the year usually prevailing about that time), dropping to $1.60 in April, continuing to decline till June, when it reached $1.50. During the remainder of the year its course was gradually upward, standing at $1.57 in August, $1.62½ in October, and closing the year at $1.70, the highest price reached since the month of October, 1869, a period of more than five years.

Whale oil opened the year at 61 cents for Arctic, slightly declining during the summer months, and closed the year at 67½ cents, at which price it would be difficult to purchase.

Humpback and South Sea oil during the year have varied from 54 @ 64 cents, closing at the latter figure.

Whalebone opened at $1 @ $1.10, continued firm throughout the year, and advanced during the fall months to $1.25, which price is still maintained.

It will be seen by our last annual review that our estimate of importations for 1874 approximated to the result, except in the quantity of whalebone, caused by shipments overland during the month of December (about 85,000 pounds), and received here in advance of the usual time.

TRADE REVIEW FOR 1875.

Review of the whale fishery for 1875.—The year just closed has been quite free from disasters to the fleet at sea, and no great changes have taken place in the business. Gains and losses have been about equally divided, the arrivals at this port during the year showing eighteen voyages that were fairly profitable and sixteen that resulted in quite a large average loss, but with a revival of business throughout the country we anticipate better results in the future.

Of the eighteen vessels in port at New Bedford January 1, 1875, sixteen have been fitted for whaling and two are now in port. Of the ten whalers now in this port eight will probably be fitted during the season, and of the twenty-five vessels to arrive here this year nearly all will go to sea again. Some vessels may possibly be added to the fleet from the merchant service; but as such ventures are attended with so heavy an outlay for repairs, alterations, and whaling inventories, it is not probable that many such additions will be made.

The present whaling fleet is 169 vessels, against 163 January 1, 1875, 171 in 1874, and 203 in 1873, and the number at sea January 1, 1876, was 137 vessels, against 119 a year ago, and 123 in 1874. Any further increase in the fleet must necessarily result in lower prices for oil.

Right whaling makes a good exhibit for the year, vessels in the Arctic Ocean having been very successful, thirteen vessels taking 18,000 barrels whale and walrus oil and 180,030 pounds whalebone, an average of 1,384 barrels oil and 13,848 pounds of whalebone. Three vessels on Kodiak and Bristol Bay took 3,980 barrels whale oil and 45,430 pounds whalebone, thus making for the fleet an average of 1,374 barrels whale and walrus oil and 14,091 pounds of whalebone, the largest average of any season since the year 1850.

As we stated in our review last year, we do not believe Arctic whaling will be given up, and certainly the whales have never been plentier on these grounds than during the past season. The fleet have all come out safely, except the bark Desmond, which is supposed to have been obliged to winter there.

A few vessels in Hudson Bay and Cumberland Inlet have had fair success, while right whaling in the southern oceans has been neglected. Humpbacking has been very successful on the coast of South America, while in other localities the catches have been moderate.

Sperm whaling has been only moderately successful, there having been but few large catches the past year. Vessels have done best on Chili and the off-shore ground, while elsewhere the average has been moderate. A summary is as follows: On Chili and off shore, seventeen vessels cruised, taking 7,010 barrels sperm, an average of 412 barrels; on New Zealand, seventeen vessels took 6,095 barrels, making an average to each of 358 barrels; in the Indian Ocean and on New Holland there were thirteen vessels, taking 4,335 barrels, an average of 333 barrels, and in the North and South Atlantic Oceans, eighty-seven vessels with a catch of 19,405 barrels, averaging 223 barrels, the last named being for an average period of about ten months, as many of the fleet winter in port. With any increase of the fleet a smaller average catch may be looked for, and it will be already seen by reference to our columns that the number of vessels at sea which have obtained 1,000 barrels or more of sperm oil is smaller than for many years.

The distribution of the whaling fleet for the present year we estimate as follows: North and South Atlantic, 77 vessels; Indian Ocean and New Holland, 15 vessels; New Zealand, 13 vessels; Pacific coast and off-shore ground, 23 vessels; North Pacific, 18 vessels; Cumberland Inlet, 4 vessels.

The number of vessels estimated to arrive at this port the coming year is twenty-five, of which apparently thirteen will be good voyages, while twelve will show a loss, the net results being much the same as for the past few years.

The demand for oils and bone has been fair throughout the year past. Sperm oil opened in January at $1.70, with a very small stock on hand, and was held at $1.80 @ $1.85 in March, and at $1.90 in April. Few sales could be effected at these figures, and the price gradually declined to $1.47 @ $1.50 in midsummer, remaining at about these figures until December, when it advanced to $1.60, closing the year at that price, at which, however, there were more sellers than buyers. Whale oil opened the year at 67½ cents per gallon for Arctic, advancing to 70 cents in January, declining to 63 @ 65 cents in May and June, and in September advancing again to 70 cents, at which price it continued to the close of the year. Humpback and South Sea oils have continued at 60 @ 65 cents through the year, with little variation. Whalebone opened at about $1.20 per pound for Arctic, and continued firm during the year, advancing in the fall months, and finally closing at $1.30.

By reference to our last year's review it will be seen that our estimate of importations are not far from the result, except in whalebone, caused by shipments overland in advance of the usual time. Our figures are made after careful consideration, and we are not swayed by the interests of either importer or purchaser.

TRADE REVIEW FOR 1876.

Review of the whale fishery for 1876.—During the year but few disasters were reported among whalemen until late in the fall, when news reached us of the destruction of a number of the Arctic fleet, and the probable loss of many lives, which cast a cloud of sadness over the community.

The success of the business the past year has been fair, the arrivals at this port showing nineteen profitable voyages, while fourteen resulted in a loss, this being fully up to the average of late years.

The building of ships for the whaling service marks a new era in the business, and is an encouraging feature. We welcome them as adding to the character of the fleet, which has suffered of late by the adding of worn-out merchant vessels which obtain insurance at the same rates as new ships just from the stocks.

The present whaling fleet, after deducting the recent losses in the Arctic Ocean, is 172 vessels, against 169 January 1, 1876, 163 in 1875, and the number at sea January 1, 1877, was 146 vessels, against 137 a year ago, and 119 in 1875. Five barks are being built for the business, and others will follow, while from the merchant service there is a prospect of adding a number of vessels, thus making the fleet larger than it has been for years. Should the catch be proportionate to the number of vessels in the business, the importation of oil would be in excess of the demand, but all our past experience has shown that, with an increase of the fleet, many of the whaling grounds are overcrowded, and the result is a smaller average to each.

The Arctic Ocean has again been a scene of disaster. Of a fleet of twenty vessels, twelve were lost or abandoned in the ice, and while the masters with most of the officers and crews were enabled to escape, more than fifty men were left behind who were unequal to the exertion necessary to save their lives. But the sad and fatal result of pushing too far north will, we hope, be a lesson to our whalemen in future not to venture where there seems hardly a chance of escape when opposing circumstances arise.

The average catch of the vessels not lost, including two on Kodiak and Bristol Bay, was 656 barrels oil and 4,225 pounds whalebone, aggregating to eight vessels 5,250 barrels oil and 33,800 pounds of bone. A few vessels cruised in Hudson Bay and Cumberland Inlet with fair results. Humpbacking has been neglected the past year, except on the African coast, where the catches were unusually good.

In sperm whaling the success has been varied, vessels having been fortunate in the North Atlantic, on Chili and the off-shore ground, while in other quarters the catch has been moderate or quite small. In the North Atlantic upwards of 13,000 barrels of sperm oil were taken, a larger yield than for many years. Whales were plenty, and many vessels took large fares. On Chili and the off-shore ground the fleet were very successful, nearly every one getting an unusual catch, while on New Zealand the results have been moderate. On the River Plate a few vessels did very well, but the majority took but little oil, and on the Congo River, with two or three exceptions, the fleet

has done poorly, it being a small ground and overcrowded with vessels. In the Indian Ocean we cannot report anything better, there being too large a fleet, and consequently the catch has been very small. There is a growing tendency of late years for ships to congregate on small grounds, in order to look for the oil which somebody caught the previous year, and a persistence in this course ruins our best whaling opportunities. The success of the vessels in the Pacific Ocean is largely due to their character and appointments. They are the crack ships of the fleet, have been many years in the service, and consequently have vastly superior opportunities for being well commanded, officered, and manned.

For the coming year the whaling fleet will be distributed about as follows: North Atlantic, 80 vessels; Congo River and coast of Africa, 20 vessels; Indian Ocean, 16 vessels; New Zealand, 15 vessels; Chili and off shore, 20 vessels; Sooloo Sea, 3 vessels; North Pacific, 20 vessels; Cumberland Inlet and Hudson Bay, 5 vessels.

The number of vessels expected to arrive at this port the coming year is twenty-two, of which nine will apparently make good voyages.

Oil and bone have been in moderate demand. Sperm oil opened the year at $1.60, declined to $1.42 in April, $1.36 in May, $1.25 in the summer months, and in the fall advanced to $1.40 per gallon, which was maintained to the close of the year. Whale oil opened at 70 cents, declined to 58 cents in the summer and fall months, and in October advanced to 70 cents, at which price the year closed. Humpback and South Sea oils have corresponded to the price of whale, selling generally at 5 cents less per gallon. Whalebone, from $1.30 in January, advanced to $1.60 in February, and $2 in March, at about which figure it continued till news reached us in October of the loss of the Arctic fleet, when it advanced to $2.50 and later to $3.50 per pound, at which price the year closed.

TRADE REVIEW FOR 1877.

Review of the whale fishery for 1877.—The past year has been free from especial disasters, and there have been no changes in the business worthy of note, except the continued additions made to the fleet.

Ship-building has revived, and twelve whalers were built during the year, it being now apparent that at the present prices new vessels can be built cheaper than merchantmen can be altered into whale ships.

The present whaling fleet is one hundred and eighty-seven vessels, against one hundred and seventy-two January 1, 1877, one hundred and sixty-nine in 1876, and one hundred and sixty three in 1875; but, although the increase is mostly in the sperm-whale fleet, the catch of the past year is not greater than for 1876, on account of some of the grounds being overcrowded with vessels. The present tendency being to cruise on those grounds nearest home, so that the catchings may be shipped at the earliest moment, we find in the North and South Atlantic Oceans a fleet of one hundred vessels, while the more fruitful grounds of the Pacific Ocean, Japan, New Zealand, and Sooloo Sea are almost neglected. The constant shipments of sperm oil have been largely instrumental in reducing the price to the present figures, which are the lowest reached for many years, and are much below the cost of catching oil, excepting the vessels that are very fortunate.

The frequenting of ports in order to ship oil is the cause of a large part of the expenses to which whaling voyages are subject, and occasions the loss of officers and crews. In view of these facts and the low prices of sperm oil now ruling, we understand several of our merchants have advised their vessels to retain their oil on board when possible, and no doubt this example will be followed by others.

The North Pacific whaling fleet was very successful the past season. The catch was small until September, when whales were found plenty, and large fares were taken. Three vessels were lost, and sixteen vessels came out with an average of 1,065 barrels of oil and 8,550 pounds of whalebone. Arctic whaling is now safer, because of caution borrowed from the experience of the past, and we trust it will be long before we record any unusual losses in that ocean.

In Hudson Bay and Cumberland Inlet but few vessels have cruised. In the South Atlantic many sperm whalers, on account of the low price of sperm oil, have tried right whaling with good success, the value of the whalebone being the chief incentive. About a dozen vessels have cruised for humpback oil, with good success, their total catch being 5,500 barrels.

In sperm whaling the results were varied, the catch in the North Atlantic Ocean being 13,500 barrels by eighty-two vessels, the largest fare taken for many years. The vessels that were well pointed were generally successful, but the presence of so large a fleet in one locality will result soon in smaller catches, and the experience of ten years ago is likely to be repeated.

The fleet on Chili, the off-shore ground, New Zealand, and in the Sooloo Sea have taken good catches. In the South Atlantic vessels have had fair success, the fleet being rather large, and in the Indian Ocean, with too large a fleet, but little oil has been taken. At the present time not a vessel is cruising in the Western Pacific Ocean and Sooloo Sea, and those excellent grounds bid fair to be entirely neglected. Large catches of sperm oil are becoming infrequent, and it is noticeable that during the past year no vessel has obtained 1,000 barrels, while in previous years several vessels have generally exceeded that quantity.

Oils and bone have been in fair demand throughout the year. Sperm oil opened in January at $1.40 per gallon, declined to $1.31 in February, $1.28 in March, $1.18 in June, $1.12 in August, $1.10 in November, and to $1.03 in December, closing the year at $1.03½, the lowest prices that have ruled for more than twenty years. Arctic whale oil, from 70 cents in January, gradually declined to 60 cents in July, at which price it closed the year. Humpback and South Sea oils have ruled at from 5 to 10 cents per gallon less than Arctic.

Arctic whalebone opened the year at $3.50 per pound, declining to $2.50 in August, and to about $2 in October, closing the year at about the latter figure. South Sea whalebone has sold at from $1.25 to $1.70 per pound.

TRADE REVIEW FOR 1878.

Review of the whale fishery for 1878.—The result of the year's business is far from being satisfactory, the catches of the fleet having been moderate and the prices of oil low. Of the vessels arriving during the year a majority had taken too small a quantity of oil to reimburse their cost even at higher prices, and those which brought good voyages netted but little profit to their owners. The number of disasters to the fleet has not been large, good weather having generally prevailed except in the North Atlantic Ocean, where, during the past few months, storms have been unusually severe. The new vessels added recently have improved the general character and average quality of whale ships, but it is to be regretted that so many vessels in an unseaworthy condition are sent out upon whaling voyages.

The whaling fleet at present numbers one hundred and eighty-six vessels, against one hundred and eighty-seven a year ago, and one hundred and seventy-two in 1877. The increase during the past four years has resulted in losses to those engaged in the business, and the average catch on the different grounds has been sensibly diminished, while, to add to the existing depression, there has seemed to be almost a rivalry as to whom shall offenest ship home their oil, and thus assist in reducing prices already too low.

The results of sperm whaling have not been encouraging. With too large a fleet on nearly all the grounds, catches have everywhere been small, with the exception of a few good fares in the high latitudes of the North Atlantic, and off Patagonia on either side of Cape Horn. The total amount of the catch reported during the year is several thousand barrels less than during 1877, and it is evident that with the continued scarcity of whales there must be a large reduction in the fleet to make the business profitable.

In right whaling, although the amount of oil and bone taken was not large, the result has been better on account of the unprecedented high price of whalebone. The Arctic Ocean fleet lost but one vessel, and averaged 856 barrels of oil and 7,322 pounds of whalebone. Whales were not abundant, but, considering the varied character of the different seasons, it may be presumed that, with occasional fortunate years, whaling in that ocean will continue to be profitable. South Sea right whaling is attracting increased attention, and there is no reason why the Antarctic grounds should not be compelled to disgorge their valuable stores of whalebone. We expect during the next decade to see profitable whaling grounds brought to light in the high latitudes of the south, and success reward those who are pioneers in the enterprise. A number of whalers are wintering in Hudson Bay and Cumberland Inlet, several of which cruised off Greenland for right whales during the summer, but without success. No doubt whales will yet be taken in great numbers around Spitzbergen and Nova Zembla, where the English and Dutch ships took such large quantities of oil and bone during the early part of the present century, and the field remains open for those who will assume the risk. Many vessels have been humpbacking during the year on account of the unusually low price of sperm oil, and have met with fair success.

We are pleased to note an increased traffic between New Bedford and the Azores, but regret to learn of greater stringency at those islands in the enforcement of tobacco regulations. When ships are detected in smuggling it is but just they should pay the penalty attached, but it seems a relic of by-gone ages to subject inoffensive vessels to a rigid search for tobacco, and to impose heavy fines on such as are found with small quantities in the possession of the crew, for which the master cannot be accountable. If such arbitary measures are persisted in, our whalemen will seek other ports for the transshipment of their oil and the recruiting of their vessels.

There has been no great change in the consumption of oil, the usual quantities having been consumed in this country and in Europe. In San Francisco there appears to be an increased demand, and all the importations through that port, both sperm and whale, find a ready sale.

The demand for sperm oil and whalebone has been good throughout the year, while whale oil seems to be neglected.

Sperm oil opened in January at $1.03½ per gallon, declined to 94 cents in April, 86 cents in June, advanced to 90 cents in July, and 92 cents in August, declined to 86 cents in September, 82 cents in October, and 80 cents in November, and advanced to 85 cents in December, closing the year with 87 cents offered, with no sellers under 90 cents. The price touched in November, viz, 80 cents, was the lowest known for thirty-five years.

Arctic whale oil opened the year at 60 cents, gradually declining to 39 cents at the close. South Sea and humpback oils have been quoted generally at about 5 cents per gallon less than Arctic.

The price for whalebone is without precedent. Opening the year at about $2 per pound for Arctic, it declined to $1.65 in February, from which figure it steadily advanced, closing in December at $3.25. South Sea whalebone has commanded about two-thirds the price of Arctic.

Referring to our estimate of imports for 1878, it will be seen, especially in sperm oil, that our calculations were correct, the predictions of dealers and correspondents in neighboring cities to the contrary notwithstanding. We find it more difficult than usual to calculate the importation for 1879, as the expressed determination of many of our merchants to retain sperm and whale oil on board their vessels, because of the low price at home, may possibly result in reducing the importation below our estimates. At the close of 1878 the quantity of sperm oil landed at the Azores and in transit was about the same as a year ago, viz, nearly 4,000 barrels. The import of whale oil for 1879 will be lower than in any previous year, on account of the sale at San Francisco of about one-half of the catch of the Arctic fleet.

TRADE REVIEW FOR 1879.

Review of the whale fishery for 1879.—The past year has not been marked with any unusual features, except the low prices of oil that have prevailed. More than the ordinary number of disasters has occurred, but no serious calamity has overtaken any special portion of the fleet. Of the arrivals, several have taken good cargoes of oil, but the majority have done poorly.

The continued depression in whaling interests has at length been checked by the retirement of a large number of vessels, now lying at our wharves, assisted by the general revival of business throughout the country, and it is possible that with a moderate number of vessels engaged whaling may again become fairly profitable.

The business, however, is subject to many serious drawbacks, some of which, if not corrected, bid fair to impair its success. Chief among these are the influences at those ports where officers and crews are constantly leaving vessels, causing a large expense in replacing them, and the frequency with which officers are sent out to join ships during their voyages indicates that the control of a whaleship is only to a limited extent in the hands of its owners. By united action among our merchants it is possible to check these disorders, and protect themselves against the losses occasioned by wholesale desertion from whaling vessels, which is too often fostered by those who are in duty bound to act otherwise. San Francisco being a port of discharge, the above would not apply to the Arctic whalers visiting that port.

The present whaling fleet consists of one hundred and seventy-eight vessels, against one hundred and eighty-six a year ago, one hundred and eighty-seven in 1878, and one hundred and seventy-two in 1877, showing a considerable net increase during the past few years.

Sperm whaling has not been attended with great success, the whales being scarce on nearly every ground, owing to the size of the fleet. No very large catches have been obtained, the best fares, perhaps, having been taken in the South Atlantic, off the coast of Africa.

Right whaling has yielded better results, the Arctic fleet averaging 951 barrels of oil and 11,000 pounds of whalebone, the best exhibit for many years. One vessel was lost, and two others are supposed to be frozen in the ice. Even should these vessels be lost no apprehensions are felt for the safety of those on board, as they are commanded by experienced Arctic navigators, who are equal to almost any emergency, and the near presence of the exploring steamer Jeannette is an additional safeguard. In the South Atlantic the fleet met with fair success, as did also some of the vessels in Hudson Bay and that vicinity. Humpbacking has been followed with average success, and is at present in better favor on account of the high price of the oil. The price of whalebone has stimulated both northern and southern right whaling, of which many vessels have availed themselves to their advantage during the continued scarcity of sperm whales.

The export of sperm oil has fallen off the past year, principally owing to the large purchases the previous year, 1879 opening in England with a stock of 20,000 barrels and about 7,000 barrels then being in transit. Of the 35,000 barrels estimated to arrive the coming year, it is probable the greater portion will be needed for home consumption. During the fall, when the price remained at 71 cents per gallon, our manufacturers purchased freely, it being very evident that it must advance in sympathy with other merchandise, and they were rewarded for their enterprise by largely increased sales to consumers at better rates.

Sperm oil opened the year at 90 cents per gallon, advanced to 94 cents in February, and from that time gradually declined to 70 cents in September, remaining at those figures during that month and through October, advancing in November to $1 and closed the year with offers at an advance on the latter figure, holders, however, asking from $1.05 to $1.10. Present prospects point to a gradual advance during the year, and as it has been proved that the oil cannot be produced at a less cost than $1.25 per gallon, owing to the heavy advance in the cost of outfits, owners of vessels arriving will not incline to send them to sea again unless they are confident a paying price can be obtained.

The present stock, consisting of about 16,000 barrels, a portion of which is of inferior quality and unsuitable for export, is probably sufficient to supply the demand until the new oil commences arriving in May, being at a period rather later than usual.

Arctic whale oil opened the year at 38 to 40 cents per gallon, at which figures it remained until October, when a gradual advance in oils having taken place, quotations gradually rose to 55 @ 60 cents at the close of the year, there being no stock on hand except some lots that have remained on our wharves many years.

South Sea and humpback oil opened in January at 35 cents per gallon, declined to 32 cents in June, gradually rose to 40 cents in October, to 50 cents in November, and 59 cents in December, closing the year at the latter figure, a most gratifying fact after the depression of the last two years.

Arctic whalebone from $3.25 per pound in January, declined to $3 in March, $2.50 in June, $2 in September, and to $1.90 in November, advancing in December to $2.25, at which price purchases could not be effected at the close of the year. South Sea whalebone from about $2.50 per pound in January, declined to $1.70 in June, $1.50 in September, and then advanced, closing the year with sales at $1.90 per pound.

Referring to our estimate of imports for the past year, our calculations were correct as regards sperm and whale oil. The importation of whalebone slightly exceeds our limit, it being difficult to foresee the success of the Arctic fleet.

TRADE REVIEW FOR 1880.

Review of the whale fishery for 1880.—The year 1880 will be long remembered as a remarkable period in the business enterprises of the country, and although the wave of prosperity that has swept over the United States has not placed whaling interests in a profitable position, we cherish the hope they may yet be benefited.

The business has been, to a certain extent, changed during the past two or three years by the constant retirement of vessels, of which twenty-eight now lie at our wharves and a few others have been sold. Of the number to arrive the present year many will be retired, and the fleet bids fair to be much reduced. Right whaling is now the order of the day, as its prospects appear better than catching of sperm oil at present prices, and if the sperm whales are neglected for a time, who knows but that we shall find them after a while as abundant as a few years since.

Large fares of whale oil are more easily taken than of sperm, and the business is of a more lively and exciting nature, while the usual high price of whalebone makes it more profitable. May success attend the efforts of the many vessels who are to follow that branch of the fishery during the present and coming years!

Our present fleet numbers 177 vessels at sea and in port, against 178 last year, 186 in 1879, and 187 in 1878.

Sperm whaling has not been a success, vessels in the North Atlantic making a fair average, and those on River Plate and Tristan doing poorly, while on the coast of Africa catches were good, and some vessels took large fares. On New Zealand the fleet met with poor success, excepting one vessel, and on Chili sperm whales were not so abundant as formerly. Near Gallipagos Island and vicinity two vessels did well, and the Indian Ocean and New Holland were entirely neglected. The continued low price for sperm oil and the scarcity of whales have discouraged many who have long followed this branch, and the success of right whalers induces them to change to that which appears more remunerative.

Right whaling has yielded good results. In the Arctic Ocean whales were very abundant, and the quantities of oil taken were limited by the size of the vessels and the number of casks, the fleet averaging 1,400 barrels of oil and 22,000 pounds of whalebone, being the handsomest return for many years. No traces were found of the two whalers missing the year previous. In the different southern oceans right whaling was prosecuted by a large number of vessels with varying success, and during the summer large catches of humpback were made on the coasts of South America and Africa, the high price compared with other oils stimulating many in that direction.

Sperm oil opened the year at $1 per gallon, advanced to $1.07 in March, declined to $1.02½ in May, and to 87 cents in July; advanced to 90 cents in August, to 95 cents in September, and to 98 cents in October, closing the year at the latter figure. The stock of crude oil in hands of importers, manufacturers, and others, both in Europe and this country, is much less than at this time last year. The quantity afloat is 4,500 barrels less.

The consumption of sperm oil has been fully equal to that of the past few years, and possibly somewhat increased, and in Europe it is expected the figures when received will show that the consumption there was nearly if not quite up to the average of previous years.

Arctic whale oil opened the year at 60 cents per gallon, declined to 50 cents in April, and to 46 cents in May, advanced to 55 cents in August, and declined to 50 cents at the close of the year. South Sea and humpback oils have sold at from 2 to 3 cents less per gallon than Arctic.

Arctic whalebone was at $2.25 per pound in January, $2 in May, and $2.30 in June, advanced further to $2.50 in August, but declined in November to $1.30, closing the year at that figure, the heavy catch weakening the market. The price of South Sea whalebone has ruled at about 25 cents per pound less than Arctic.

TRADE REVIEW, 1858 TO 1881.

The Oil, Paint, and Drug Reporter, of November 23, 1881, gives the following interesting review of the whale fishery in an article entitled "Whale and sperm oils":

The appearance of large bodies of whales in the Atlantic along the United States coast during the summer and up to a very recent date has suggested the possibility of resuming operations on the ground abandoned years ago. The reason, perhaps, that the presence of those whales has not attracted more attention is that they belong to the humpback [mostly finback] species, which produce no whalebone, and therefore are not a profitable catch except in times of high prices. The only demonstrations that have been made against them so far have been the shooting of a few in Provincetown Harbor, Massachusetts, and the fitting out of a schooner from that port. This vessel cruised along the coast of Maine during the summer and took about 100 or 150 barrels humpback oil. This result was not sufficiently alluring to induce others to follow the example of the owners of the schooner, though we believe a menhaden steamer did cruise in the neighborhood of Block Island for a time without making a haul. The recent appearance of a large school of sperm whales in the Middle Atlantic, however, suggests the idea that the whaling industry might be profitably revived in these waters at no distant day. There are many considerations to be taken into account before such a venture could be made, the most important of which are the prices that can be obtained for the oil. Since the time when whale and sperm oils began to be supplanted by cheaper illuminating and lubricating oils, the whale fisheries have been, naturally, on the decrease, as the result of competition has been to force prices down to a point barely covering the cost of catching. The cost of catching sperm oil largely depends, of course, upon the price of labor at the port where the vessel is fitted out and the cost of such fitting out, an important article of which is the provision, which, for a long voyage, such as is now made, is composed largely of salt pork, beef, and canned goods. The lowest prices at which sperm oil can now be laid down in New Bedford is variously estimated at 90 to 95 cents per gallon, which at the best prices at present obtainable for export or home consumption leaves a very small margin of profit to the whalemen. The profits in right-whale oil fishing are largely dependent upon a freak of fashion. At first sight such a statement might seem somewhat ludicrous to the ordinary reader, but nevertheless the change in the mode of female attire plays an important part in the market rates of whale oil. If it is the fashion to wear much whalebone in articles of dress, then the demand for that article becomes of such importance that the whale-catcher derives a sufficient profit from its sale to render the price of oil a matter of secondary importance. But it would require an enormous demand for whalebone to do away with the necessity of obtaining something for the oil, and although the fashion in dress for a number of years past has required the annual use of immense quantities of whalebone, still this has not been sufficient to keep the whaling industry from going into a decline, because a sufficient return could not be had for the oil. As sperm oil has to depend upon its own merits, the sperm whale yielding no other valuable product, its competition with other oils has seriously detracted from its importance, and at the same time reduced the profits of the industry to a point, as we said above, a little more than half the cost of catching. * * *

The annual report of the New York Chamber of Commerce for 1858, in commenting upon the condition of the whale fisheries during that year, says:

"The prospects for the coming year are far from flattering, but upon the whole, perhaps not less encouraging than at the commencement of the year that has now passed. There will, from present appearances, be a further diminution of vessels employed in the fleet, and with a diminished competition the business may again regain a healthy state. Other fields of enterprise now opened and opening present better opportunities for investment than are now offered in the whale fishery."

It was about this time that petroleum oils for illuminating and lubricating purposes were beginning to attract attention, but they had not yet attained much commercial importance. The same authority quoted above, in its review of the industry for the year 1861, says:

"The average price of whale oil has been something more than 5 cents per gallon less than the year 1860. This has been owing to the introduction of petroleum and kerosene oils, which have in a great measure taken the place of whale oil for illuminating purposes."

The first of hydrocarbon lubricating oils was produced at Mecca, Ohio. It is undoubtedly the best oil of its class ever put on the market; but, unfortunately, it did not last, and it is now almost forgotten. Small quantities of it are still produced by sand pumps, and find a ready sale at the wells at $40 per barrel. It was a natural oil, and when it first appeared on the market was of about 26 gravity. In 1866 or 1868, West Virginia natural oils first began to attract the attention of the oil trade. They were obtained mostly from shallow wells and were from 27 to 28 gravity. Their appearance on the market had a very serious effect on the sale of whale oil, for the railroad companies who had previously taken the latter for lubricating purposes, owing to the high cost of sperm oil, readily took the mineral oil at good prices, one road paying as high as $1 per gallon for it. The result was that whale oil steadily declined from $1.25 per gallon to about 70 cents, and it has never since (with the exception of a short time in 1869) got beyond that point. The West Virginia oils have deteriorated somewhat since then, and prices are, of course, much lower. The shallow wells are nearly all exhausted, and the oils now produced run from 33 to 40 gravity, though a small percentage of oil of a specific gravity as heavy as 29 degrees is still obtained. From the time of the introduction of the hydrocarbon oils, the importance of the products of the whale has steadily declined, and thus one of the largest industries of the United States has sunk, comparatively speaking, into insignificance. By the end of 1869 it began to be apparent that the business had entirely lost its former prestige, and very discouraging views of the future were entertained. From a review published at the beginning of 1871 we extract the following:

"The year 1870, like its predecessor, has been one of poor returns to those engaged in the whale fishery. The prices of our staples, which at the opening were considered unremunerative, steadily declined throughout the year, closing at the lowest quotation of any year since 1861. The decline in sperm oil was owing to the limited consumption of the article, together with a large stock on hand at the beginning of the year, and the unexpected large import, being about 10,000 barrels in excess of the estimate for the year, while whale oil and whalebone were similarly affected by the introduction largely of cotton-seed oil and a closed foreign market, caused by the European war, to which we export largely, especially of bone. We note that while the importation of seal oil has been restricted by a higher tariff, that cotton-seed oil has stepped into its place, and claims its share of consumption, which is by no means limited, 75,000 barrels, it is estimated, having been marketed the present year. * * * Our merchants do not look upon the future of whaling with encouragement, and seem disposed to distrust it as to its pecuniary results, induced more by extraneous causes than inherent, having to add to the list of its competitors lard, petroleum, and seal oil, that of cotton-seed oil, said by its advocates to be but in its infancy."

The importance of the competition with cotton-seed oil was not overestimated, as has been practically demonstrated since. Fish oil also has assumed an important place among the list of competitors. It is not astonishing, in view of all the circumstances, that the whale fishery should have ceased to exert an important influence upon the commerce of the country; but it has left many evidences of its former glory behind. Along our coast are a number of ports once teeming with life and activity, their inhabitants nearly all identified, in one way or another, with what was then one of the most remunerative industries of the United States. Now these ports are silent and deserted; their once busy wharves are vacant and fallen into decay; their streets are grass-grown, and most of their inhabitants have long since departed. In place of the numerous harbors affording shelter for the large fleet of whalers, one or two ports now suffice to shelter them all.

What possibilities there may be for a revival of the former greatness of the industry remains for the future to show; but so far as the immediate future is concerned there seems to be no good reason to believe that further depreciation in the value of whale or sperm oil will occur. Prices have at last touched "rock-bottom," and there are now indications of improvement. Foreign consumers manifest a strong prejudice in favor of these staples, and as long as they can be obtained at a reasonable price, an export outlet is assured. With regard to the home consumption, it is impossible, unless the production of mineral oils should greatly decrease, that it can ever again attain the prominence it once enjoyed. The hydrocarbon oils, which at first seriously interfered with the consumption of whale and sperm, now help it, as many of the manufactured mineral lubricating oils contain more or less of these products which are used to give body and weight to the lubricants. In this way, also, a certain outlet is assured. * * *

A factor in the whale-oil trade, which promises to attain some prominence in the future, is the shipment of oil by rail from San Francisco by tank cars. The project was first made known last fall at the close of the whaling season, but did not make much headway. This year it was renewed, but so far has met with little success, apart from exerting a depressing influence upon the Eastern markets. So far as we can learn there is not much oil to come that way, the bulk of the catch being shipped in the usual manner. It is likely that 5,000 to 8,000 barrels will be

marketed in San Francisco, and part of this may find its way East by tank cars. Some of this has already been sold, but it is impossible to tell how much. On its way to the East its arrival at different points on the route has been telegraphed here, and such information has usually been taken as indicating a new sale.

The following reviews for 1881, 1882, 1883, and 1884 are by Messrs. I. H. Bartlett & Sons, of New Bedford:

TRADE REVIEW FOR 1881.

Review of the whale fishery for 1881.—The year has been generally free of disasters, only four vessels having been lost. Otherwise there has been no special feature of note. Arctic whaling has yielded good returns, while sperm oil has not been found abundant. The most of the voyages closed during the year were successful, and the outlook for the future would be good if better prices could be obtained, and the business relieved of the many clogs and hindrances which have for many years oppressed United States shipping, and which have been so ably set forth in the recent report of the committee appointed by the New York Chamber of Commerce. Prominent features in that report were, the payment of three months' wages to discharged seamen, now exacted by no other nation, and the protection granted to deserters by consular authorities and foreign Governments.

The present whaling fleet numbers one hundred and sixty-one vessels, against one hundred and seventy-seven a year ago, a reduction of sixteen.

Sperm whaling continues to droop, and vessels have generally had but moderate success, those on the African coast and on Chili having made the largest catches, while in other quarters the year's work has been small.

Right whaling has been successfully prosecuted. The Arctic fleet took good fares of oil and bone, as our tables will show, remunerating those who invested their capital and labor in that direction, but we sadly record the evidence indicating there is no hope of finding alive the crews of the two whalers that were ice-bound two years since. We however welcome the news of the safety of a part or all of the Jeannette's company, and further tidings of them is now daily expected.

The price of sperm oil in January last was nominally 98 cents per gallon, but owing to the immense stock on hand sales could not have been effected to any extent at over 85 to 90 cents. The price declined to 80 cents in May and June, rose to 82½ cents in July, and gradually advanced till it reached 95 cents in October, at which price it closed the year, with some sales in the latter part at a slight advance on that figure. The incubus of stock that has for so long a time weighed like a wet blanket on our sperm-whaling interests has now been removed, and no mariner returning from a four years' voyage ever hailed with more satisfaction the sight of his home port, than do our merchants the contemplation of the fact that the stock of sperm oil for the whole of the present year will be less in quantity than the consumption of the last.

Whale oil opened the year at 48 cents per gallon for Arctic, dropped temporarily to 45 cents in May, advanced in June and July to 55 cents, and continued at about that figure the remainder of the year, closing at 53 cents. Humpback and South Sea oils have ruled at about 3 cents per gallon less.

The price of whalebone opened the year at $1.30 per pound, advancing soon to $1.75 to $1.90, and continuing at about these figures until fall, closing the year at $1.40. South Sea bone has sold for about 20 cents per pound less.

TRADE REVIEW FOR 1882.

Review of the whale fishery for 1882.—The year just closed has been without features of special note. Several vessels have been lost at sea, mostly in different localities, the only loss of life being the officers and crew of schooner Pilot's Bride, of New London. At home, the continued low price of sperm oil has discouraged those engaged in that branch of the business, and fast leading to its discontinuance.

The present whaling fleet numbers one hundred and forty-seven, against one hundred and sixty-one a year ago, of which number one hundred and five are now at sea. Many of these in port are to be withdrawn for merchant service, while others have become too dilapidated to warrant repairs.

Sperm whaling during the past year has continued to droop, only eight vessels having taken in excess of 500 barrels each, of which four cruised on the coast of Chili, and four in other localities. The owners, tired of small catches and ridiculously low prices, are changing their vessels to right whaling or withdrawing them from the business. Indications point to an import of 20,000 barrels for the present year, and a probable reduction in the future. As the oil cannot be produced at a less cost than $1.25 per gallon, we cannot blame our merchants for transferring their time and capital to other enterprises.

Right whaling has been prosecuted with fair success. Thirty vessels cruised in the Northern Pacific, averaging to each 767 barrels of oil and 11,730 pounds of whalebone, in addition to which they took on their between-season cruises an aggregate of 2,800 barrels sperm, 720 barrels whale oil, and 4,000 pounds of whalebone.

Two vessels were lost in the Arctic in the early part of the season by being crushed in the ice. If bad weather had not unexpectedly prevailed during the latter part of the season, the catch would have been much larger. Many additions are to be made to the fleet the coming year.

The Southern right whalers were quite fortunate, and fair catches were made on the Tristan grounds and other localities.

The consumption of our different products is an interesting subject, and one that requires from us some attention. It has always been our custom to report as the consumption for the year the amounts cleared from our import markets by the refiners and manufacturers, regardless of the stocks the latter were carrying at the close of the year. The

continuance of this custom led us to report for the year 1881 a consumption of sperm oil in this country of 25,275 barrels, and in England of 3,000 tuns or 30,000 barrels, an aggregate of 55,000 barrels, when actually the large stocks in refiners' hands a year ago makes it probable that the actual consumption was not much in excess of 40,000 barrels.

We give below a carefully made statement of the estimated actual consumption for 1882:

	Barrels.	
Crude sperm oil in importers' hands January 1, 1882		16,275
Crude sperm oil in refiners' hands in United States and England		16,300
Crude sperm oil imported into United States in 1882		29,875
Crude sperm oil imported into England from the colonies, &c		3,850
		66,300
Less stock in importers' hands January 1, 1883	20,100	
Less stock in refiners' hands in United States and importers' and refiners' hands in England	6,000	
		26,100
Net consumption for the year		40,200

Whale oil is rapidly absorbed as soon as it arrives in market, and whalebone has been used during the past year to a greater extent than heretofore.

Sperm oil, from 95 cents at the commencement of the year, advanced steadily to $1.05 in February, $1.10 in April, $1 11 in July, and then gradually receded, touching 96 cents at the close of the year.

Whale oil, from 53 cents in January, gradually advanced, touching 59 cents in September, and declining in December to 55 cents.

Whalebone opened the year at $1.40 and steadily advanced, touching $2.25 in October, and closing the year at $2.

The quantity of sperm oil at present on board of the whaling fleet is 5,300 barrels, against 12,000 barrels a year ago, being the smallest amount known in our experience.

TRADE REVIEW FOR 1883.

Review of the whale-fishery for 1883.—The past year has been one of loss to those engaged in this business, and its results have been discouraging. The failure of the Arctic season, with small catches in other localities, has brought but small remuneration to those who risk their capital in the whale-fishery.

The fleet now numbers one hundred and twenty-five vessels of all classes hailing from Atlantic ports, against one hundred and thirty-eight a year ago, and nineteen from San Francisco, as against eight last year. The number of vessels engaged in sperm whaling has been considerably decreased, owing to the low prices of oil, while, on account of the value of whalebone, agents are inclined to send most of their vessels to the Arctic Ocean and other right-whale regions. Indications point to a steady decrease in the number of vessels sailing from Atlantic ports, and perhaps a small increase in the number sailing from San Francisco for the Arctic Ocean.

A new feature of the past year arising from the increase of Arctic whaling at San Francisco has been the establishment of extensive works at that place for the manufacture and sale of whale and sperm oil, thus enabling the owners there located, as well as others who import oils at that place, to find a market without paying the heavy cost of shipping the same to the Atlantic seaboard. It is understood that the whole Arctic catch of oil, about 10,000 barrels, has been purchased at San Francisco at increased prices. Their works, in addition to large facilities for the manufacture of sperm candles, have a capacity of 150 barrels of oil per day, and are to be enlarged if the imports at that place and the sales of their products shall warrant.

Sperm whaling continues to decline, and no catches of any amount were made during the year except a few in the Atlantic Ocean, and two or three off Patagonia. The number of ships and barks now in that fishery at sea is forty-eight, most of which will follow right whaling during half of the year. The continued low price of oil will soon prevent the business being followed to any great extent.

Right whaling has been unfortunate, and the season in the North Pacific, owing to prevalence of ice and bad weather, was a failure. Thirty-eight vessels cruised there, three of which were lost, and the remaining thirty-five averaged 274 barrels of oil and 4,350 pounds of whalebone to each. The southern right whalers were not as fortunate as in the previous year, and their general success was moderate.

The price of sperm oil from 96 cents per gallon on January 1 rose to $1.05 in April and May, and from that time steadily declined, closing the year at 90 cents.

Whale oil from 55 cents in January continued at about the same price, with the exception of a rise to 59½ cents in April, until December, when on account of the demand at San Francisco it advanced, closing the year at 60 cents per gallon asked.

Whalebone opened the year at $2 per pound for Arctic, and with a few variations steadily advanced, until at the close of the year it sold at $4.75 per pound.

The purchases of sperm oil for consumption during the year have amounted to 32,200 barrels; the purchases of whale oil to 23,600 barrels, and of whalebone, 376,000 pounds; all the above being bought at Atlantic ports, besides the purchases at San Francisco of all their importations, and quite an amount of oil and bone belonging to New Bedford vessels.

Our figures of imports for 1883 do not include the oil and bone purchased at San Francisco, it being difficult for us, at this distance, to obtain the information with accuracy.

TRADE REVIEW FOR 1884.

Review of the whale-fishery for 1884.—Another year has passed, and its results, like its predecessors, have been unsatisfactory and discouraging to those who have continued to risk their capital in the whale-fishery. With two or three exceptions the larger class of vessels that arrived during the year made losing voyages, and with the discouraging features which still exist it is doubtful if they are soon fitted out again. Of the vessels in port one-half at least are known to be for sale, and of those expected to arrive during this year it is now intended that a number will be offered for sale.

The North Atlantic fleet was more fortunate on the whole than during the year previous, the smaller vessels doing the best. Some good catches of sperm oil were made on the west coast of South America during the months from April to October, seven vessels averaging 700 barrels, one taking 1,200 barrels, and three or four vessels did quite well on New Holland.

The season in the Arctic was better than that of 1883, but not fully satisfactory, except to some having steamers that penetrated the ice, which the sailing vessels considered unsafe to enter, thereby obtaining good catches. Thirty-nine vessels cruised there, and the only loss was the steamer Bowhead, of San Francisco, the first one built by the Pacific Whaling Company, and a fine vessel. Her catchings had been previously shipped home. The fleet averaged 527 barrels whale oil and 8,380 pounds whalebone.

Three vessels on New Zealand did well right whaling, taking an average of 700 barrels.

The total number of vessels of all classes engaged in the business is one hundred and thirty-three, of which nineteen hail from San Francisco, and all but one engaged in Arctic whaling. The decrease of the catching power during the year was 1,912 tons, the greater portion of which had been engaged in sperm whaling.

The present tonnage of the entire fleet is 31,207, of which 3,432 is at home ports. Of the remaining 27,775 tons, about one-half is exclusively engaged in Arctic whaling, one-quarter exclusively sperm whaling, and the remaining one-quarter sperm and right whaling; showing the tonnage engaged in sperm whaling to be about 10,400 tons, which is about 20 per cent. less than last year.

The consumption of sperm oil was well maintained, notwithstanding the depressed condition of business all over the country during the year.

The consumption of whale oil was curtailed in consequence of lack of stock, but very little of the Northern catch of 1883 having been sent to the Eastern market.

In consequence of the high price of whalebone, the consumption was not as large as the previous year.

The exports were less than previous years, especially of sperm oil, a large stock having been carried over in London January 1, 1884. The consumption in Europe of sperm oil reached 13,650 barrels, and the stock remaining on hand January 1, 1885, 426 tons, is about one-half of that on January 1, 1884.

Sperm oil began the year at 90 cents, touched 76 cents in November, and closed at 77 cents in December.

Whale oil began the year at 66½ cents, touched 57 cents in November, and closed at 54 cents in December.

Whalebone began the year at $4.75, touched $2 in October, and closed at $2.35 in December.

Our figures of imports include that imported into San Francisco by vessels owned there, which in former years were omitted.

We estimate the import of sperm oil for 1885 at 17,000 to 20,000 barrels; that of whale oil and whalebone will depend on the success of the Arctic fleet.

(*b*) STATISTICAL TABLES OF PRODUCTS AND VALUES.

Table showing the receipts from the American fleet, the exports, and the home consumption of sperm and whale oil from 1860 *to* 1884.

Year.	Sperm oil.			Whale oil.			Year.	Sperm oil.			Whale oil.		
	Receipts.	Exports.	Home consumption.	Receipts.	Exports.	Home consumption.		Receipts.	Exports.	Home consumption.	Receipts.	Exports.	Home consumption.
	Bbls.	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*		*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*
1860	73,708	32,792	38,507	140,005	13,007	143,009	1873	42,053	16,238	24,190	40,014	2,153	33,881
1861	68,932	37,547	31,091	133,717	49,969	105,839	1874	32,203	18,675	21,768	37,782	3,300	44,357
1862	55,641	27,976	27,759	100,478	68,583	67,254	1875	42,617	22,802	18,451	34,594	5,424	31,860
1863	65,055	18,366	32,527	62,974	11,297	65,352	1876	39,811	23,600	14,473	33,010	10,300	22,620
1864	64,372	45,000	30,190	71,863	12,000	62,528	1877	41,119	18,047	31,737	27,191	6,390	20,501
1865	34,242	20,158	27,666	76,238	1,660	64,107	1878	43,508	32,769	11,124	33,778	14,371	12,557
1866	36,663	10,630	19,133	74,302	618	69,534	1879	41,308	11,843	23,315	23,334	7,374	24,885
1867	43,433	25,147	22,986	89,289	18,253	58,836	1880	37,614	12,283	13,750	34,776	4,395	23,856
1868	47,174	18,916	23,258	65,575	9,885	72,390	1881	30,600	16,600	25,275	31,650	6,450	32,000
1869	47,936	18,645	17,239	85,011	3,842	56,236	1882	29,884	13,006	13,053	23,371	4,421	21,425
1870	55,183	22,733	28,812	72,691	9,872	68,452	1883	24,595	13,996	17,324	24,170	4,543	19,052
1871	41,534	22,156	33,528	75,152	18,141	63,011	1884	22,099	5,143	15,481	24,670	2,343	23,777
1872	45,201	24,344	24,052	31,075	1,528	42,852							

Table showing the receipts from the American fleet, the home consumption, and the exports of whalebone from 1865 *to* 1884.

Year.	Received.	Consumed.	Exported.	Year.	Received.	Consumed.	Exported.
	Pounds.	*Pounds.*	*Pounds.*		*Pounds.*	*Pounds.*	*Pounds.*
1865	619,350	394,200	202,000	1875	372,303	143,067	205,426
1866	920,375	420,175	521,400	1876	150,628	150,628	133,400
1867	1,001,397	181,631	717,796	1877	160,220	67,820	70,800
1868	900,850	246,986	704,882	1878	207,259	96,859	113,400
1869	603,603	197,101	311,605	1879	286,280	183,565	75,715
1870	708,365	255,347	347,918	1880	464,028	176,770	171,258
1871	600,655	319,856	387,199	1881	368,000	202,000	106,000
1872	193,793	74,141	177,932	1882	271,999	211,529	175,470
1873	206,396	155,351	120,545	1883	254,037	198,423	175,614
1874	345,560	200,807	165,553	1884	426,968	109,144	113,024

Table showing the value of oil and bone landed by the American whaling fleet, the value of the proportion consumed in the United States, and the value of the proportion exported during the years 1865 *to* 1880.

Year.	Value of oil and bone landed.	Value of oil and bone consumed in the United States.	Value of oil and bone exported.	Year.	Value of oil and bone landed.	Value of oil and bone consumed in the United States.	Value of oil and bone exported.
1865	$6,906,650 51	$5,564,786 26	$1,848,399 75	1873	$2,962,106 96	$1,947,037 50	$929,247 94
1866	7,037,891 23	4,766,597 88	1,591,727 82	1874	2,713,034 51	2,154,638 63	1,179,286 32
1867	6,356,772 51	3,189,220 19	3,034,987 12	1875	3,314,800 24	1,700,823 45	1,494,727 64
1868	5,470,157 43	3,568,082 30	2,106,985 72	1876	2,639,463 31	1,346,828 00	1,487,533 00
1869	6,205,244 32	3,013,426 34	1,554,956 25	1877	2,309,569 69	1,113,681 00	924,175 60
1870	4,529,126 02	2,896,883 19	1,476,864 85	1878	2,232,029 55	849,043 12	1,357,162 34
1871	3,691,469 18	2,798,408 97	1,479,153 69	1879	2,056,069 08	1,345,582 05	582,994 17
1872	2,954,783 00	2,081,468 87	1,374,098 37	1880	2,659,725 03	1,165,944 00	795,657 78

Table showing the average prices of sperm and whale oil per gallon and whalebone each month from 1868 *to* 1880. *

	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
January:													
Sperm oil	$2 00	$1 85	$1 52½	$1 25	$1 55	$1 50	$1 50	$1 69½	$1 60	.....	$1 04 8/10	$0 90	$1 04½
Whale oil	64	1 10	69	65	.....	66	61	66½	67½	$0 70	55	35	.....
Whalebone	.....	1 03	.....	.....	.....	1 10	.....	.....	1 15	.....	1 67½	3 00	2 39
February:													
Sperm oil	2 00	.....	1 54½	1 32	1 54	1 53	1 60	1 78	1 54	1 31	1 01 8/10	90	1 04
Whale oil	66	1 12	74	60	73	64	60	65	65	70	52	37	57
Whalebone	.....	1 14	.....	.....	.....	1 00	.....	.....	1 40	.....	1 69½	3 00	2 26
March:													
Sperm oil	2 00	1 93	1 54½	1 34	1 60	1 52½	1 66	1 84	1 50	1 25	1 03	85	1 06
Whale oil	70	1 13	75	62	71	68	63	66	62½	68	50	37	52
Whalebone	.....	1 28	.....	.....	.....	1 06	.....	.....	1 65	.....	2 10	2 95	2 10
April:													
Sperm oil	2 00	.....	1 40	1 28½	1 56	1 52	1 60½	1 80	1 43	.....	.....	81	1 02
Whale oil	73	1 05	69	58	69	66	63	65	62½	65	50	36	48
Whalebone	.....	1 20	.....	.....	.....	1 10	.....	.....	1 75	.....	2 65	2 82	2 02
May:													
Sperm oil	2 00	1 93	1 41½	1 26	1 53	1 48	1 55	1 70	1 37	1 20	94	77	1 02½
Whale oil	77	1 03	66½	55	69	62	60	65	55	63	45	35	47
Whalebone	.....	.....	.....	.....	1 55	1 10	.....	.....	.....	.....	2 50	2 50	2 00
June:													
Sperm oil	2 00	1 85	1 38	1 22½	1 40	1 42	1 52	4 55	1 35	1 19	87½	75	93½
Whale oil	80	1 03	63½	54	62	61	60	62	58	53	41	36	45
Whalebone	.....	1 25	.....	.....	.....	1 09	.....	.....	2 00	.....	2 40	2 50	2 18

* The following additional data have been received since the above was compiled: Average price of sperm oil per gallon in 1881, 88 cents; in 1882, $1.06; in 1883, 97 cents; in 1884, 85 cents. Whale oil in 1881, 48 cents; in 1882, 53½ cents; in 1883, 54 cents; in 1884, 56 cents. Whalebone per pound in 1881, $1.63; in 1882, $1.71; in 1883, $2.87; in 1884, $3.55.

Table showing the average prices of sperm and whale oil per gallon and whalebone each month from 1868 *to* 1880—Continued.

	1868.	1869.	1870.	1871.	1872.	1873.	1874	1875.	1876.	1877.	1878.	1879.	1880.
July:													
Sperm oil	$1 89½	$1 79	$1 33	$1 23	$1 38	$1 40	$1 55	$1 50½	$1 31	$1 16	$0 88	$0 75	$0 88⅛
Whale oil	80	1 04	66⅓	55	64	62	58	64	.. ..	50	41	35	50⅛
Whalebone	.....	1 28	... ...	... ..	1 18	1 10	.. ..	.....	2 00	... ...	2 83	2 50	1 88
August:													
Sperm oil	1 80	1 76	1 33	1 24	1 38	1 47	1 57	1 49	1 28	1 15	91⅖	75	90
Whale oil	85⅛	95	69⅓	84	64	63	58	70	55	51	43	35	53
Whalebone	.....	1 24	.. .	... ..	1 15	1 15	.....	.....	2 00	... ...	.....	2 30	2 45
September:													
Sperm oil	1 86	1 77	1 26	1 24½	1 35	1 50	1 61	1 48	1 27¼	1 11	87⅛	71	94
Whale oil	1 00⅛	1 00	64	55	64	61	57½	67	55	51	39	37	52⅛
Whalebone	....	1 32	.....	... .	1 15	1 12	.....	.. ...	2 15	... ..	.....	2 05	2 25
October:													
Sperm oil	1 95	1 75	1 23	26	1 35	1 42	1 64	1 48	1 40	1 09	82⅖	77	98
Whale oil	1 12¾	1 00	66½	66½	62	60	60	60	58	51	38⅖	39	55
Whalebone	.. ..	1 35	.....	.....	1 20	1 10	.....	.....	2 50	... ..	2 65	1 99	1 75
November:													
Sperm oil	1 80	1 72	1 23⅓	1 50	1 47	1 42	1 65	1 50	1 40	1 08	81⅓	1 00	98
Whale oil	90	92	63¼	75	66	52	61½	65	70	54	37½	48	50
Whalebone	.....	1 30	.....	.. ....	1 20	... ...	. ...	. .	2 90	...	3 00	2 00	1 30
December:													
Sperm oil	1 75	1 59	1 22	1 57	1 50	1 50	1 64	1 60½	1 40	1 03	83⅘	1 00	98
Whale oil	85	84	64	.....	67	62	64	70	65	55	35	57	50
Whalebone	....	1 10	.....	.....	1 18	1 02	....	.. .	3 25	.. ...	3 06	2 00	1 30
Yearly average:													
Sperm oil	1 92	1 78	1 35	1 35	1 45¼	1 48	1 59	1 60⅓	1 40½	1 13	91½	84½	99
Whale oil	82	1 01¾	67¼	60	65½	62	60⅓	65¼	56	52	44	39	51
Whalebone	1 02½	1 24	85	70	1 28⅓	1 08	1 10	1 12¾	1 96	2 50	2 46	2 34	2 00

Table showing monthly receipts of oil and whalebone from the whaling fleet of the United States from 1868 to 1880.

	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875	1876.	1877.	1878.	1879.	1880.
January:													
Sperm oil .. bbls.	2,538	2,713	253	2,596	1,357	903	.....	2,036	182	1,259	1,085	2,158	588
Whale oil .... do .	396	201	648	706	73	... ...	. ...	440	893	2,290	1,857	449	65
Whalebone .... lbs .	26,732	42,770	47,195	2,125	23,481	69,605	.....	179,425	72,403	21,944	48,757	21,528	12,123
February:													
Sperm oil.....bbls..	1,004	763	.....	1,086	595	1,802	1,046	840	1,406	1,811	2,761	123	475
Whale oil .....do .	... .	400	217	1,100	115	2,037	1,208	17	3,014	22	893	5,815	3,361
Whalebone ..... lbs	3,332	12,600	.....	124,000	.....	73,534	199,206	.. ...	.. ..	.....	.. ...		9,967
March:													
Sperm oil..... bbls.	720	708	1,817	486	1,014	864	38	. ...	899	1,241	373	2,618	... ..
Whale oil ..... do ..	7,997	2,174	8,975	2,980	1,182	2,557	120	117	353	3,078	3,095	350	1,396
Whalebone .....lbs..	168,422	17,800	94,996	42,056	.. ...	2,212	. .	... .	.. ..		395	...	2,225
April:													
Sperm oil.....bbls	3,424	5,112	4,730	2,373	2,240	2,791	960	2,179	2,674	1,789	443	5,246	85
Whale oil ..... do .	16,664	22,610	5,717	33,614	1,155	3,788	11,654	10,058	15,160	2,307	4,637	1,275	7,860
Whalebone ..... lbs..	257,565	365,763	105,785	319,967	2,855	4,850	18,709	2,940	14,600	.....	2,335	7,368	6,923
May:													
Sperm oil..... bbls..	4,305	3,131	13,481	3,453	7,007	6,133	4,363	5,746	3,383	2,351	4,587	4,046	5,162
Whale oil .....do..	19,669	22,043	20,537	9,407	5,601	10,169	2,968	12,086	3,136	4,602	2,872	1,956	4,149
Whalebone ..... lbs	249,030	25,736	60,170	37,945	.....	3,977	7,250	.. ..	300	4,189	.....	2,574	11,046
June:													
Sperm oil.... .....bbls..	5,324	6,301	7,498	4,200	6,889	11,369	4,024	3,468	3,954	8,693	8,231	3,513	8,182
Whale oil .....do .	5,745	5,684	17,203	7,642	8,839	7,298	7,088	1,905	3,228	4,915	2,709	1,460	6,877
Whalebone ..... .lbs.	7,461	19,830	222,715	8,904	4,162	3,592	1,350	595	561	20,117	14,384	28,579	16,408
July:													
Sperm oil.....bbls..	2,799	1,930	7,732	9,342	4,854	2,273	3,078	4,723	7,329	5,062	6,861	5,264	3,484
Whale oil .... do...	1,382	8,236	4,798	5,414	1,213	487	1,498	122	558	1,310	5,595	809	1,089
Whalebone .....lbs.	9,698	13,000	250	10,798	1,951	.....	.....	.....	1,680	3,141	22,442	5,018	4,881

Table showing monthly receipts of oil and whalebone from the whaling fleet of the United States from 1868 *to* 1880—Cont'd.

	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
August:													
Sperm oil.....bbls..	7,742	6,620	4,203	8,557	9,557	4,811	3,669	4,599	5,293	3,441	4,409	2,226	2,916
Whale oil ..... do...	6,105	9,256	3,041	3,862	5,662	3,501	2,547	804	816	1,911	4,459	1,969	1,624
Whalebone .....lbs..	21,042	28,608	.....	17,720	14,475	2,904	.....	.....	22,719	8,334	1,044	11,027	.....
September:													
Sperm oil..... .....bbls..	9,903	9,213	7,012	4,535	2,293	4,225	7,061	8,813	5,140	4,017	5,153	3,971	4,592
Whale oil .... do..	4,779	4,399	3,841	4,855	2,434	7,103	4,274	4,499	1,061	1,691	2,147	2,427	1,485
Whalebone .....lbs..	29,006	20,365	4,149	2,200	.....	25,422	3,967	18,652	.....	14,011	350	13,549	5,193
October:													
Sperm oil.....bbls..	6,690	3,444	7,366	2,017	5,182	3,295	3,646	3,395	3,844	4,279	3,520	3,695	4,228
Whale oil ..... do ..	1,972	5,401	3,237	1,950	4,013	1,604	4,383	1,858	2,683	3,576	1,555	210	3,501
Whalebone .....lbs..	2,932	22,795	41.105	27,244	9,877	.....	16,009	.....	1,400	18,411	15,290	59,650	19,150
November:													
Sperm oil.....bbls..	2,440	4,717	961	1,177	1,455	.....	4,318	79	3,215	5,266	4,740	2,074	3,519
Whale oil .... do...	866	3,191	3,953	3,589	704	560	772	2,344	1,431	750	1,982	5,308	605
Whalebone .. .. lbs..	13,630	29,336	66,000	7,696	2,092	.....	.....	28,295	22,655	3,300	42,629	31,534	135,600
December:													
Sperm oil..... bbls..	485	3,284	330	1,712	2,758	3,577	.....	6,739	2,492	1,910	1,345	6,394	4,383
Whale oil .... do..	.....	1,413	524	33	684	1,210	1,270	344	377	739	1,977	1,276	2,764
Whalebone .....lbs..	112,000	5,000	66,000	.....	133,900	20,300	99,069	142,396	14,920	66,773	59,633	105,453	240,512

RECAPITULATION.—(*Total receipts each year.*)

Sperm oil..... .....bbls..	47,174	47,936	55,183	41,534	45,201	42,053	32,203	42,617	39,811	41,119	43,508	41,308	37,614
Whale oil ..... do...	65,575	85,011	72,691	75,152	31,075	40,014	37,782	34,594	33,010	27,191	33,778	23,334	34,776
Whalebone .....lbs..	900,850	603,603	708,365	600,655	193,793	206,396	345,560	372,303	150,628	160,220	207,259	286,280	464,028

The following statement shows the quantities of oil and bone landed by the American fleet and the total value of the same from 1804 to 1880.* The statistics are compiled from Starbuck's History of the Whale Fishery and from the Whalemen's Shipping List. The total yield of this fishery for the entire period is seen to be 166,604,496 gallons of sperm oil, 270,727,205 gallons of whale oil, and 76,386,148 pounds of whalebone, having a total value of $340,204,873.

Scammon estimates that sperm whales will average 25 and right whales 60 barrels of oil, and of the former 10 and of the latter 20 per cent. of those killed are lost. Upon that basis the above amounts of oil would represent the slaughter of about 232,790 sperm and 196,002 right whales.

* The following additional statistics have been received since this statement was compiled:

Year.	Gallons sperm oil.	Gallons whale oil.	Pounds whalebone.	Total value.
1881	963,900	996,975	368,000	$1,926,620
1882	941,346	736,186	271,999	1,861,779
1883.....	774,742	761,355	254,037	1,891,716
1884.....	696,118	777,105	26,968	2,542,614

Production of oil and bone by the American whaling fleet and total value of same from 1804 *to* 1880.

Year.	Gallons sperm oil.	Average price per gallon.	Gallons whale oil.	Average price per gallon.	Pounds whalebone.	Average price per pound.	Total value.
1804 to 1820	7,983,119	.....	18,159,836	.....	841,940	.....	$16,941,493 57
1821	1,357,618	67½	1,213,506	33	62,893	12	1,324,396 29
1822	1,351,350	65	1,619,951	32	50,799	12	1,402,857 70
1823	2,938,351	43	1,697,440	32	103,404	13	1,820,114 25
1824	3,091,064	45½	1,833,237	30	133,472	13	1,973,756 58
1825	1,924,303	70½	1,666,413	32	152,534	15	1,912,765 87
1826	919,800	75	1,108,233	30	79,368	16	1,035,018 78
1827	2,958,480	72½	1,119,037	30	106,255	18	2,499,735 00
1828	2,475,176	62½	1,591,790	26	137,323	25	1,995,181 15
1829	2,350,152	61½	2,256,502	26	563,654	25	2,172,947 50
1830	3,482,042	65½	2,831,315	39	514,991	20	3,487,949 56
1831	3,636,738	71	3,609,774	30	279,279	17	4,139,790 61
1832	2,299,563	85	5,703,894	23½	442,881	13	3,352,618 17
1833	3,289,765	85	5,153,148	26	266,432	13	4,170,754 89
1834	3,891,573	72½	4,144,833	27½	343,324	21	4,033,317 55
1835	5,181,523	84	3,950,289	39	965,192	21	6,095,787 35
1836	4,200,021	89	4,301,892	44	1,028,773	25	5,888,044 42
1837	5,329,138	82½	6,389,995	35	1,753,104	20	6,983,657 90
1838	4,076,100	86	7,204,365	32	1,200,000	20	6,250,842 80
1839	4,408,866	1 05	7,040,975	36	2,000,000	18	7,524,060 30
1840	4,928,017	1 00	6,408,391	30	2,000,000	19	7,230,534 30
1841	4,956,304	94	6,459,516	32	2,000,000	20	7,125,970 88
1842	3,256,155	73	4,876,232	34	2,500,000	23	4,379,812 03
1843	5,260,027	63	6,511,900	34	1,127,270	36	6,293,680 21
1844	4,239,711	90⅝	8,254,481	36 7/12	2,532,445	40	7,875,970 38
1845	4,967,550	88	8,593,483	33	2,195,054	34	8,283,611 75
1846	3,155,481	87⅞	6,589,737	33¾	3,252,939	34	6,203,115 43
1847	3,803,719	1 00¾	9,864,225	36	3,341,680	31	8,419,288 49
1848	3,401,274	1 00	8,840,663	33	3,003,000	25	6,819 442 78
1849	3,179,736	1 08⅝	7,827,498	39 1/12	2,281,100	21⅞	7,069,953 74
1850	2,926,098	1 20 7/16	6,319,152	49 1/10	2,869,200	32⅜	7,564,124 72
1851	3,137,116	1 27¼	10,347,214	45 5/16	2,916,500	34½	10,031,744 05
1852	2,484,468	1 23¾	2,652,647	68½	1,259,900	50⅜	5,565,409 89
1853	3,246,925	1 24⅜	8,193,591	58⅛	5,652,300	34½	10,766,521 20
1854	2,315,924	1 48¾	10,074,866	59⅝	3,445,200	39⅛	10,802,594 20
1855	2,288,443	1 77 5/10	5,796,472	71 3/10	3,707,500	45½	9,413,148 93
1856	2,549,642	1 62	6,233,535	79½	2,592,700	58	9,589,846 36
1857	2,470,860	1 28⅓	7,274,641	73¼	2,058,850	96¾	10,491,548 90
1858	2,581,142	1 21	5,740,025	54	2,571,200	92¼	7,672,227 31
1859	2,879,352	1 36¼	5,997,946	48½	1,923,850	88	8,525,108 91
1860	2,306,934	1 41½	4,410,158	49½	1,337,650	80½	6,520,135 12
1861	2,171,358	1 31½	4,212,085	44½	1,038,45	66	5,415,090 59
1862	1,752,692	1 42¾	3,165,057	59⅓	763,500	88	5,051,781 64
1863	2,049,232	1 61	1,983,681	95¼	488,750	1 53	5,936,507 17
1864	2,027,718	1 89½	2,263,685	1 28	760,450	1 80⅜	8,113,922 07
1865	1,047,123	2 25½	2,401,497	1 45	619,350	1 71⅝	6,906,650 51
1866	1,154,885	2 55	2,340,513	1 21	920,375	1 37	7,037,891 23
1867	1,368,139	2 27	2,812,603	73⅜	1,001,397	1 17½	6,356,772 51
1868	1,485,981	1 92	2,065,613	82	900,850	1 02½	5,470,157 43
1869	1,509,984	1 81⅓	2,677,846	1 01¾	603,603	1 23	6,205,244 32
1870	1,738,265	1 36⅔	2,289,767	67½	708,365	85	4,529,126 02
1871	1,308,321	1 31	2,367,288	64	600,655	77	3,691,469 18
1872	1,423,832	1 45⅓	973,684	65½	193,793	1 28½	2,954,783 00
1873	1,324,669	1 47⅓	1,260,441	62¼	206,396	1 08½	2,962,106 96
1874	1,014,395	1 59	1,190,133	60½	845,560	1 10	2,713,034 51
1875	1,342,435	1 60½	1,089,711	65¼	372,303	1 20⅔	3,314,800 24
1876	1,254,047	1 40½	1,039,815	56	150,628	1 96	2,639,463 31
1877	1,295,249	1 13	856,516	52	160,220	2 50	2,309,569 69
1878	1,370,502	91½	1,064,007	44	207,259	2 46	2,232,029 55
1879	1,301,202	84½	735,021	39	286,280	2 34	2,056,069 08
1880	1,184,841	99	1,395,444	51	464,028	2 00	*2,659,725 03
Total	166,604,496	.....	270,727,205	.....	76,386,148	.....	340,204,873 86

* Year ended December 31, 1880.

(c) STATISTICS OF THE WHALING FLEET.

Number of whaling vessels belonging to the several ports of the United States on January 1 of each year from 1840 to 1880.

[Vessels fitted for Antarctic sealing are omitted. They belong mostly at Stonington and New London, and number from ten to twenty in each year. The details of the sealing fleet are given in a subsequent chapter of this volume.]

	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.
Barnstable, Mass								1	1					
Bath, Me				1										
Beverly, Mass											1	2	3	3
Boston, Mass	1	2	2	5	3	1	3	1	1			1	3	3
Bridgeport, Conn	3	3	3	3	3	3		3	2	2				
Bristol, R. I	6	5	5	10	7	6	6	6	1	1				
Bucksport, Me				1										
Cold Spring, N. Y		2	2	2	4	7	8	8	8	8	7	7	6	7
Dartmouth, Mass	3	3	3	2	1	1	1	2	1	1	1	1	3	4
Dorchester, Mass	2	2	2											
Duxbury, Mass				1	1	1								
Edgartown, Mass	8	8	9	13	10	11	10	9	8	8	6	6	9	9
Fairhaven, Mass	44	44	45	49	45	45	48	48	50	49	46	45	50	49
Falmouth, Mass	8	8	7	7	5	5	4	4		3	3	3	3	3
Fall River, Mass	7	7	6	7	7	7	7	7	6	5	2	2	2	3
Freetown, Mass				1	1	2		2	1					
Greenport, N. Y	5	5	1	5	8	10	11	11	11	10	10	10	9	9
Holmes Hole, Mass	4	4	4	3	3	3	4	4	3	3	3	3	4	4
Hudson, N. Y	8	8	8	2	2	1								
Jamesport, N. Y	1	1	1	1										
Lynn, Mass	4	3	2	2	2	2	3	3	2	2	2	2	2	2
Mattapoisett, Mass		8	8	5	10	9	10	11	11	10	9	9	13	15
Mystic, Conn	6	6	7	9	8	12	18	17	15	16	11	10	10	9
Nantucket, Mass	81	78	83	88	66	77	74	75	71	69	62	55	56	56
New Bedford, Mass	177	174	179	211	219	239	256	254	248	250	238	249	282	311
Newburyport, Mass	3	3	2	2	1	1					1			
New Suffolk, N. Y	1	1	1	1	1	2	2	2	1	1		1	1	
New London, Conn	39	36	31	42	46	61	70	7	59	48	44	42	41	45
Newport, R. I	11	10	10	12	12	11	11	9	6	6	4	4	5	5
New York, N. Y	3	3		2	3	2	1	1						
Newark, N. J	1	1	1	2	1									
Orleans, Mass												1	2	3
Plymouth, Mass	3	3	6	9	7	5	4	2	1	1				
Portland, Me	1	1	1											
Portsmouth, N. H	1	1	1	1	1	1	1	1	1					
Poughkeepsie, N. Y	6	6	6	4	1									
Providence, R. I	3	3	3	8	8	9	9	8	6	4	3	2	2	2
Provincetown, Mass	1		13	16	17	19	23	18	15	10	10	27	30	27
Quincy, Mass				1							1			
Rochester, Mass	15													
Sag Harbor, N. Y	31	31	30	44	49	60	63	62	50	41	23	15	18	19
Salem, Mass	14	14	12	12	6	5	2	2	2	1			1	1
Sandwich, Mass													1	2
Sippican, Mass		6	8	8	7	4	5	5	3	1	1			1
Somerset, Mass			1	2	2	2		1	1	1	1			
Stonington, Conn	11	8	9	14	13	20	26	27	24	20	18	16	17	16
Truro Mass												1	1	1
Wareham, Mass	4	3	5	7	4	6	6	4	3	1	1	1	1	1
Warren, R. I	21	19	18	21	19	20	25	23	21	20	15	15	17	16
Westport, Mass	9	9	10	15	11	11	11	13	14	15	15	16	19	22
Wilmington, Del	5	5	5	3	3	1								
Wiscasset, Me	1	1	1											
Yarmouth, Mass										1	1			
Total	512	535	554	654	617	685	722	651	647	608	539	546	611	648

Number of whaling vessels belonging to the several ports of the United States, &c.—Continued.

	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.
Beverly, Mass	5	5	4	2	2	3	3	2	1	2	2	2	2	2
Boston, Mass	1									5	3	3	4	8
Cold Spring, N. Y	7	7	5	5	5	4	4	2	2					
Dartmouth, Mass	3	6	9	10	10	10	9	6	5	4	4	4	3	3
Edgartown, Mass	10	12	13	17	19	18	18	16	12	8	7	6	6	6
Fairhaven, Mass	49	45	48	46	46	45	42	39	29	18	9	7	8	9
Falmouth, Mass	3	3	3	3	3	3	3	1	1	1	1			
Fall River, Mass	4	4	4	3	2	2	2	2	1					
Gloucester, Mass	1	1												
Greenport, N. Y	10	10	11	9	7	4	2							
Groton, Conn														1
Holmes Hole, Mass	4	4	5	4	2	2	2	1	1	1	1	1		
Lynn, Mass	1	1	1	1										
Marion, Mass														4
Mattapoisett, Mass	15	15	15	18	19	19	19	18	9	5	3	2		
Mystic, Conn	9	11	7	6	5	4	4	2						
Nantucket, Mass	47	42	42	41	38	34	21	18	13	13	10	7	2	6
New Bedford, Mass	318	314	311	329	324	316	301	291	260	220	197	175	164	181
Newburyport, Mass														2
New Haven, Conn						1	1	1	1	1				
New London, Conn	46	45	44	54	51	45	36	29	16	13	16	19	15	18
Newport, R. I	5	5	5	4	3	3	2							
New York, N. Y														1
Orleans, Mass	5	5	4	4	4	4	3	3	3					
Providence, R. I	1	1	1	1										
Provincetown, Mass	27	18	20	22	28	26	26	26	28	30	25	23	33	45
Sag Harbor, N. Y	20	19	16	18	20	20	19	17	11	9	6	8	8	7
Salem, Mass	1	1	1		1	1	1	1		1	1	1	2	3
Sandwich, Mass	2	2	2	1	1	1	1	1	1	1				
Sippican, Mass	2	2	2	3	5	6	6	5	4	3	3	2	2	
Stonington, Conn	15	14	16	6	5	4	4	1						
Tisbury, Mass														1
Truro, Mass	1													
Wareham, Mass	1	1	1	1	1	1	1	1						
Warren, R. I	17	16	14	15	15	13	10	4	3	2	2	1		
Wellfleet, Mass														1
Westport, Mass	22	21	21	19	20	20	20	17	15	15	11	10	9	9
Total	652	631	625	642	636	609	561	504	416	352	301	271	258	307

	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.
Beverly, Mass	1	1	1	1	1	1	1						
Boston, Mass	11	10	8	7	6	5	4	6	7	6	5	5	5
Dartmouth, Mass	3	3	3	3	2	2	2	2	2	2	2	2	2
Edgartown, Mass	7	7	7	6	4	3	1	2	2	3	3	4	6
Fairhaven, Mass	13	12	11	8	6	5	2	3	2	2	1	1	
Groton, Conn	1	1	1										
Marion, Mass	4	7	6	5	2	3	3	2	2	2	2	2	2
Nantucket, Mass	7	8	8	6	3	1							
New Bedford, Mass	181	178	176	176	143	130	113	107	116	118	130	132	128
Newburyport, Mass	3	3	3										
New London, Conn	14	15	15	14	10	10	9	4	4	3	5	3	5
New York, N. Y	2	5	5	3	2	2		1	1	1	3	1	
Provincetown, Mass	53	54	49	27	16	19	17	18	19	21	22	23	19
Sag Harbor, N. Y	7	5	4	3	2	2	1	1					
Salem, Mass	4	4	3	3	1								
San Francisco, Cal		6	5	8	4	1	1	1	1	2	2	1	3
Tisbury, Mass	1	1	1	1									
Wellfleet, Mass	1	1	1										
Westport, Mass	10	10	9	9	9	8	8	5	3	3	4	4	3
Total	323	331	316	280	211	192	162	152	159	165	179	178	173

Census statistics of the whaling fleet for 1880.*

Port.	Number of vessels.	Tonnage.	Number of crew.	Value of vessels.	Value of outfit.
Boston	6	926.64	131	$34,000	$36,000
Provincetown	20	1,938.92	331	68,800	66,350
Marion	2	175.38	34	6,500	6,000
Edgartown	7	1,446.82	211	48,000	80,000
New London	5	866.41	93	24,000	17,000
Westport	2	498.33	30	13,000	16,000
Dartmouth	1	231.59	28	4,000	16,000
New Bedford	123	31,568.83	3,226	891,000	1,501,500
San Francisco	5	989.46	144	27,000	36,500
Total	171	38,633.38	4,198	1,116,300	1,775,350

*Since the year 1880 the fleet has been greatly reduced. According to an annual review of the whale fishery, published by I. H. Bartlett & Sons, of New Bedford, the fleet on January 1, 1885, numbered 93 ships and barks, 6 brigs, and 34 schooners, aggregating 31,207 tons. The San Francisco fleet has increased to 17 vessels, this port having become the headquarters of most of the North Pacific fleet. Statistics of the North Pacific fleet for each year since the beginning of the fishery are given on preceding pages.

The names and other details of each vessel in the fleet are given in Section VI of this report. The total capital invested in the whaling fleet, wharves, store-houses, and whale-oil refineries in 1880, was $4,624,650.

Statement showing the tonnage of vessels employed in the United States whale fishery from 1794 *to* 1884.

[Compiled from the Report of the Commissioner of Navigation for 1884. The years, excepting 1835 and 1843, which end September 30 and June 30, respectively, close with December 31.]

Year.	Tons.	Year.	Tons.	Year.	Tons.
1794	4,129	1825	35,379	1856	189,461
1795	3,103	1826	41,984	1857	195,842
1796	2,364	1827	45,992	1858	198,594
1797	1,104	1828	54,801	1859	185,728
1798	763	1829	57,284	1860	166,841
1799	5,647	1830	39,705	1861	145,734
1800	3,466	1831	82,797	1862	117,714
1801	3,085	1832	73,246	1863	99,228
1802	3,201	1833	101,636	1864	95,145
1803	12,390	1834	108,424	1865	90,516
1804	12,339	1835	97,649	1866	105,170
1805	6,015	1836	146,254	1867	52,384
1806	10,507	1837	129,157	1868	71,343
1807	9,051	1838	124,860	1869	70,202
1808	4,526	1839	132,285	1870	67,954
1809	3,777	1840	136,927	1871	61,490
1810	3,589	1841	157,405	1872	51,608
1811	5,299	1842	152,990	1873	44,755
1812	2,930	1843	152,517	1874	39,108
1813	2,942	1844	168,614	1875	38,229
1814	562	1845	190,903	1876	39,116
1815	1,230	1846	187,420	1877	40,593
1816	1,168	1847	193,859	1878	39,700
1817	5,224	1848	192,613	1879	40,028
1818	16,750	1849	180,186	1880	38,408
1819	32,386	1850	146,017	1881	38,551
1820	36,445	1851	181,644	1882	32,802
1821	27,995	1852	193,798	1883	32,414
1822	48,583	1853	193,203	1884	27,249
1823	40,503	1854	191,901		
1824	33,346	1855	186,848		

10. LIST OF WHALING VOYAGES FROM AMERICAN PORTS, 1870 TO 1880.

The following statement gives the name, rig, and tonnage of each American whaling vessel since 1870; also the whaling ground, the date of sailing and returning, and the amount of oil and bone secured by each vessel during the years 1870 to 1880. The vessels are arranged in alphabetical order by ports, and according to the year of their departure on a voyage. Vessels fitted from Stonington and New London for Antarctic fur seal and sea-elephant voyages are not included.

These returns from 1870 to 1876 are corrected from the list given by Alexander Starbuck in his History of the Whale Fishery, and for later years are compiled from the files of the Whalemen's Shipping List and the custom-house records. In the report of the U. S. Fish Commission for 1877, Starbuck gives, as far as practicable, the details of each voyage from American ports since the beginning of the fishery, and also information as to the owner and master of each vessel.

The details of voyages of vessels in the North Pacific and Hudson Bay fleets are also given above, on pages 86 to 94 and 99 to 104.

Number of vessels sent out annually since 1850.

Years.	Number of vessels.	Years.	Number of vessels.
1860	126	1870	69
1861	75	1871	66
1862	124	1872	60
1863	90	1873	37
1864	98	1874	49
1865	131	1875	75
1866	131	1876	71
1867	139	1877	70
1868	113	1878	61
1869	103	1879	54

From 1870 to 1880 the number of individual vessels that participated in the whale fishery of the United States was 326, and the number of vessels lost while on their voyages was 67. From 1860 to 1880, 1,734 voyages were undertaken: 998 to the North and South Atlantic oceans; 271 to the Pacific Ocean; 201 to the Pacific, Arctic, and adjacent waters; 147 to the Indian Ocean; 117 to Hudson Bay and Cumberland Inlet.

From 1870 to 1880 615 vessels sailed from home ports on whaling cruises. Of this number 385 were fitted for cruising in the Atlantic, 96 in the Pacific, 49 in the Indian Ocean, 52 in the North Pacific and Arctic, 18 in Hudson Bay, 12 in Cumberland Inlet, 2 at New Zealand, and 1 in Sooloo Sea. None have been fitted for the Indian Ocean since 1877. The largest number of vessels fitted in one year during this decade was 75 in 1875, and the smallest number was 37 in 1873; 63 were fitted in 1880.

Voyages of American whaling vessels, 1870 to 1880.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage. Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	Remarks.
1870.									
New Bedford, Mass.									
Addison	Bark	385	Pacific Ocean	May 20	Apr. 19, 1874	90	639	3,550	Sent home 180 sperm, 550 bone.
Adeline Gibbs	do	527	Indian Ocean	Sept. 1 / Oct. 19	Sept. 26, 1870 / May 22, 1875	600	200	...	Captain Cleaveland died, and the vessel was damaged in a gale.
Alfred Gibbs	do	347	Pacific Ocean	May 25	July 20, 1873	819	209	...	Sent home 567 sperm, 1,700 bone; sold to New York 1873.
Ansel Gibbs	do	303	Hudson Bay	June 21	Oct. 6, 1871	...	1,340	22,040	
Avola	do	230	Pacific and Ind	Dec 7	Feb. 13, 1874	986	15	...	Sent home 494 sperm.
Awashonks	do	380	North Pacific	Oct. 19	...	...	...	...	Lost in the Arctic 1871.
Canton	Ship	239	Indian Ocean	Oct. 19	Sept. 22, 1874	991	4	...	
Cicero	Bark	226	Atlantic	May 9	Oct. 24, 1873	284	85	...	J. F. Mandousa, third mate, dropped dead in his boat while fast to a whale, 1870; sent home 691 sperm, 290 whale, 1,300 bone.
Commodore Morris	Ship	338	do	Apr. 27	May 24, 1873	610	...	...	Sent home 1,215 sperm.
Contest	do	341	North Pacific	July 19	...	...	...	...	Sent home 97 sperm; lost in the Arctic 1871.
Gazelle	Bark	273	Indian Ocean	Oct. 26	June 2, 1874	954	...	...	Captain Gifford died August 26, 1873, at sea; sent home 25 sperm.
Gay Head	Ship	300	North Pacific	Oct. 26	...	...	...	...	Lost in the Arctic 1871.
George Howland	Bark	361	do	Sept. 29	...	...	...	...	Do.
Hadley	do	163	Pacific Ocean	Sept. 27	July 20, 1874	247	444	...	
Irving	Schooner	106	Atlantic	May 28	Oct. 2, 1871	...	301	5,204	Withdrawn 1872.
John Carver	Bark	319	Pacific Ocean	Aug. 23	July 2, 1874	1,081	4	...	Robert Saulsbury, fourth mate, died at Valparaiso, May, 1873; sent home 437 sperm.
John Dawson	do	173	Indian Ocean	July 6	Oct. 7, 1872	691	4	...	Sent home 278 sperm, 10 whale.
Massachusetts	do	356	North Pacific	July 19	...	...	...	...	Sent home 184 sperm; lost in the Arctic 1871.
Mary and Susan	do	327	Pacific Ocean	Aug. 6	June 4, 1874	975	6	...	Sent home 721 sperm.
Niger	Ship	412	do	Nov. 10	Aug. 10, 1874	481	1,346	...	Added 1870; formerly a freighter; C. W. Swain, second mate, drowned by a foul line while fast to a whale, May 7, 1872; sent home 870 sperm, 825 whale, 2,124 bone.
Ocean Steed	Bark	258	Atlantic	May 4	...	...	...	...	Transferred from New York 1870; sent home 591 sperm; sold to San Francisco 1873.
Oriole	do	280	North Pacific	Nov. 7	...	...	...	...	Sent home 93 sperm; stove by ice in the Arctic 1871.
Orlando	do	190	Sooloo Sea	June 28	Oct. 6, 1873	1,199	1	...	Sent home 171 sperm; sold to Port Jefferson for freighting 1873.
Osceola, 2d	do	178	Pacific Ocean	Aug. 1	...	...	...	...	Sent home 718 sperm; condemned at Mahe October, 1872.
Pacific	do	341	Indian Ocean	Oct. 5	June 19, 1873	930	70	...	
Petrel	Schooner	61	Atlantic	June 1	Oct. 11, 1871	119	...	...	
Progress	Bark	358	North Pacific	Oct. 19	May 10, 1875	434	3,225	...	Captain Dowden left at San Francisco; Captain Eldridge, formerly of Cherokee, took command; sent home 39,836 bone.
Rainbow	do	351	Pacific Ocean	Nov. 1	Sept. 1, 1874	287	419	...	Mr. Garrity fourth mate, murdered by one of the crew May, 1873; sent home 309 sperm, 857 bone.
Reindeer	Ship	332	North Pacific	Oct. 4	...	...	...	...	Sent home 154 sperm; lost in the Arctic September, 1871.
Roscoe	Bark	313	Pacific Ocean	Nov. 1	...	...	...	...	Sent home 470 sperm, 319 elephant; crushed by ice in the Arctic August 19, 1872; had 800 sperm.
Robert Edwards	Ship	...	...	May —	...	...	...	...	Burned at sea July 24, 1870; fired by the crew
Rousseau	Bark	305	Pacific Ocean	Oct. 26	May 2, 1875	1,130	650	2,500	Captain Hyland came home sick 1871.
Stafford	do	156	Indian Ocean	Oct. 21	May 5, 1873	860	141	1,707	Sent home 242 sperm, 58 whale.
Starlight	Brig	141	Atlantic	July 6	Aug. 12, 1873	128	...	...	Sent home 630 sperm, 372 whale; sold to Bangor, Me., for the African trade, 1873.
Union	Schooner	66	do	May 21	Aug. 11, 1871	39	135	...	Added 1870 from Fairhaven; sent home 129 sperm.
Vigilant	Bark	215	Indian Ocean	Oct. 25	Aug. 24, 1874	992	146	...	Sent home 506 sperm, 1,040 whale.
Xantho	do	206	do	May 4	...	...	...	...	Sent home 230 sperm, 800 bone; lost off Celebes July, 1871.
Fairhaven, Mass.									
Ellen Rodman	Schooner	73	Atlantic	Nov. 4	Sept. 14, 1872	83	...	...	Sent home 230 sperm.
George J. Jones	do	126	do	June 7	Aug. 6, 1871	109	135	...	Added 1870; sent home 30 sperm.
William and Henry	Bark	234	do	May 12	...	...	...	...	Sent home 414 sperm; condemned at Fayal November, 1871.

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage. Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	Remarks.
1870.									
Marion, Mass.									
Columbus	Schooner	83	Atlantic	May 17	Sept. 24, 1870		8		
William Wilson	do	92	do	May 17	Sept. 23, 1870	173			
Westport, Mass.									
Sea Queen	Bark	195	Pacific Ocean	Nov. 22	Apr. 15, 1873	1,231			
Provincetown, Mass.									
Alleghania	Schooner	76	Atlantic	Feb. 7	Sept. 9, 1870	30	15		Withdrawn 1871.
Antarctic	do	101	do	May 12	Sept. 6, 1871	206	50		Sent home 72 sperm.
Ada M. Dyer	do	87	do	Jan. 11	Sept. 5, 1870	11	189		Sent home 100 whale.
B. F. Sparks	do	92	do	Jan. 11	June 27, 1870	10	124		
C. L. Sparks	do	90	do	Dec. 24	Nov. 23, 1871	119	21		
Elbridge Gerry	do	71	do	Feb. 12	June 21, 1871	30	170		Sent home 250 sperm, 18 whale.
Ellen Rizpah	do	64	do	Jan. 8	Aug. 28, 1870	148	151		
Gage H. Phillips	do	107	do	Oct. 24	June 11, 1873	109	60		Sent home 180 sperm, 352 whale, 700 hump.
Gracie M. Parker	do	82	do	Jan. 11	Sept. 1, 1873	163	182		Sent home 100 whale.
Mary G. Curren	do	102	do	Jan. 29	Aug. 25, 1871	123			Withdrawn 1871.
M. E. Simmons	do	105	do	Apr. 23	Sept. 16, 1871	635	36		Sent home 220 sperm, 200 whale.
Montezuma	do	66	do	Feb. 22	Sept. 25, 1870	73	2		
O. M. Remington	do	139	do	May 16	Aug. 9, 1871	120	325		Sent home 315 sperm; withdrawn 1871.
Quickstep	do	94	do	Feb. 26	Sept. 19, 1870	21	180		
Rising Sun	do	69	do	Jan. 4	Sept. 1, 1870	70	130		
Sassacus	do	110	do	Feb. 12	Aug. 31, 1870	65	50		
S. A. Paine	do	139	do	Jan. 11	July 29 1871	151	229		Withdrawn 1871.
William A. Grozier	do	117	Atl. and Ind	Apr. 26	June 6, 1872	556	66		Sent home 50 sperm.
Boston, Mass.									
F. H. Moore	Brig	107	Atlantic	Oct. —	Oct. 16, 1872	142	316		Sent home 295 sperm, 323 whale.
Heman Smith	do	123	do	Dec. 7	Oct. 4, 1872	540	40		
Thriver	Schooner	69	do	Jan. 3	Aug. 22, 1870	38	69		Sailed again soon after, and was lost at Aux Cayes February 3, 1873; sent home 45 sperm, 150 whale.
New London, Conn.									
George and Mary	Bark	105	Cum. Inlet	May 3	Nov. 20, 1871		425	5,000	Sold to New Bedford 1873.
Peru	do	259	South Atlantic	July 9	June 1, 1871	18	771		Do.
S. B. Howes	Schooner	101	Hudson Bay	July 7					Lost in Cumberland Inlet 1873; sent home 400 whale.
San Francisco, Cal.									
C. E. Foote	Schooner	156	Pacific Ocean	Oct. 7	June 30, 1872		263		Withdrawn 1872.
Carlotta	Bark	480	do	Dec. 31					Added 1870; lost in the Arctic Ocean 1871.
Massachusetts	Ship	351	do	Dec. 22					Lost at Scammon's Lagoon February 6, 1871.
Menshikoff	Bark	223	do	Dec. 10	Aug. 14, 1872	320			Menshikoff withdrawn 1872.
Page	Schooner	110	do	Apr. 27	—— —, 1872				Added 1870; withdrawn 1872; no report
1871.									
New Bedford, Mass.									
A. R. Tucker	Bark	129	Indian Ocean	May 2	Oct. 18, 1874	220			Sent home 344 sperm.
Abm. Barker	do	380	Pacific Ocean	May 16	Sept. 21, 1875	1,450	2,050		
Active	do	291	North Pacific	Nov. 11					Sent home 395 sperm, 1,079 whale, 22,215, bone; condemned at Yokohama 1874.
Alaska	do	340	Pacific Ocean	June 28	Oct 4, 1875	1,850	1,700	15,500	
Annawan	do	108	Atlantic	May 23	May 16, 1873	40	108	755	Sent home 202 sperm; sold to Fairhaven 1873.
Ansel Gibbs	do	303	Hudson Bay	Dec. 13					Lost on Marble Island, Hudson Bay, October 19, 1872; had 530 whale, 10,000 bone; saved 3,500 bone. Fifteen of the crew died of scurvy.
Barth. Gosnold	do	365	North Pacific	Nov. 2	Mar. 30, 1876	950	1,200	12,500	
Benj. Cummings	do	305	Pacific Ocean	June 20	Sept. 5, 1875	1,400			
Callao	do	299	do	July 15	Sept. 21, 1875	410	760		
Camilla	do	328	North Pacific	Dec. 6					Abandoned in the Arctic 1876; had on board 190 sperm, 300 whale, 5,000 bone; sent home 75 sperm, 3,850 whale, 45,778 bone.

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage. Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	Remarks.
1871.									
New Bedford, Mass.—Continued.									
Charles W. Morgan	Bark	314	Indian Ocean	Sept. 26	Oct. 31, 1874	1,340	242	.....	Sent home 109 sperm, 1,600 pounds bone.
Cornelia	do	203	Pacific Ocean	Oct. 10	....	.....	.....	.....	Condemned at Paita, March, 1873; sent home 278 sperm, 408 humpback.
Courser	do	259	do	July 19	.....	.....	.....	.....	Run down by steamship Ytata October 26, 1873; abandoned with 200 sperm, 350 whale; sent home 170 sperm, 350 whale.
Emma C. Jones	Ship	307	do	July 11	Nov. 6, 1874	2,137	3	.....	Sent home 415 sperm.
Europa	do	323	North Pacific	Dec. 14	Apr. 17, 1876	50	4,200	32,386	Belongs to Dartmouth parties.
George and Susan	Bark	343	Atlantic	Aug. 21	May 2, 1874	647	1,019	.....	Sent home 572 sperm, 141 whale, 540 bone
Glacier	do	195	Cum. Inlet	July 9	Sept. 26, 1873	....	75	1,600	Sold to Wiscasset, Me., 1873.
Helen Mar	do	324	North Pacific	Sept. 26	Apr. 15, 1876	340	3,850	36,085	
Helen Snow	do	215	Pacific Ocean	Oct. 17	.....	.....	.....	.....	Sent home 169 sperm; damaged by ice in the Arctic, August 19, 1872, and abandoned; afterward found, taken into San Francisco, and sold to pay salvage; sailed one voyage from San Francisco then under Russian flag.
Hercules	do	311	Indian Ocean	Aug. 23	Aug. 4, 1875	1,410	965	.....	
Hunter	do	355	Pacific Ocean	Sept. 27	July 14, 1875	2,700	1,100	.....	
Islander	do	240	Indian Ocean	July 25	.....	.....	.....	.....	Sent home 695 sperm; sold at Albany, New Holland, March, 1873.
Jireh Perry	Ship	316	North Pacific	Dec. 21	Apr. 1, 1875	715	4,550	72,000	
John P. West	Bark	353	Indian Ocean	Sept. 9	Oct. 3, 1874	402	1,752	7,400	Sent home 37 sperm, 4,700 pounds bone.
Josephine	Ship	363	North Pacific	Sept. 26	May 22, 1875	540	4,175	53,500	
Kathleen	Bark	206	Indian Ocean	Oct. 16	Apr. 30, 1875	1,450	.....	.....	
Laconia	do	158	Atlantic	June 20	Nov. 3, 1872	101	1	.....	Sent home 95 sperm.
Mar ngo	Ship	478	North Pacific	June 27	.....	.....	.....	.....	Sent home 230 sperm, 2,302 whale, 29,300 pounds bone; sold at San Francisco 1874; lost in the Arctic 1876.
Mary Frazier	Bark	301	Pacific Ocean	Nov. 7	Aug. 25, 1876	770	1,500	1,200	Sold to Edgartown 1876.
Milwood	do	216	Cum. Inlet	Apr. 25	.....	.....	.....	.....	Sent home 20 sperm; lost on Black Lead Island, November 13, 1871; saved 140 whale; built in 1806.
Northern Light	do	385	North Pacific	Oct. 10	May 17, 1880	350	1,150	.....	Sent home 530 sperm, 7,200 whale, 71,318 bone, 15,353 ivory.
Osmanli	do	292	Indian Ocean	Oct. 4	June 15, 1875	535	1,235	.....	
Ospray	do	173	Pacific Ocean	July 27	July 13, 1874	.....	156	.....	Sent home 655 sperm, 465 humpback.
Petrel	do	257	Indian Ocean	July 20	May 1, 1874	1,338	69	400	Sent home 74 sperm.
Petrel	Schooner	61	Atlantic	Dec. 30	Sept. 1, 1872	11	12	.....	
Sarah	Bark	128	do	May 24	May 12, 1873	185	311	.....	Sent home 696 sperm, 208 whale, 1,080 bone.
Sea Breeze	do	323	North Pacific	Aug. 3	May 10, 1875	60	940	8,300	
Sunbeam	do	255	Indian Ocean	Dec. 4	Dec. 6, 1875	560	.....	.....	
Trident	do	432	North Pacific	Sept. 6	.....	.....	.....	.....	Sent home 397 sperm, 1,640 whale, 21,000 pounds bone; lost at Panama 1873.
Wave	do	150	Atlantic	May 9	July 21, 1873	336	.....	.....	Sent home 416 sperm, 7 whale.
Young Phœnix	Ship	355	Indian Ocean	Oct. 3	June 14, 1875	340	400	1,000	Sailed under Capt. Silas G. Baker, who came home 1871.
Fairhaven, Mass.									
General Scott	Bark	315	Pacific Ocean	June 20	Apr. 1, 1875	650	650	.....	
Marion, Mass.									
Cohannet	Schooner	83	Atlantic	June 13	Sept. 17, 1871	150	.....	.....	
William Wilson	do	92	do	May 24	Sept. 13, 1871	175	.....	.....	
Westport, Mass.									
Mattapoisett	Bark	110	Atlantic	June 21	Sept. 1, 1872	438	38	.....	Sent home 115 sperm.
Platina	do	214	Pacific Ocean	Nov. 6	June 25, 1875	1,605	865	.....	
Sea Fox	do	166	Indian Ocean	Apr. 18	June 6, 1874	255	267	.....	Mr. Crocker, first mate, killed by a whale, December 12, 1873.
Edgartown, Mass.									
Clarice	Bark	183	Atlantic	Oct. 5	Sept. 4, 1875	1,040	.....	.....	Stocked $60,000; $15,000 profit.
Provincetown, Mass.									
Agato	Schooner	81	Atlantic	Jan. —	Sept. 24, 1871	106	100	.....	
Arizona	do	79	do	Jan. —	Aug. 30, 1871	....	70	.....	

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1871.									
Provincetown, Mass.—Continued.									
Ada M. Dyer	Schooner	87	Atlantic	Feb. 20	Sept. 11, 1871	42	210		
B. F. Sparks	do	92	do	Jan. —	Sept. 29, 1871	215	186		
D. A. Small	Brig	119	do	Jan. 4	June 11, 1873	188	235	570	Sent home 160 sperm, 425 whale.
Ellen Rizpah	Schooner	67	do	Feb. —	Sept. 8, 1871	78	61		
Gracie M. Parker	do	82	do	Feb. 20	Sept. 7, 1871	75	240		
Montezuma	do	60	do	Feb. 17	Aug. 30, 1871	60	25		Towed into Vineyard Haven; dismantled in a gale, August 16.
Quickstep	do	94	do	Apr. —	Sept. 2, 1872	95	6		Sent home 206 sperm.
Rising Sun	do	69	do	Mar. 23	Nov. 23, 1871	70	10		
Boston, Mass.									
Rosa Baker	Brig	108	Atlantic	Nov. 28	Apr. 13, 1874	71	5		Sent home 505 sperm.
Sarah E. Lewis	Schooner	96	do		Sept. 11, 1872	109	158		
Beverly, Mass.									
Esebol	Brig	143	Atlantic	May 20	Aug. 14, 1872	150			Sent home 149 sperm.
New London, Conn.									
Concordia	Bark	217	Cum. Inlet	Apr. 25	Nov. 9, 1871				Nothing but freight; broken up, 1873.
Isabella	Brig	192	do	May 31	Oct. 28, 1872		228		
Sag Harbor, N. Y.									
Myra	Brig	116	Atlantic	July 17					Sent home 430 sperm, 590 whale, 700 pounds bone; condemned at Barbadoes, December 14, 1874; Sag Harbor's last whaler.
San Francisco, Cal.									
Mannella	Brig	128	Pacific Ocean	Feb. 4					No report; lost at Scammon's Lagoon, Lower California.
1872.									
New Bedford, Mass.									
Abbie Bradford	Schooner	115	Hudson Bay	May 28	Sept. 7, 1873		878	13, 131	
Arnolda	Bark	340	North Pacific	Jan. 2	May 1, 1876	620	1, 175	16, 200	
Atlantic	do	291	Pacific Ocean	June 25	June 8, 1876	670	540		
California	Ship	367	New Zealand	Aug. 7	Aug. 17, 1876	2, 600	200	1, 500	
China	Bark	367	Indian Ocean	June 5					Sent home 428 sperm, 1,170 whale, 8,000 bone; condemned.
Coral	do	361	Pacific Ocean	Dec. 4	Mar. 5, 1877	630	1, 320	12, 000	Arrived at San Francisco.
Draco	do	258	Atlantic	May 1	May 1, 1875	1, 390	459		
Eliza Adams	Ship	408	Pacific Ocean	June 10	July 26, 1876	2, 215	185	1, 100	Mr. Soverino, second mate, died March, 1875
E. H. Adams	Brig	107	Atlantic	June 18	Aug. 10, 1874	326			Sent home 272 sperm.
Falcon	Bark	285	do	May 14	Aug. 5, 1875	1, 205	300		
Illinois	do	409	North Pacific	Jan. 9					Added 1871; collided with the Marengo and sunk in the Arctic April 18, 1876; sent home 587 whale, 26,590 bone.
James Allen	do	349	do	Jan. 3					First mate John N. Norton and boat's crew lost 1874, taken down by a whale; abandoned in the Arctic 1876; sent home 150 sperm, 5,100 whale, 79,500 bone; had 1,600 whale, 10,000 bone on board.
Janus	Ship	276	Atlantic	May 28	May 21, 1875	1, 650	1, 150	3, 572	
Java	Bark	309	North Pacific	Oct. 3					Captain Kelley came home sick 1873; had taken at last report (1877) 330 sperm, 3,200 whale, 32,930 bone; lost in Arctic 1877.
Java, 2d	do	290	do	Oct. 2					Abandoned in the Arctic 1876; had 800 whale, 3,000 bone; sent home 520 sperm, 2,050 whale, 20,000 bone.
John Dawson	do	173	Indian Ocean	Nov. 26	Sept. 14, 1875	1, 000	10		
John Howland	do	377	do	June 4	May 27, 1877	1, 150	2, 000		
Joseph Maxwell	do	263	North Pacific	Jan 16					Sent home 1,203 whale, 24,000 bone; condemned and sold at Honolulu December 2, 1874.
Lætitia	do	208	Atlantic	July 18	Aug. 18, 1875	1, 500			

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1872.									
New Bedford, Mass.—Continued.									
Martha	Bark	235	Pacific Ocean	Oct. 5					Condemned at Bay of Islands November 20, 1874; sent home 494 sperm, 365 whale.
Merlin	do	246	New Zealand	July 2	June 19, 1876	1,920			
Mt. Wollaston	do	325	North Pacific	July 9					Lost in Arctic 1879; 2,850 whale; 20,000 bone.
Ohio	do	205	Atlantic	May 28	Oct. 19, 1875	1,600	60	533	
Onward	do	339	Pacific Ocean	June 25					Abandoned in the Arctic 1876; had 1,400 whale, 14,000 bone; sent home 645 sperm, 856 whale, 47,200 bone.
Orray Taft	do	134	Hudson Bay	July 2					Lost on Marble Island (Hudson Bay) September 14, 1872.
Palmetto	do	215	Atlantic	Oct. 2	Sept. 4, 1875	1,350			
Petrel	Schooner	61	do	Oct. 21	July 22, 1873		Clean		
President, 2d	Bark	123	do	May 3	Sept 20, 1874	409	18		Sent home 540 sperm, 10 blackfish.
Seine	do	234	Pacific Ocean	June 3	July 1, 1875	1,610			
Spartan	do	294	Atlantic	May 22	May 5, 1873	705			
St. George	Ship	392	North Pacific	June 4					Abandoned in the Arctic 1876; had 1,400, whale, 1,800 bone; sent home 295 sperm, 4,100 whale, 36,390 bone.
Triton	Bark	264	do	Jan. 8	June 6, 1876	255	2,700	43,000	
Union	Schooner	66	Atlantic	May 13	Sept. 21, 1872	87			
Fairhaven, Mass.									
Ellen Rodman	Schooner	73	Atlantic	Oct. 9	Sept. 1, 1873	73			
Geo. J. Jones	Brig	128	do	May 28					Sent home 278 sperm; condemned at Barbadoes April, 1873.
Marion, Mass.									
Admiral Blake	Schooner	84	Atlantic	May 22	Sept. 22, 1873	24	11		Added 1872.
Cohannet	do	83	do	Jan. 30	Aug. 31, 1872	260	20		Sold to Fairhaven 1874.
				Dec. 4	Sept. —, 1873	158	2		
Wm. Wilson	do	92	do	May 27	June 15, 1873	22	5	285	Sent home 200 sperm.
Dartmouth, Mass.									
Cape Horn Pigeon	Bark	212	Pacific Ocean	Aug. 8	May 11, 1876	1,070	3,200		
Westport, Mass.									
A. Hicks	Bark	303	Atlantic	July 23	Sept. 14, 1876	1,760			E. N. Briggs, first mate, drowned by a foul line 1872.
Greyhound	do	163	Indian Ocean	June 25	Oct. 18, 1875	1,620	500		
Provincetown, Mass.									
Agate	Schooner	81	Atlantic	Jan. 31	Sept. 2, 1872	93	221		
Alcyone	do	92	do	Feb. 22	Oct. 7, 1872	101	230		
Antarctic	do	101	do	Apr. 23	Sept. 14, 1872	123	28		
Arizona	do	79	do	Jan. 25	Sept. 6, 1872		221		
Ada M. Dyer	do	87	do	Jan. 25	Sept. 13, 1872	57	190		Withdrawn 1872.
B. F. Sparks	do	92	do	Feb. 7	Sept. 25, 1872	75	254		
C. L. Sparks	do	96	do	May 6	Aug. 28, 1873	107	169	1,438	Sent home 175 sperm.
E. H. Hatfield	do	89	do	Apr. 11	Oct. 5, 1872	143			Replaced 1872; sailed again in 1872, arrived September 16, 1873; 157 sperm.
Elbridge Gerry	do	71	do	Mar. 16	Sept. 25, 1872	47	72		Returned 1872.
Ellen Rizpah	do	67	do	Feb. 22	July 16, 1872	112	214		
Gracie M. Parker	do	82	do	Jan. 25	Aug. 7, 1872	107	323		
John Atwood	do		Hudson Bay	May 29	Oct. 8, 1872		180	2,128	Formerly a freighter; added 1872; withdrawn 1872.
M. E. Simmons	do	105	Atlantic	Feb. 22	Sept. 1, 1873	163	156		Sent home 150 sperm, 250 whale
Montezuma	do	60	do	June 18	Sept. 18, 1873	85	3		Sent home 105 whale; withdrawn 1874
N. J. Knights	do	70	do	Feb. 29	Sept. 14, 1872	59	15		Returned 1872.
Rising Sun	do	69	do	Jan. 30	Sept. 21, 1872	58	80		
New London, Conn.									
Acors Barns	Bark	296	North Pacific	Jan. 18	—— —, 1874	35	130	22,740	Sold at San Francisco to New Bedford 1875.
Nile	Ship	273	Atlantic	Sept. 3	May 5, 1873	76	303		

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1873.									
New Bedford, Mass.									
Annawan	Bark								Lost near Bermuda July 8, 1873; five men lost.
Com. Morris	do	338	Atlantic	July 29	Sept. 24, 1876	2,930			
Desdemona	do	236	do	June 3	Apr. 29, 1876	1,600	875		
Edward Everett	do	187	do	July 21	Aug. 12, 1875	890	23		
Lagoda	do	371	Pacific Ocean	July 21	Oct. 5, 1877	1,330	2,700	14,500	
Marcella	do	166	Indian Ocean	Nov. 11	May 2, 1876	1,050			
Mercury	do	311	do	May 13	Nov. 6, 1876	1,260	500	1,200	
Milton	Ship	373	Pacific Ocean	Oct. 8	Oct. 24, 1876	2,360	200	1,363	
Morning Star	Bark	238	do	Nov. 13	June 28, 1878	1,910			
Pacific	do	341	Atlantic	Oct. 1	Nov. 5, 1876	1,670			
Pioneer	do	228	do	July 8	Sept. 20, 1874	851			
Sarah	do	128	do	Aug. 5	May 2, 1876	1,035	780		
Stafford	do	156	Indian Ocean	June 30	May 24, 1876	880	230		
Tamerlane	do	372	Atlantic	Aug. 6	Aug. 5, 1877	1,450	300	2,000	
Union	Schooner	66	do	Apr. 10	Sept. 26, 1873	170			
Dartmouth, Mass.									
Matilda Sears	Bark	231	Pacific Ocean	July 22	July 16, 1877	820	670		
Westport, Mass.									
Mattapoisett	Bark	110	Atlantic	June 10	Sept. 21, 1874	337			Sent home 102 sperm.
Mermaid	do	273	Indian Ocean	Aug. 28	Apr. 16, 1876	1,825			
Sea Queen	do	195	do	June 20	Aug. 20, 1875	1,210	80		
Provincetown, Mass.									
Agate	Schooner	81	Atlantic	Feb. 5	Sept. 15, 1873	37	86		
Alcyone	do	92	do	Feb. 20	Sept. 24, 1873	171	158		
Antarctic	do	101	do	Feb. 20	Sept. 16, 1873	117	45		
Arizona	do	79	do	Feb. 20	Sept. 9, 1873	125	258		
B. F. Sparks	do	92	do	Feb. 20	Sept. 26, 1873	357			
E. H. Hatfield	do	89	do	Dec. 30	Sept. 13, 1874	242			Sailed again in 1873 or 1874, arrived September 7, 1875, with 250 sperm.
Elbridge Gerry	do	71	do	Feb. 20	Sept. 10, 1873	121	191		Withdrawn 1874.
Ellen Rizpah	do	67	do	Feb. 20	Aug. 12, 1873	105	207		
Gracie M. Parker	do	82	do	Feb. 20	Sept. 2, 1873	138	202		
N. J. Knights	do	70	do	Feb. 20	Sept. 14, 1873	32	210		
Quickstep	do	94	do	May 5	Aug. 20, 1874	175	22		Sent home 63 sperm.
Rising Sun	do	69	do	Feb. 20	Aug. 30, 1874	123	245	1,436	
Sassacus	do	110							Sassacus lost at Cape Negro (Nova Scotia), August 24, 1873.
Wm. A. Grozier	do	117	do	May 12	Aug. 17, 1874	487			Replaced 1873; sent home 180 sperm.
Boston, Mass.									
F. H. Moore	Brig	107	Atlantic	May —	Aug. 6, 1875	625			
Heman Smith	do	123	do	May 29	Sept. 24, 1874	187	11		Sent home 200 sperm.
Sarah E. Lewis	Schooner	96	do	May 14	Sept. 17, 1874	222	5		Sent home 151 sperm.
Beverly, Mass.									
Eschol	Brig	143	Atlantic	May 20					Condemned at Barbadoes 1874; Beverly's last whaler
New London, Conn.									
Isabella	Brig	192	Cum. Inlet	June 26	Sept. 2, 1873		Clean		
San Francisco Cal.									
Florence	Bark	245	Pacific Ocean	Dec. 24	Nov. 12, 1874	80	200		Added 1872.

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1874.									
New Bedford, Mass.									
A. R. Tucker	Bark	129	Atlantic	Nov. 26	Oct. 25, 1876	800			
Abbie Bradford	Schooner	115	Hudson Bay	May 12	Sept. 14, 1875	60	650	12,000	First mate and boat's crew lost in the ice September 5, 1874.
Avola	Bark	230	Indian Ocean	July 16					Nine hundred sperm to March 5, 1877, when she was condemned at Mahe.
Canton	do	239	do	Dec. 8	July 9, 1878	1,530	45		
Cicero	do	226	Atlantic	May 9	Dec. 6, 1875	250	300		
Cornelius Howland	Ship	333	North Pacific	Aug. 4					Abandoned in the Arctic 1876; had 1,400 whale, 8,000 bone; sent home 600 sperm, 1,220 whale, 10,000 bone.
Eliza	Bark	296	do	May 28	Oct. 1880				October 26, 1880, had taken 480 sperm, 4,175 whale, 43,300 bone.
E. H. Adams	Brig	107	Atlantic	Oct. 1	Aug. 15, 1876	330	10		
George and Susan	Bark	343	do	Sept. 17	June 12, 1877	1,310	1,260		
Hadley	do	163	do	Oct. 29	July 25, 1877	910	36		
Janet	do	154			Nov. 27, 1874	172			Bought from Westport 1874.
James Arnold	Ship	346	Pacific Ocean	June 3	June 14, 1878	1,840	650	2,000	
Louisa	Bark	303	Atlantic	Aug. 11	May 3, 1878	1,000	1,700	1,400	
Lydia	do	329	Pacific Ocean	June 18	Oct. 24, 1877	1,380			Forty-seven pounds ambergris.
Mars	do	256	do	July 1	June 17, 1878	1,900	70		
Mary and Susan	do	327	do	Aug. 11	June 5, 1877	2,000			
Mattapoisett	do	110	Atlantic	Oct. 14	July 3, 1876	400	200		Bought from Westport 1874.
Napoleon	do	322	do	July 13	May 4, 1878	1,640	17		
Nautilus	do	277	Pacific Ocean	Aug. 14	Apr. 22, 1877	1,900			
Niger	Ship	412	do	Oct. 17	May 29, 1878	2,000	550	3,300	
Ocean	Bark	288	Atlantic	July 21	June 12, 1878	2,280	630	1,200	
Osprey	do	173	do	Nov. 10	Oct. 26, 1876	880			
Petrel	do	257	Indian Ocean	July 7	May 20, 1877	1,050	200	1,629	
Petrel	Schooner	61	Atlantic	May 9	Sept. 7, 1875	125			
President	Bark	257	Hudson Bay	June 9	Sept. 16, 1875		500	8,000	
Sea Ranger	do	273	Atlantic	July 1	Sept. 27, 1875	1,650			
Stamboul	do	260	Pacific Ocean	May 27	Sept. 22, 1877	1,520			T. F. Morse, third mate, killed by a whale June, 1874.
Union	Schooner	66	Atlantic	May 19	May 9, 1875	180	10		
Vigilant	Bark	215	Pacific Ocean	Nov. 3	June 24, 1878	1,410	475		
Wave	do	150	Atlantic	May 19	Oct. 5, 1876	750			
Fairhaven, Mass.									
Ella Rodman	Schooner	73	Atlantic	Apr. 21	Sept. 3, 1874	85			
				Sept. 21	Sept. 17, 1875	170	136		
Marion, Mass.									
Adm'l Blake	Schooner	84	Atlantic	May 22	Oct. 6, 1874	78			
				Oct. 27	Apr. 17, 1875	85	5		
William Wilson	do	92	do	June 11	Oct. 9, 1874	188			
				Dec. 2	Sept. 16, 1875	185	35		
Edgartown, Mass.									
Perry	Bark	150	Atlantic	Aug. 12	Oct. 12, 1877	810			Bought from New London 1874.
Provincetown, Mass.									
Agate	Schooner	81	Atlantic	Feb. 12	Sept. 24, 1874	134	150		
Alcyone	do	92	do	Jan. 24	Sept. 10, 1874		275		
Antarctic	do	101	do	Mar. 30	Oct. 7, 1874	315			
Arizona	do	79	do	Feb. 28	Sept. 10, 1874	100	100		
B. F. Sparks	do	92	do	June 22	Aug. 9, 1875	285	140		
Charles Thompson	do	152	do	May 28	Oct. 14, 1874	34	8		Added 1874; sent home 145 sperm, 20 whale; sailed again 1874 or 1875; returned September 21, 1875, with 315 sperm, 10 whale.
C. L. Sparks	do	96	do	Apr. 14	Sept. 15, 1875	230	100		
Ellen Rizpah	do	67	do	Feb. 28	Aug. 20, 1874	114	197		
Gracie M. Parker	do	82	do	Mar. 2	Sept. 13, 1874	148	222		
M. E. Simmons	do	105	do	Mar. 2	Sept. 6, 1874	19	266		

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1874.									
Provincetown, Mass.—Continued.									
N. J. Knights	Schooner	70	Atlantic	Feb. 12	Sept. 9, 1874	92	83	.....	
Rising Sun	do	69	do	Feb. —	Sept. 19, 1874	140	210	.....	
Boston, Mass.									
E. B. Phillips	Bark	144	Atlantic	July 28	July 30, 1876	450	.....	.....	Added 1874 from New London.
Rosa Baker	Brig	108	do	May 22	May 2, 1875	270	15	.....	
Wm. Martin	Schooner	92	do	June 5 Nov. 13	Oct. 4, 1874 Sept. 21, 1875	56 320	 15	....	Added 1874.
New London, Conn.									
Nile	Ship	293	Cum. Inlet	June 15	Dec. 9, 1874	.....	800	8,000	
New York, N. Y.									
Oak	Bark	152	Pacific Ocean	Dec. 22	Out, 1878	.....	.....	.....	Had taken at last report, November 30, 1879, 475 sperm, 2,025 whale.
1875.									
New Bedford, Mass.									
Abm. Barker	Bark	380	Pacific Ocean	Oct. 26	Oct, 1880	.....	.....	.....	Had at last report, November 4, 1880, 1,080 sperm, 2,920 whale, 39,000 bone.
Abbott Lawrence	Brig	160	Atlantic	Apr. 20	Nov. 5, 1877	505	.....	.....	Bought from Fairhaven 1874.
Acors Barns	Bark	296	North Pacific	Mar. 27	.....	.....	.....	.....	Bought from New London 1875; abandoned in the Arctic 1876; sent home 130 sperm, 1,650 whale, 13,450 bone; had on board 900 bone.
Adeline Gibbs	do	327	Atlantic	Aug. 9	Apr. 3, 1878	900	1,300	.....	One hundred and thirty-two pounds ambergris.
Benj. Cummings	do	305	Pacific Ocean	Nov. 17	.....	.....	.....	.....	Lost on the island of Fogo December 20, 1875.
Callao	do	299	Indian Ocean	Nov. 30	.....	.....	.....	.....	Condemned at Mauritius October 27, 1878; had taken 775 sperm.
Catalpa	do	202	Atlantic	Apr. 29	Aug. 24, 1876	250	.....	.....	Returned to whaling; fitted ostensibly for whaling, but was owned by parties who dispatched her to Australia, where she rescued the Fenian prisoners.
Charles W. Morgan	do	314	do	Apr. 23	May 17, 1878	850	90	....	
Draco	do	258	do	July 1	June 8, 1878	600	1,300	1,200	
Edward Everett	do	187	.....	Oct. 5	.....	.....	.....	.....	Lost in a gale five days out.
Emma C. Jones	Ship	307	Pacific Ocean	June 1	July 21, 1879	2,200	.....	.....	
Falcon	Bark	285	do	Oct. 26	Apr. 21, 1879	1,400	175	.....	
Gazelle	do	273	do	June 29	Apr. 22, 1879	1,300	470	729	
General Scott	do	315	Indian Ocean	July 7	May 27, 1878	980	60	.....	
George and Mary	do	105	Atlantic	May 4	May 13, 1877	365	.....	.....	Bought from New London 1874.
Golden City	Schooner	89	do	Dec. 9	Sept. 29, 1876	440	40	.....	Bought from Boston.
Greyhound	Bark	163	Indian Ocean	Nov. 30	Nov. 11, 1878	800	140	1,000	
Hercules	do	311	do	Oct. 19	Sept. 17, 1879	1,500	.....	.....	
Hope On	do	191	Atlantic	Nov. 24	Nov. 17, 1878	750	1,000	2,000	Formerly a schooner; added from Boston and rerigged.
Hunter	do	355	Pacific Ocean	Sept. 29	Ont, 1880	.....	.....	.....	Had taken at last report, October 30, 1880, at San Francisco, 960 sperm, 3,650 whale, 15,500 bone.
Janet	do	154	Atlantic	Apr. 14	Nov. 4, 1876	750	.....	.....	
Janus	do	276	do	July 20	Jan. 1, 1877	580	3,200	.....	
Jireh Perry	Ship	316	Indian Ocean	Sept. 27	July 3, 1879	2,150	.....	.....	
John Carver	Bark	319	Pacific Ocean	June 1	May 18, 1879	872	65	.....	Captain Dean died of heart disease July 28, 1876.
John Dawson	do	173	Indian Ocean	Nov. 25	Aug. 19, 1878	490	.....	.....	
John P. West	do	353	Pacific Ocean	May 4	July 9, 1878	2,250	.....	.....	
Josephine	do	363	North Pacific	Aug. 24	.....	.....	.....	.....	Abandoned in the Arctic 1876; had 1,400 whale, 10,000 bone; sent home 190 sperm.
Kathleen	do	206	Indian Ocean	July 19	May 6, 1879	1,560	70	.....	
Lætitia	do	208	do	Oct. 11	.....	920	.....	.....	Condemned 1879; sent home 670 sperm.
Lancer	do	295	Atlantic	June 15	Sept. 13, 1877	.....	.....	.....	
Linda Stewart	do	336	do	July 7	Oct. 30, 1877	1,105	.....	.....	

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage. Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	Remarks.
1875.									
New Bedford, Mass.—Continued.									
Midas	Bark	313	Atlantic	Oct. 26					Condemned at Flores October, 1878; 790 sperm.
Norman	do	316	North Pacific	Oct. 9	Out, 1880				Novembor 4, 1880; 800 sperm, 5,850 whale, 52,000 bone.
Ohio 2d	do	363	Atlantic	July 6	Oct. 18, 1878	1,800			
Osmanli	do	292	Pacific Ocean	July 20					Had taken at last report 210 sperm, 370 whale, 1,800 bone; lost off Altata March 8, 1878; value, $32,000.
Palmetto	do	215	Atlantic	Nov. 24	June 17, 1879	1,400	150	1,200	
Peru	do	259	do	Apr. 15	Aug. 5, 1878	940			Bought from New London 1874.
Pioneer	do	228	do	Apr. 10	June 13, 1877	975	3		
Petrel	Schooner	61	do		Sept. 16, 1876	120			
Platina	Bark	214	Indian Ocean	Oct. 28	Apr. 30, 1879	1,250			
President	do	257	Atlantic	Nov. 17	June 14, 1876	60			
President 2d	do	123	do	Apr. 29	July 5, 1877	900			Returned leaking.
Rainbow	do	351	North Pacific	Jan. 21	Out, 1880				At San Francisco October 30, 1880, 445 sperm, 8,950 whale, 86,000 bone.
Rousseau	do	305	Atlantic	July 14	Oct. 7, 1878	700	910		
Sappho	do	263	do	Dec. 1	May 14, 1879	1,490			
Sarah B. Hale	do	183	do	Apr. 27	Aug. 22, 1877	680			Bought from Portland, Me., 1874.
Sea Breeze	do	323	Pacific Ocean	Oct. 2	Out, 1880				Sold to San Francisco October, 1880; had taken 530 sperm, 5,975 whale, 49,500 bone.
Sea Fox	do	166	do	June 1	July 9, 1878	1,425	75		Bought from Westport 1874.
Seine	do	234	Atlantic	July 30	Oct. 22, 1876	575	25		
Spartan	do	294	do	May 12					Condemned at St. Michael's November 6, 1876; sent home 380 sperm.
Three Brothers	do	357	North Pacific	Oct. 12					Lost in Arctic 1877. Had taken 30 sperm, 2,213 whale, 14,920 bone, 2 casks ivory; value, $40,000.
Union	Schooner	66	Atlantic	June 8	Sept. 12, 1876	67	7		
Young Phœnix	Ship	355	Indian Ocean	July 8	Oct. 1, 1878	325	900	3,000	
Fairhaven, Mass.									
Cohannet	Schooner	83	Atlantic	May 1	Nov. 16, 1875	14			Bought from Marion 1874.
Marion, Mass.									
Admiral Blake	Schooner	84	Atlantic	May 26	Oct. 4, 1875	195	10		Sailed again in 1875; arrived March 31, 1876, with 80 sperm, 20 whale.
Westport, Mass.									
Sea Queen	Bark	195	Atlantic	Oct. 25	May 17, 1879	955			
Edgartown, Mass.									
Clarice	Bark	183	Atlantic	Nov. 3	Sept. 14, 1878	914	5		
Provincetwn, Mass.									
Agate	Schooner	81	Atlantic	Mar. 25	Aug. 2, 1876	310	100		
Alcyone	do	92	do	Apr. 10	Oct. 4, 1875	200			
Antarctic	do	101	do	Mar. 12	Oct. 21, 1875	100			
Arizona	do	92	do	Mar. 19	Sept. 22, 1875	160			
D. A. Small	Brig	119	do	Mar. 25	Aug. 16, 1876	300			Returned to whaling 1875
Edward Lee	Schooner	110		Mar. 11	Sept. 27, 1875	90			Bought from Newburyport 1874.
E. H Hatfield	do	89	Atlantic	Jan. 23	Sept. 4, 1876	290			
Ellen Rizpah	do	67	do	Mar. 19	Sept. 21, 1875		220		
Gage H. Phillips	do	107	do	Jan. 8	Sept. 7, 1875		450		Resumed 1875; sailed again on December 15, and arrived September, 1877; 515 sperm.
Lottie E. Cook	do	82	do	Mar. 19	Sept. 21, 1875	20	190		Bought 1874.
M. E. Simmons	do	105	do	Mar. 30	Sept. 26, 1875	170			
Quickstep	do	94	do	Jan. 23 Dec. 18	Sept. 24, 1875 Sept. 22, 1876	100 175	15		
Rising Sun	do	69	do	Mar. 27	Sept. 22, 1875	159	60		
Wm. A. Grozier	do	177	do	Mar. 25	Aug. 20, 1876	680	30		

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage. Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	Remarks.
1875.									
Boston, Mass.									
F. H. Moore	Brig	107	Atlantic	Oct. 12	Aug. 19, 1877	690	19	.....	
Lonisa A	Schooner	122	do	.....	Sept. 23, 1875	160	.....	.....	Replaced 1875.
				Dec. 1	Oct. 4, 1876	290	.....	.....	
Rosa Baker	Brig	108	do	June 22	Sept. 14, 1876	450	.....	.....	
Sarah E. Lewis	Schooner	96	do	Oct. 11	Sept. 22, 1876	135	.....	.....	
New London, Conn.									
Isabella	Brig	192	Cum. Inlet	June 8	Aug. 27, 1877	.....	400	4,000	Transferred to New Brunswick 1878.
Nile	Ship	293	do	May 4	Jan. 11, 1876	.....	380	5,000	
San Francisco, Cal.									
Florence	Bark	245	Pacific Ocean	Mar. 31	Nov. 3, 1875	.....	1,250	.....	
1876.									
New Bedford, Mass.									
Abbie Bradford	Schooner	115	Atlantic	May 4	Sept. 24, 1877	.....	750	10,000	
A Houghton	Bark	219	Hudson's Bay	May 23	.....	.....	.....	.....	Lost in Hudson Bay June 12, 1877; value, $24,000; rebuilt by the United States during the rebellion; had 200 whale, 4,500 bone.
Alaska	do	347	Pacific Ocean	June 1	May 28, 1880	320	203	1,217	
A. R. Tucker	do	145	Atlantic	Dec. 12	May 19, 1879	950	.....	.....	
Arnolda	do	340	do	July 6	Dec. 2, 1880	300	2,450	15,254	
Amelia	Schooner	95	do	Dec. 27	July 25, 1877	260	.....	.....	
Atlantic	Bark	291	Indian Ocean	Aug. 8	Sept. 26, 1879	925	950	7,000	
Bartholemew Gosnold	do	365	Atlantic	May 23	June 27, 1880	1,050	1,000	4,000	
Bounding Billow	do	262	Pacific Ocean	Sept. 13	May 21, 1880	650	170	600	Built at Chelsea 1854; sent home 1,975 sperm, 175 whale, 4,000 bone.
California	Ship	367	do	Nov. 8	Nov. 5, 1880	2,380	140	800	
Cicero	Bark	226	Atlantic	Sept. 6	Nov. 14, 1878	1,100	500	.....	
Cleone	do	346	North Pacific	May 23	.....	.....	.....	.....	Captain Stanton came home sick 1876; returned to whaling 1876; had taken at last report 130 sperm, 900 whale, 12,000 bone; lost in St. Lawrence Bay 1877.
Desdemona	do	236	Atlantic	July 20	Aug. 31, 1877	700	1,250	3,000	
E. B. Phillips	do	144	do	Nov. 4	July 20, 1880	1,365	.....	.....	Bought from Boston.
Eliza Adams	Ship	408	do	Sept. 6	Nov. 13, 1878	1,150	.....	.....	
E. H. Adams	Brig	107	do	Oct. 3	Sept. 13, 1878	320	.....	.....	
Europa	Bark	323	Pacific Ocean	Sept. 12	Nov. 9, 1879	1,032	3,079	23,684	
Franklin	Schooner	77	Atlantic	Aug. 29	June 11, 1878	150	.....	.....	Bought from New London.
Helen Mar.	Bark	324	North Pacific	July 6	Out, 1880	.....	.....	.....	November 4, 1880, had taken 470 sperm, 4,750 whale, 68,000 bone.
John & Winthrop	do	338	Pacific Ocean	July 19	July 24, 1880	2,000	230	1,650	
Laconia	do	157	Indian Ocean	May 30	.....	.....	.....	.....	Condemned at Mahe, March 7, 1879; had taken at last report, March 7, 1879, 815 sperm, 80 whale.
Marcella	do	166	do	Aug. 1	.....	.....	.....	.....	Condemned at St. Helena October 15, 1879; 840 sperm.
Mattapoisett	do	110	Atlantic	Aug. 7	May 4, 1878	960	142	.....	
Mercury	do	311	North Pacific	Dec. 14	.....	40	2,000	20,030	Lost in the Arctic October, 1879, with 1,000 oil, 4,000 ivory, 9,000 bone.
Merlin	do	246	Indian Ocean	Nov. 27	Aug. 19, 1880	1,100	.....	.....	Five pounds ambergris.
Milton	Ship	372	Pacific Ocean	Dec. 28	June 11, 1880	150	240	.....	Sent home 230 sperm, 40 whale, 2,100 bone.
Minnesota	do	243	do	July 11	June 27, 1879	1,150	70	600	Sold on the voyage 17 pounds ambergris; sold to Edgartown 1880.
Ohio	Bark	205	Atlantic	May 9	July 8, 1878	1,020	260	1,600	
Pedro Varela	Schooner	89	do	Nov. 6	Sept. 3, 1878	450	.....	....	
Petrel	do	61	do	Nov. 16	Sept. 15. 1877	283	17	.....	
President	Bark	257	do	July 26	Aug. 20, 1879	243	25	150	
Pacific	do	341	North Pacific	Dec. 13	Out, 1880	.....	.....	.....	September, 1880, had taken 260 sperm, 5,430 whale, 50,000 bone, 3,000 ivory.
Progress	do	358	do	Nov. 16	Out, 1880	.....	.....	.....	November 30, 1880, had taken 140 sperm, 4,800 whale, 58,000 bone.
Sarah	do	128	Atlantic	June 20	Sept. 3, 1878	720	.....	.....	

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whale bone.	
1876.									
New Bedford, Mass.—Continued.									
Sea Ranger	Bark	273	Atlantic	July 6	Apr. 13, 1879	1,150	1,290	11,000	
Seine	do	234	do	Nov. 9	Apr. 6, 1877	250	.....	.....	
Stafford	do	156	do	July 17	May 1, 1879	1,210	130	.....	
Sunbeam	do	255	do	May 2	May 29, 1878	1,280	.....	.....	
Swallow	do	326	do	Apr. 18	Sept. 4, 1878	1,100	.....	.....	Returned to whaling.
Triton	do	264	do	Aug. 25	Sept. 12, 1880	1,700	....	.....	
Thomas Pope	do	231	North Pacific	Dec. 7	Out, 1880	.....	...	.....	At San Francisco October 29, 1880, 230 sperm, 3,700 whale, 50,500 pounds bone.
Tropic Bird	do	145	Atlantic	May 2	July 30, 1878	725	.....	.....	
Varnum H. Hill	Brig	126	do	Sept. 7	Sept. 13, 1878	335	.....	.....	Bought from Provincetown.
Wave	Bark	150	do	Nov. 15	June 30, 1879	700	.....	.....	
Fairhaven, Mass.									
Cohannet	Schooner	83	Atlantic	May 2 Nov. 14	Sept. 22, 1876	75	.....	.....	
Ellen Rodman	do	73	do	Dec. 1	Aug. 3, 1878	263	5	.....	
Marion, Mass.									
Admiral Blake	Schooner	84	Atlantic	May 16	Oct. 8, 1876	90	....	.....	Sailed again in December, and arrived September 22, 1877; 155 sperm.
William Wilson	do	92	do	Mar. 27 Nov. 27	Sept. 14, 1876 Oct. 2, 1877	100 85	 125	....	
Dartmouth, Mass.									
Cape Horn Pigeon	Bark	212	Pacific Ocean	Sept. 6	June 22, 1880	660	3,050	.....	
Westport, Mass.									
A. Hicks	Bark	303	Indian Ocean	Oct. 18	Sept. 19, 1878	600	.....	.....	Fifteen pounds ambergris.
Mermaid	do	273	do	June 20	Apr. 12, 1879	1,700	....	.....	
Edgartown, Mass.									
Mary Frazier	Bark	301	Atlantic	Oct. 25	Aug. 20, 1880	800	1,000	2,200	
Provincetown, Mass.									
Alcyone	Schooner	92	Atlantic	Apr. 20	Aug. 22, 1877	460	40	.....	
Antarctic	do	101	do	Jan. 22	Sept. 26, 1876	115	80	.....	
Arizona	do	79	do	Jan. 24	Sept. 15, 1876	80	20	.....	
B. F. Sparks	do	92	do	May 11	Aug. 30, 1877	310	150	.....	
Carrie W. Clark	do	116	do	Mar. —	Sept. 20, 1877	380	.....	.....	
Charles Thompson	do	152	do	Jan. 24	Sept. 11, 1877	420	20	.....	
C. L. Sparks	do	96	do	May 1	Aug. 20, 1877	310	200	.....	
Edward Lee	do	110	do	Jan. 24	Sept. 16, 1876	.....	180	.....	
E. H. Hatfield	do	89	do	Jan. 22	Aug. 29, 1876	194	9	.....	Sailed again in December, and arrived June 22, 1878, with 295 sperm.
Ellen Rizpah	do	67	do	Jan. 24	July 30, 1876	110	200	.....	
Gracie M. Parker	do	82	do	Feb. 21	Sept. 4, 1876	165	200	...	
H. M. Simmons	do	116	do	Apr. 20	Sept. 1, 1877	240	220	..	
Lottie E. Cook	do	82	do	Jan. 24	Aug. 17, 1877	75	200	....	
M. E. Simmons	do	105	do	Feb. 21	Sept. 15, 1876	150	200	.....	
N. J. Knights	do	70	do	Jan. 8	Aug. 25, 1876	160	125	.....	
Quickstep	do	94	do	Nov. 11	Aug. 5, 1877	430	.....	.....	
Rising Sun	do	69	do	Feb. 18	Sept. 12, 1876	100	200	.....	
Boston, Mass.									
Heman Smith	Brig	122	Atlantic	May 12	Sept 11, 1877	50	25	.....	
William Martin	Schooner	93	do	May 8	Oct. 2, 1876	225	.....	.....	
Sarah E. Lewis	do	96	do	Dec. 18	Sept. 18, 1877	200	80	.....	
New London, Conn.									
Nile	Ship	293	Cum. Inlet	June 24	Nov. 17, 1876	.....	* 550	6,500	

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1876.									
San Francisco, Cal.									
Clara Bell	Bark	196	North Pacific.	Apr. 18					Abandoned in the Arctic 1876; had 650 whale.
Florence	do	245	do	Mar. 3	Oct. 22, 1876		700		Sailed again November 29, and returned October 26, 1877; 1,200 whale.
1877.									
New Bedford, Mass.									
Amelia	Schooner	95	Atlantic	Oct. 2	Oct. 3, 1879	170			
A. J. Ross	Brig	197	Hudson Bay	July 17	Apr. 10, 1878		243	2,300	
Attleboro	Bark	179	Atlantic	July 31	Sept. 6, 1880	525	40	500	
Aurelia	Schooner	48	do	July 2 Oct. 6	Sept. 16, 1877 Aug. 13, 1878	40 120			
Catalpa	Bark	202	do	Apr. 25	July 1, 1879	300	80		Withdrawn 1879.
Com. Morris	do	338	do	Apr. 10	Dec. 12, 1880	2,690			
Daniel Webster	do	327	do	Apr. 17	Oct. 23, 1880	200	530	2,400	Sent home 950 sperm, 20 whale.
Fanny Brynes	Schooner	66	do	Dec. 3	Aug. 16, 1879	208	25		
F. H. Moore	Brig	107	do	Sept. 18					Condemned at St. Helena, October, 1879; 340 sperm, 30 whale.
Fleetwing	Bark	328	North Pacific.	Nov. 6					October 29, 1880, at San Francisco; 175 sperm, 1,900 whale, 22,500 bone.
Frs. A. Barstow	Brig	128	Atlantic	June 27	Sept. 14, 1878	400			
Gay Head	Bark	265	do	Aug. 29	Out, 1880				September 29, 1880, at St. Helena; 1,140 sperm, 290 whale.
George and Mary	do	105	do	June 20	May 22, 1879	800	67		
George and Susan	do	343	do	Oct. 16	Out, 1880				August 27, 1880, at Montevido; 190 sperm, 2,730 whale.
Golden City	Schooner	80	do	June 19	Sept. 21, 1878	365	40		
Hadley	Bark	163	do	Sept. 4	Aug. 6, 1878	210	10		Broken up in 1878.
Horatio	Ship	349	Pacific	Aug. 7	Out, 1880				June 17, 1880, at Bay of Islands; 1,570 sperm, 250 whale.
J. A. Howland	Bark	355	do	Sept. 23	Out, 1880				September 10, 1880, off Talachuano; 1,700 sperm, 450 whale.
James Allen	do	348	do	Sept. 18	Out, 1880				September 3, 1880, at Valparaiso; 1,770 sperm, 340 whale.
Janet	do	154	Atlantic	Feb. 20					November 23, 1879, abandoned at sea; 900 whale.
Janus	do	276	Pacific	Mar. 27	Oct. 19, 1879	1,070	75		
John Howland	do	384	North Pacific	Dec. 26					November 4, 1880, at San Francisco; 190 sperm, 2,510 whale, 29,000 bone.
Josephine	do	385	Atlantic	May 15	June 21, 1880	800	3,400	21,000	
Lagoda	do	371	do	Dec. 18	Out, 1880				October 27, 1880, at Fayal; 1,420 sperm, 75 whale.
Lancer	do	295	do	Oct. 23	Out, 1880				August, 1880, at sea; 665 sperm, 400 whale.
Linda Stewart	do	236	Pacific	Nov. 27	Out, 1880				July 29, 1880, at Payta; 1,630 sperm. 50 whale.
Lucretia	do	312	do	July 17	Out, 1880				August, 1880, at sea; 1,640 sperm.
Mabel	do	188	Indian	Sept. 18	Out, 1880				January 30, 1880, at Hobartown; 495 sperm, 80 whale.
Mary and Susan	do	327	Pacific	Aug. 14	Out, 1880				April 25, 1880, at sea; 750 sperm.
Minerva	do	337	Atlantic	Apr. 17	Sept. 3, 1880	2,410	45	400	
Nautilus	do	277	Pacific	Aug. 7	Out, 1880				August, 1880, at sea; 1,600 sperm, 65 whale.
Ospray	do	173	Atlantic	May 29	Sept. 3, 1879	470			
Petrel	do	257	Indian	July 10	June 19, 1880	1,850	25	270	
Petrel	Schooner	61	Atlantic	Nov. 7	Oct. 3, 1878	85			
Pioneer	Bark	228	do	Aug. 15	June 15, 1880	870	60		
President 2d	do	123	do	Sept. 25	Out, 1880				October 13, 1880, at Teneriffe; 800 sperm, 370 whale.
Reindeer	do	357	do	June 12	Oct. 18, 1880	2,870			
Roman	do	379	North Pacific.	Feb. 20					Bought from New London 1876; lost near Magdalena Bay, California, 1878; had taken 80 sperm, 700 whale.
Sarah B. Hale	do	183	Atlantic	Oct. 2					Condemned at St. Helena April, 1880; had taken 180 sperm, 590 whale.
Seine	do	234	do	May 25	Sept. 14, 1879	280	350		
Stamboul	do	260	Pacific	Nov. 21	Out, 1880				August, 1880, at sea; 1,015 sperm
Tamerlane	do	372	Atlantic	Sept. 25	Oct. 6, 1880	1,300	200		

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1877.									
Provincetown, Mass.									
Agate	Schooner	81	Atlantic	Apr. 6	Sept. 13, 1878	170	100		
Antarctic	do	101	do	May 8	Sept. 14, 1878	340	100		
Arizona	do	79	do	Apr. 6	Sept. 11, 1877	130			
Carrie W. Clark	do	116	do	Nov. 7	Mar. 31, 1879	480			
D. A. Small	Brig	119	do	Mar. 15	Sept. 17, 1878	630			
Edward Lee	Schooner	110	do	Feb. 15	Sept. 12, 1878	380	120		
Ellen Rizpah	do	67	do	Feb. 15	Aug. 13, 1877	125	200		
Gracie M. Parker	do	82	do	Feb. 15	July 25, 1877	175	250		
H M. Simmons	do	116	do	Oct. 30	Sept. 14, 1879	400	10		
Lottie E. Cook	do	82	do	Feb. 15	Aug. 17, 1877	125	170		
M. E. Simmons	do	105	do	Nov. 1	Sept. 14, 1877	160	300		
N. J. Knight	do	70	do	Feb. 5	Sept. 1, 1877	55	70		
Quickstep	do	94	do	Nov. 12	Sept. 21, 1878	240	130		
W A. Grozier	do	117	do	Mar. 15	Sept. 18, 1878	500			
Rising Sun	do	69	do	Mar. 1	Sept. 17, 1877	100	130		
Boston, Mass.									
Heman Smith	Brig	123	Atlantic	Nov. 12	Oct. 6, 1879	150			
Louisa A	Schooner	122	do	June 29	July 17, 1879	340	35		
Wm. Martin	do	90	do	Apr. 16	Sept. 18, 1878	430	25		
New London, Conn.									
Era	Schooner	134	Hudson Bay	July 11	Dec. 4, 1878		20		
L. P. Simmons	do	89	Cum. Inlet	May 30	Nov. 27, 1878		100	2,000	
Nile	Bark	292	Hudson Bay	July 11	Dec. 1, 1878		350	8,000	Still in port, 1880.
Marion, Mass.									
Admiral Blake	Schooner	84	Atlantic	Nov. 21	Sept. 3, 1878	225	5		
Wm. Wilson	do	92	do	Dec. 9	Sept. 18, 1878	90			
Dartmouth, Mass.									
Matilda Sears	Bark	231	Pacific	Aug. 28	Out. 1880				Last report September 20, 1880; 510 sperm. 1,050 whale.
Westport, Mass.									
Union	Schooner	66	Atlantic	Feb. 27	Oct. 2, 1877	52	4		Sailed again October 25, 1877; returned October 7. 1878, with 85 sperm.
Edgartown, Mass.									
Perry	Bark	149	Atlantic	Dec. 10			840		Wrecked in hurricane at Bermuda, August 29, 1880.
New York, N. Y.									
Henry Trowbridge	Bark	176	Atlantic	Oct. 30	May 14, 1879		200		
San Francisco, Cal.									
Dawn	Bark	260	Pacific	Dec. 8	Nov. 15, 1878		800		
1878.									
New Bedford, Mass.									
Abbio Bradford	Schooner	115	Hudson Bay	May 8	Aug. 31, 1879		550	8,000	
Abbott Lawrence	Brig	160	do	May 4	Sept. 1, 1879		190	3,000	
Adeline Gibbs	Bark	327	Atlantic	July 2	Oct. 26, 1880	800	120	600	
A. J. Ross	Brig	197	Hudson Bay	May 15					August 16, 1878, lost at Rose Welcome, Hudson Bay; 20 barrels whale.
Astoria	Schooner	73	Atlantic	May 22 / Oct. 15	Sept. 7, 1878	45	350		Sailed again October 1, 1879; October 22, 1879, at Montevideo with 150 whale; condemned at Cape Good Hope March, 1880.
Bertha	Bark	177	do	Jan. 15	Out, 1880				September 13, 1880, coast of Africa; 735 sperm, 100 whale.
Caleb Eaton	Schooner	110	do	June 25	Sept. 23, 1879	200	230	3,000	
Canton	Bark	239	Pacific	Sept. 12	Out, 1880				July 1, 1880, at Auckland; 900 sperm.

Voyages of American whaling vessels, 1870 *to* 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1878.									
New Bedford, Mass.—Continued.									
Chas. W. Morgan	Bark	314	Atlantic	July 17	Out, 1880				September 27, 1880, at Kabenda; 960 sperm, 1,350 whale.
Chas. W. Morse	Schooner	112	do	May 14	Aug. 23, 1879	290	60	750	
Coral	Bark	361	North Pacific	Mar. 4					Sailed from San Francisco, where she had been idle for a year; condemned and refitted. October 28, 1880, at San Francisco; 3,850 whale, 37,000 bone.
Draco	do	258	Atlantic	Aug. 6					Condemned at St. Helena April 3, 1880; had taken 470 sperm, 590 whale.
E. B Conwell	Schooner	91	do	May 6	July 28, 1879	610	100	880	
E. H. Adams	Brig	107	do	Oct. 29	Sept. 7, 1880	450			
Frs. A. Barstow	do	128	do	Nov. 7	Sept. 12, 1880	460			
Franklin	Schooner	77	Hudson Bay	July 25	Aug. 31, 1879		40	218	
Golden City	do	80	Atlantic	Nov. 29	Mar. 18, 1880	340	60	500	
Isabella	Brig	132	Hudson Bay	May 14	Aug. 31, 1879		200	4,000	
James Arnold		346	Pacific	Oct. 8	Out, 1880				April 15, 1880, at Bay of Islands; 700 sperm, 180 whale.
John P. West	Bark	353	do	Oct. 8	Out, 1880				October 7, 1880, at Paita; 900 sperm.
Lonisa	do	303	Atlantic	July 9	Out, 1880				July 27, 1880, at sea; 215 sperm, 580 whale.
Lydia	do	329	Pacific	Apr. 16	Oct 21, 1880	965			
Mars	do	256	Atlantic	Oct. 8	Out, 1880				July 27, 1880, at sea; 525 sperm, 1,300 whale.
Mattapoisett	do	110	Cum. Inlet	May 28	Sept. 7, 1879		150	2,000	
Morning Star	do	238	Atlantic	Oct. 15	Out, 1880				October 13, 1880, at Teneriffe; 430 sperm, 110 whale.
Napoleon	do	322	Pacific	Aug. 1	Out, 1880				September 29, 1880, at Panama; 300 sperm, 600 whale.
Niger		412	do	Aug 7	Out, 1880				September 25, 1880, at St. Helena; 735 sperm, 1,130 whale.
Ocean				July 1	Sept. 26, 1878	40			
Ohio	Bark	205	Atlantic	Sept. 3	Out, 1880				September 24, 1880, at Montevideo; 255 sperm, 835 whale.
Ohio, 2d	do	363	do	Nov. 19	Out, 1880				July 15, 1880, at sea; 665 sperm, 875 whale.
Pedro Varela	Schooner	90	do	Oct. 22	Oct. 12, 1880	760			
Peru	Bark	259	do	Nov. 12	Out, 1880				October 11, 1880, at Fayal; 1,120 sperm.
Petrel	Schooner	61	do	Nov. 5	Aug. 20, 1879	87			
Sarah	Bark	128	do	Oct. —					Lost, seven hours out from home; only three men saved.
Sea Fox	do	160	Pacific	Oct. 1	Out, 1880				September 19, 1880, at Panama; 750 sperm, 750 whale.
Sunbeam	do	235	Atlantic	July 9	Out, 1880				August 28, 1880, at Mayumba; 495 sperm, 850 whale.
Surprise	Schooner	53	do	Oct. 15	Aug. 23, 1879	157			
Swallow	Bark	326	Pacific	Oct. 15	Out, 1880				October 16, 1880, at Montevideo; 470 sperm, 1,070 whale.
Tropic Bird	do	145	Atlantic	Sept. 3	Out, 1880				September 30, 1880, at Fayal; 845 sperm, 70 whale.
Varnum H. Hill	Brig	126	do	Oct. 29	July 20, 1880	380			
Wanderer	Bark	303	do	June 4	Out, 1880				September 16, 1880, at sea; 1,280 sperm, 550 whale.
Marion, Mass.									
Admiral Blake	Schooner	84	Atlantic	Nov. 19	July 21, 1879	40			
Wm. Wilson	do	92	do	Nov. 25	Oct. 2, 1879	120			
Edgartown, Mass.									
Clarice	Bark	183	Atlantic	Nov. 7	Out, 1880				Had taken, October 5, 1880, 725 sperm.
Tropic Bird	Brig	176	North Pacific	Oct. 14	Out, 1880				Had taken, October 21, 1880, 195 sperm, 1420 whale, 16,300 bone.
Provincetown, Mass.									
Alcyone	Schooner	92	Atlantic	May 3	Sept. 1, 1879	170	25		
Arizona	do	73	do	Apr. 15					Lost at sea August, 1879; last report, 300 sperm, 40 whale.
B. F. Sparks	do	91	do	May 1	Sept. 1, 1879	325			
Chas. Thompson	do	152	do	Feb. 16	July 22, 1879	225	40		

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1878.									
Provincetown, Mass.—Continued.									
Clara L. Sparks	Schooner	95	Atlantic	May 3	June 5, 1879	200			
E. H. Hatfied	do	82	do	July 6	Sept. 18, 1878				
Ellen Rizpah	do	67	do	Feb. 4	Sept. 7, 1878	80	170		
Express	do	61	do	Mar. 14	Sept. 10, 1878	25	200		
Gaze H. Phillips	do	106	do	Apr. 25	Aug. 30, 1880	1,000			
Grace Parker	do	81	do	Jan. 30	Sept. 12, 1878	90	210		
Lottie E. Cook	do	82	do	Mar. 14	Aug. 22, 1879	390	100		
M. F. Simmons	do	104	do	Feb. 4	Sept. 14, 1878	100	250		
M. G. Curren	do	102	do	Feb. 6	Sept. 16, 1878	90	300		
N. J. Knight	do	69	do	Feb. 14	Sept. 1, 1878	70	220		
Boston, Mass.									
Rosa Baker	Brig	108	Atlantic	July 17	June 3, 1879	385			
Sarah E. Lewis	Schooner	86	do	May 1	Nov. 23, 1878				
San Francisco, Cal.									
Florence	Bark	245	North Pacific	April 18					Lost in Arctic 1878; had taken 650 whale.
1879.									
New Bedford, Mass.									
Alice Knowles	Bark	302	Atlantic	June 10	Out, 1880				July 12, 1880, at sea; 550 sperm, 240 whale.
Amelia	Schooner	95	do	Nov. 2	Sept. 16, 1880	160	5		
Caleb Eaton	do	110	do	Nov. 1	Out, 1880				October 4, 1880, at Bermuda, dismasted; 200 sperm.
Chas. W. Morse	do	112	do	Oct. 30	Out, 1880				October 6, 1880, at St. Michael's; 325 sperm, 310 whale.
Cicero	Bark	226	do	May 22	Out, 1880				August 17, 1880, at Maynmba; 330 sperm, 190 whale.
E. B. Conwell	Schooner	91	do	Oct. 13	Sept. 3, 1880	380	20	200	
Ellen Rodman	do	73	do	May 14	Aug. 18, 1880	205			
Eliza Adams		408	do	Sept. 17	Out, 1880				September 25, 1880, at St. Helena; 425 sperm, 100 whale.
Falcon	Bark	285	do	June 3	Out, 1880				July 27, 1880, at sea; 450 sperm, 80 whale.
Fanny Brynes	Schooner	66	do	Oct. 30	Out, 1880				September, 25, 1880, at Fayal; 25 whale.
George and Mary	Bark	105	Hudson Bay	June 23	Sept. 22, 1880		70	2,4.9	Mate froze to death while going for food; brought home remains of Dr. Irving, of Sir John Franklin expedition.
Greyhound	do	178	Atlantic	May 14	Out, 1880				July 26, 1880, at sea; 195 sperm, 35 whale.
Hercules	do	311	do	Oct. 14	Out, 1880				October 16, 1880; 815 sperm, 510 whale, 540 bone.
Janus	do	276	Pacific	Dec. 16	Out, 1880				September 2, 1880, at Montevideo; 170 sperm, 200 whale.
Jireh Perry	do	316	Atlantic	Sept. 1	Out, 1880				September 1, 1880, off St. Helena; 535 sperm, 150 whale.
John Dawson	do	173	do	June 12	Out, 1880				September 21, 1880, at Panama; 170 sperm, 480 whale.
Mary and Helen	Steamer	420	North Pacific	Sept. 9	Out, 1880				October 10, 1880, at San Francisco; 265 sperm, 2,350 whale, 45,000 bone.
Mattapoisett	Bark	110	Atlantic	Oct. 25	Out, 1880				September 30, 1880, at Fayal; 175 sperm.
M. E. Simmons	Schooner	105	do	May 14	Oct. 7, 1880	300	9		Transferred from Provincetown.
Ocean	Bark	288	Pacific	May 22	Out, 1880				October 13, 1880, at St. Catherine's; 750 sperm, 280 whale.
Plavina	do	214	Atlantic	June 11					July 20, 1880, at sea; 200 sperm.
Petrel	Schooner	61	do	Oct. —					Lost in gale when few days out; all but five lost.
President	Bark	257	do	Sept. 30	June 19, 1880	243	25	150	
Sappho	do	263	Pacific	Aug. 5	Out, 1880				August 18, 1880, at Talcahuano; 220 sperm.
Sea Ranger	do	273	Atlantic	June 4	Out, 1880				June 15, 1880, at sea; 280 sperm, 285 whale.
Stafford	do	156	do	Sept. 3	Out, 1880				June 15, 1880, at sea; 370 sperm.
Surprise	Schooner	53	do	Nov. 1	Aug. 1, 1880	65	85	1,000	
Union	do	66	do	May 13	May 18, 1880	18			

Voyages of American whaling vessels, 1870 to 1880– Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1879.									
New Bedford, Mass—Continued.									
Vigilant	Bark	215	North Pacific	Jan. 22					Lost in Arctic 1879; up to October 10, 1879, had taken 400 whale, 6,000 bone.
Wave	do	150	Atlantic	Aug. 20	Out, 1880				October 16, 1880, at Fayal; 290 sperm.
Westport, Mass.									
A. Hicks	Bark	303	Atlantic	June 24	Out, 1880				September 25, 1880, at Fayal; 860 sperm, 140 whale.
Edgartown, Mass.									
Emma Jane	Schooner	86	Atlantic	Nov. 30	Out, 1880				Had taken, November 6, 1880, 640 sperm, 30 whale.
Boston, Mass.									
Rosa Baker	Brig	108	Atlantic	July 30	Aug. 18, 1880	350			
Sarah E. Lewis	Schooner	86	do	Mar. 20	Sept. 3, 1879	50			
Wm. Martin	do	90	do	May 15	Sept. 18, 1879	150			Sailed again November 17, 1879, and returned September 8, 1880, with 100 sperm, 12 whale.
New London, Conn.									
Delia Hodgkins	Schooner	95	Cum. Inlet	June 15	Nov. 22, 1879		300		
Era	do	134	Hudson Bay	June 23	Nov. 24, 1880		550	8,000	
Provincetown, Mass.									
Agate	Schooner	81	Atlantic	Feb. 3	Aug. 23, 1879	60	260		
Antarctic	do	100	do	Mar. 20	Sept. 29, 1879	204	120		
Carrie W. Clark	do	116	do	July 10	Out, 1880				October 9, 1880, at Teneriffe; 350 sperm.
Clara L. Sparks	do	95	do	July 11	Sept. 12, 1880	160			
D. A. Small	Brig	119	do	May 7	Oct. 3, 1880	430	40		
Edward Lee	Schooner	109	do	Feb. 3	Aug. 3, 1880	70	190		
Ellen Rizpah	do	66	do	Feb. 3	Aug. 3, 1879	135	180		
Gracie M. Parker	do	81	do	Jan. 14	Sept. 13, 1877	320			
Mary G. Curren	do	102	do	Feb. 3	Sept. 7, 1879	150	350		
W. J. Knight	do	69	do	Feb. 3	Aug. 26, 1879	40	200		
Rising Sun	do	69	do	Feb. 4	Sept. 1, 1879	330	80		Sailed again November 12, 1879, and returned September 12, 1880; 65 sperm, 80 whale.
Wm. A. Grozier	do	116	do	Apr. 24	July 12, 1880	735	35		
Quickstep	do	93	do	July 3	Sept. 5, 1880	220			
San Francisco, Cal.									
Alaska	Schooner	149	North Pacific	Mar. 28	Dec. 3, 1879	400	6,000		1,200 pounds walrus ivory.
Dawn	Bark	260	do	Mar. 16	Nov. 17, 1879		850	4,000	
Francis Palmer	do	195	do	Sept. 8	Nov. 17, 1879		500	3,500	
Hidalgo	Brig	175	do	Apr. 2	Nov. 11, 1879		120		
1880.									
New Bedford, Mass.									
A. R. Tucker	Bark	145	Atlantic	Apr. 13					October 25, 1880, at Fayal; 15 sperm, 45 whale.
Abbie Bradford	Schooner	115	Hudson Bay	May 6					Previous to August 13, 1880, Hudson Strait; 40 whale.
Abbott Lawrence	Brig	160	do	Apr. 6					August 13, 1880, Hudson Strait.
Adelia Chase	Schooner	85	Atlantic	Feb. 16					July 3, 1880, sailed from Bravo.
Alaska	Bark	347	Pacific	Sept. 14					October 14, 1880, at sea; 135 sperm.
Atlantic	do	291	North Pacific	Nov. 2					
Attleboro	do	179	Atlantic	Oct. 26					
Belvedere	Steamer	440	North Pacific	Aug. 17					August 27, 1880, at sea, latitude 41°, longitude 56°.
Cape Horn Pigeon	Bark	212	Pacific	Aug. 24					September 13, 1880, at sea; 100 sperm.
Daniel Webster	do		North Pacific	Nov. —					
E. B. Cornwell	Schooner	91	Atlantic	Nov. 12					
E. H. Adam	Brig	107	do	Sept 28					October 6, 1880, at sea, latitude 35°, longitude 59° 30′.

Voyages of American whaling vessels, 1870 *to* 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1880.									
New Bedford, Mass.—Continued.									
Europa	Bark	323	Atlantic	Apr. 7					October 24, 1880, at Teneriffe; 300 sperm.
Franklin	Schooner	77	do	June 14					September 29, 1880, at St. Michael's.
Gazelle	Bark	273	do	May 11					September 27, 1880, at Teneriffe; 90 sperm.
Golden City	Schooner	85	do	June 2					No date, at sea, latitude 31° 05′, longitude 76° 34′; 195 sperm.
Isabella	Brig	132	Hudson Bay	May 31					August 10, 1880, in Hudson Bay.
John Carver	Bark	319	Atlantic	May 18					October 5, 1880, at Fayal; 130 sperm.
Josephine	do	385	do	Oct. 7					
Kathleen	do	206	do	May 5					September, 1880, at Fayal; 265 sperm.
Lottie E. Cook	Schooner	82	do	Feb. 11 Oct. 21	Sept. 12, 1880	65	150		Transferred from Provincetown. No report to October 20, 1880.
Lydia	Bark	329	do	Nov. 23					
M. E. Simmons	Schooner	105	do	Nov. 12					
Mermaid	Bark	273	do	June 1					October 25, 1880, at Fayal; 280 sperm.
Milton		373	do	Oct. 6					
Northern Light	do	385	North Pacific	Sept. 22					
Ospray	do	173	Atlantic	May 4					September 28, 1880, at Teneriffe; 20 sperm.
Palmetto	do	215	do	June 3					September 3, 1880, at Fayal; 70 sperm.
Petrel	do	257	do	Oct. 19					
Pioneer	do	228	do	Aug. 17					August 26, 1880, at sea, latitude 36° 08′, longitude 55° 04′.
Seine	do	234	do	July 22					October 3, 1880, at Teneriffe; 500 sperm.
Surprise	Schooner	53	do	Oct. 19					November 6, 1880, at sea; 1 sperm whale.
Varnum H. Hill	Brig	126	do	Sept. 29					October 28, 1880, latitude 32° 30′, longitude 73° 40′; 4 whales.
Marion, Mass.									
Admiral Blake	Schooner	84	Atlantic	May 26	Oct. 12, 1880	170			
William Wilson	do	92	do	June 24					October 19, 1880, at Teneriffe; 30 sperm.
Edgartown, Mass.									
E. H. Hatfield	Schooner		Atlantic	June 15	Oct. 27, 1880	90			
Mary Frazier	Bark	301	do	Nov. 3					
Minnesota	do	243	do	Nov. 18					
Robt. Morrison	do	314	do	Apr. 16					Had taken, August 28, 135 sperm.
E. H Hatfield			do	Nov. 30					Arrived from previous trip October 27, 1880, with 90 sperm.
Provincetown, Mass.									
Agate	Schooner		Atlantic	Feb. 6	Sept. 13, 1880	70	260		
Alcyone	do	92	do	Mar. 17					October 6, 1880, had 85 sperm.
Antarctic	do	101	do	Apr. 28					November 4, 1880, at sea; 165 sperm.
B. F. Sparks	do	92	do	May 3					October 14, 1880, at St. Michael's; 30 sperm.
Crown Point	do	96	do	May 3					
Edward Lee	do	110	do	Nov. 1					
Gracie M. Parker	do		do	Jan. 19	Sept. 17, 1880	65			
H. M. Simmons	do	116	do	Jan. 19					October 20, 1880, at Teneriffe; 295 sperm, 200 whale.
Ellen Rizpah	do		do	Feb. 14	Aug. 27, 1880	130	180		
N. J. Knight	do		do	Feb. 11	Sept. 17, 1880		220		
Mary G. Curren	do	102	do	Feb. 19	Sept. 16, 1880	80	115		
Boston, Mass.									
E. F. Herriman	Bark	395	North Pacific	Nov. 8					
Herman Smith	Brig	123	Atlantic	Oct. 6					
Sarah E. Lewis			do	Jan. 28	Sept. 8, 1880	100	12		
New London, Conn.									
Delia Hodgkins	Schooner	95	Atlantic	Nov. 23					No report to December, 1880
Pilot's Bride	do	194	Desolation	Apr. 27					No report to December, 1880.

Voyages of American whaling vessels, 1870 to 1880—Continued.

	Rig.	Tonnage.	Whaling ground.	Date of sailing.	Date of return.	Result of voyage.			Remarks.
						Barrels sperm oil.	Barrels whale oil.	Pounds whalebone.	
1880.									
New London, Conn.—Continued.									
Roswell King	Schooner	134	Desolation	May 11					Last report June 14, 1880, at Flores with 35 whale.
Trinity	Bark	317	do	June 1					No report to December, 1880.
Wanderer	Schooner	151	Atlantic	Aug. 12					
San Francisco, Cal.									
Alaska	Schooner	149	North Pacific	Mar. 13	Oct. 15, 1880		500	22,900	Also 270 walrus in number, and 2,000 pounds walrus ivory.
Francis Palmer	Bark	195	do	Mar. 17	Sept. 25, 1880		1,000		
Dawn	do	260	do	Mar. 2	Oct. 27, 1880		1,400		
Hidalgo	Brig	175	do	Mar. 13	Oct. 4, 1880		800		

11. REVIEW OF WHALE FISHERY OF FOREIGN NATIONS.

In 1846 the combined whaling fleet of the world numbered nearly one thousand sail, of which number seven hundred and twenty-nine were under the American flag, the others hailing from Great Britian, Germany, France, and other foreign countries.

In 1880 the entire fleet numbered not more than two hundred and fifty vessels, one hundred and seventy-one of which were American. The only foreign country that now has a fleet of large vessels in the whale fishery is Scotland, which employs about twenty large steamers in the whale fishery of East Greenland and in Davis Strait. Norway has a fleet of small-sized steamers and sail vessels employed in whaling chiefly along shore. Australia and New Zealand have a few vessels engaged in whaling in the vicinity of those countries, and Chili owns a few vessels cruising along the South American coast. Canada and Newfoundland also employ a few vessels in whaling, though most of their time is spent in sealing.

It is impossible to tell when and where the fishing for whales originated. In many of the ancient records there are references to these great animals and accounts of their capture. Most writers on the subject think that the Norwegians were the first to make a business of catching whales, and the account of a voyage to Norway by one Othere, a native of Heligoland, is frequently quoted to show that before the year 890 they had been captured on the coast of Norway. The Norwegians may have been the first to engage in the whale fishery, but they pursued no systematic plan, and their work should be regarded the same as the fishing expeditions of the Eskimos. The Biscayans were probably the first who prosecuted the fishery as a regular commercial pursuit, and they carried it on with great vigor in the twelfth, thirteenth, and fourteenth centuries.

The whales taken by the Biscayans were probably the finback species, which doubtless frequented the bays and seas of Europe in pursuit of herring. As they became scarce near home they were hunted in other parts, as at Iceland, upon the banks of Newfoundland, and in the Gulf of Saint Lawrence.

The first authentic account of the English people engaging in whaling is in 1594, when several vessels were sent to Cape Breton fitted for hunting the walrus and whale. One of these vessels, the Grace of Bristol, brought home to England a quantity of whale fins or whalebone,

which was found at Saint George's Bay, where it was said to have been left three years before by a wrecked Biscayan ship. This whalebone is supposed to be the first ever imported into England. There are no records to show to what extent the fishery was carried on at this early period by either the Biscayans or the English. If the industry had been very important some historical data would remain. When this fishery by the French ceased is a matter of doubt, but it was probably about the close of the sixteenth century.

EARLY WHALING AT GREENLAND AND SPITZBERGEN.

The Spitzbergen whale fishery was the first of great importance. It was begun by the English in 1611, when two vessels made voyages there under the direction of Capt. Jonas Poole, who had previously visited the coast. The island of Spitzbergen had been discovered about the year 1596 by explorers in search of a passage to India, who, though they failed of their main object, made known the haunts of the polar whale. Although the English were the first to enter upon the new fishery, they were not the most energetic, for the Dutch soon outstripped them in the number of vessels engaged and the profits of the voyages. The first effort of the English was to obtain supreme control of whaling in the seas about Spitzbergen on the pretext that the island had been discovered by an Englishman. The Muscovy Company, under whose auspices the first English whalers were sent out, obtained a royal charter prohibiting all other nations from fishing in the seas round Spitzbergen. Efforts were made to enforce this charter by force, and several encounters took place between the Dutch and English vessels, until it was finally agreed to divide the island and adjacent waters into districts that were assigned, respectively, to the English, Dutch, Hamburgers, French, Danes, &c.

Whales were so abundant that extra vessels were sent out to bring home the oil and bone, and a village was built on the island of Spitzbergen, where the blubber was tried out. "Nothing can give a more vivid idea of the extent and importance of the Dutch fishery in the middle of the seventeenth century than the fact that they constructed a considerable village, the houses of which were all previously prepared in Holland, on the Isle of Amsterdam, on the northern shore of Spitzbergen, to which they gave the appropriate name of *Smeerenberg* (from *smeeren*, to melt, and *berg*, a mountain). This was the grand rendezvous of the Dutch whale ships, and was amply provided with boilers, tanks, and every apparatus required for preparing the oil and bone. But this was not all. The whale ships were attended with a number of provision ships, the cargoes of which were landed at Smeerenberg, which abounded during the busy season with well furnished shops, good inns, &c., so that many of the conveniences and enjoyments of Amsterdam were found within about eleven degrees of the pole. It is particularly mentioned that the sailors and others were every morning supplied with what a Dutchman regards as a very great luxury, *hot rolls* for breakfast. Batavia and Smeerenberg were founded nearly at the same period, and it was for a considerable time doubted whether the latter was not the more important establishment."*

From 1611 to about 1700 the Spitzbergen fishery was important, and was participated in by most of the northern nations of Europe. About 1680 the Dutch whale fishery in those seas was at its height and employed some two hundred and sixty ships and fourteen thousand sailors. Whales finally became scarce about Spitzbergen and were pursued along the east coast of Greenland. From here it was found more convenient to bring the blubber home and not try it out on land, as they had been accustomed to do. As whales became less and less numerous on the old grounds, new

* De Reste, Histoire des Pesches, &c., tome 1, p. 42.

places were constantly being sought for. About 1719 Dutch whaling vessels first entered Davis Strait and established a fishery that continues to this day to employ fleets of Scotch and American whalers; the latter began whaling in this strait about the year 1737.

Scoresby,* in his account of the Arctic regions, gives a history of the northern whale fishery from its commencement till 1820, and accurately describes the methods employed in the capture of whales. He also gives valuable statistics of the Spitzbergen, Greenland, and Davis Strait fisheries, in which he shows that the Dutch sent 17,331 ships to the northern fisheries between 1669 and 1778 and captured 64,576 whales. The following statement shows these facts by decades:

Dutch whale fishery, 1669 to 1769.

Period.	Greenland.*			Davis Strait.		
	Number of ships.	Ships lost.	Whales taken.	Number of ships.	Ships lost.	Whales taken.
1669–1678	993	83	6,314			
1679–1688	1,932	113	10,559			
1689–1698	955	82	4,864			
1699–1708	1,652	62	8,537			
1709–1718	1,351	51	4,645			
1719–1728	1,504	40	3,439	748	20	1,251
1729–1738	858	13	2,198	975	14	1,929
1739–1748	1,356	31	6,193	368	10	1,162
1749–1758	1,339	30	4,770	340	6	513
1759–1768	1,324	25	3,078	296	4	818
1769–1778	903	31	3,493	434	8	1,313
Total	14,167	561	57,590	3,164	62	6,986

* Greenland included Spitzbergen and east coast of Greenland.

"This fishery, when in its most flourishing condition, was principally carried on in the seas and bays round Spitzbergen, and there the Hollanders constructed the village of Smeerenberg, where they boiled the blubber and prepared the oil and whalebone. The havoc made among the whales, and their dispersion to the coasts of Greenland and Davis Strait, put an end to the establishment, and with it to the golden age of the whale fishery. In 1842 there was only one vessel engaged in this once flourishing fishery; in 1853 there were five, and in 1854 there were three."†

"The history of the Spitzbergen country," says Nordenskiold, "has not yet been written in a satisfactory way, and is in many respects very obscure. It is supposed that after the discovery of Spitzbergen in 1596 by Barents, the hunting in the polar seas began during Bennet's first voyage in 1603, and that the whale fishing was introduced by Joanu Poole in 1610. But already in the following year Poole, whose vessel was then wrecked on the west coast of Spitzbergen, found in Horn Sound a ship from Hull, to which he gave charge of saving his cargo, and two years after the English were compelled, in order to keep foreigners from the fishing field they wished to monopolize, to send out six men-of-war, which found there eight Spanish and a number of Dutch and French vessels (Purchas, iii, pp. 462, 716, &c.). Even in our days the accounts of new sources of wealth do not spread so rapidly as in this case, unless, along with the history of the discovery which was written by Hakluyt, Purchas, De Veer, &c., there had been an unknown history of discovery, and the whale fishing, of which it may still be possible to collect some particulars from the archives of San Sebastian, Dunkirk, Hull, and other ports.

* Account of the Arctic Regions, &c., London, 1820, 2 vols.

† Ency. Britannica, vol. xi, 583.

"However this may be, it is certain that the English and Dutch northeast voyages gave origin to a whale fishery in the sea round Spitzbergen, which increased by many millions the national wealth of these rich commercial states. The fishing went on at first immediately along the coasts, from which, however, the whales were soon driven, so that the whale fishers had to seek new fishing grounds, first farther out to sea, between Spitzbergen and Greenland, then in Davis Strait, and finally in the South Polar Sea, or in the sea on both sides of Behring Strait.

"Spitzbergen, when the whale fishing ceased in its neighborhood, was mostly abandoned, until the Russians began to settle there, principally for the hunting of the mountain fox and the reindeer. Of their hunting voyages we know very little, but that they had been widely prosecuted is shown by the remains of their dwellings or huts on nearly all the fjords of Spitzbergen. They seem to have often wintered, probably because the defective build of their vessels only permitted them to sail to and from Spitzbergen during the height of summer, and they could not thus take part without wintering in the autumn hunting, during which the fattest reindeer are got; nor could the thick and valuable fur of the winter fox be obtained without wintering. But the hunting voyages of the Russians to Spitzbergen have also long ceased. The last voyage thither took place in 1851–'52, and had a very unfortunate issue for most of those who took part in it, twelve men dying out of twenty. On the other hand, the Norwegian voyages to Spitzbergen for the seal and walrus hunting, begun in the end of the last century, still go on."*

NORWAY.

About the year 1864 Capt. Svend Foyn, of Tönsberg, established a whaling station on a small island in the Varanger Fiord in Finmark. The whales were captured with harpoons thrown from a swivel gun expressly constructed for the purpose, and mounted at the bow of a small steamer. This harpoon was charged at the lower end with an explosive ball that burst when the harpoon had penetrated the flesh, and killed the animal instantly. From the first this enterprise proved successful, and about 25 similar stations have since been started at different places on the Finmark coast, east and west of North Cape.†

* Voyage of the Vega, translated by Alexander Leslie, 1881, vol. i, pp. 291–293.

† Capt. Niels Juel, in a letter to Prof. S. F. Baird dated Bergen, Norway, September 22, 1884, gives the following information about the whale fishery of Norway:

"The whale fishery began in 1864 and was carried on till 1869 by a single company with one steamer, and from that date till 1877 by two steamers, belonging to the same company. In 1877 the number of companies increased to two, in 1881 to five, in 1882 to eight, employing twelve steamers, and in 1883 to fourteen, with twenty-three steamers. Of these companies eleven are in Ostfinmarken, east of Cape North, and three in Vestfinmarken, between Cape North and the town of Hammerfest. The catch has been as follows:

Year.	No. of whales.	Year.	No. of whales.	Year.	No. of whales.
1866	0	1873	36	1880	145
1867	1	1874	51	1881	279
1868	30	1875	37	1882	386
1869	17	1876	42	1883	506
1870	36	1877	32	1884	416
1871	20	1878	130	Total	2,327
1872	40	1879	123		

"In 1872, 1877, and 1878, whaling was tried in the Strait of Davis by one vessel, but without success. In 1883 Mr. Svend Foyn, who is the creator of the Norwegian whale fishery in Finmarken, put up an establishment in Iceland. This year he got twenty-two whales there. Whales are also occasionally taken by fishermen, who shoot them with arrows. In the waters of Spitzbergen there are taken every year, by vessels fitted out from Tromso, from 150 to 250 so-called white whales (*Delphinapterus leucas* Pallas), by means of nets, 1,100 to 1,200 meters long with meshes of 0.16 meter.

Prof. G. O. Sars, who visited Captain Foyn's station in 1874, says that the kind of whale captured almost exclusively is the blue whale (*Balænoptera Sibbaldi*). A smaller whale (probably *Balænoptera laticeps*) is also abundant, but, being smaller and less fat than the blue whale, is not captured. Two other species of whales are said to come there in small numbers during the season of the herring fisheries, *Balænoptera musculus* and the *Megaptera boops*.

The condition of the whale fisheries of Norway in 1881 is told by United States Consul Gade, of Christiania, in a report dated January 7, 1882. He says: "The floating ice in 1881 extended much farther to the south and nearer to the coasts of Norway than usual. It was even found between 15 and 20 Norwegian miles north of the North Cape. This circumstance was not without its influence on the temperature of the year, as the summer was unusually cold, but at the same time the opinion has been expressed that it was advantageous to the whaling on the coasts of Finmark, which was very considerable. It is supposed that ice drove such a supply of food into the fiords of Finmark that whales, fish, and sea birds were drawn there in crowds. During the month of March the Varanger Fiord is said to have offered a splendid spectacle; several thousand whales flocked in and carried on the wildest antics. The sea was covered with columns of spray, and the heavy sound of the whales breathing could be heard as far as Vadso. The whale is, however, protected during this month, and the fishing could only begin at the end of May, from which time it continues through the summer. Two hundred and eighty whales were caught in 1881, the largest number ever killed in one year off the Norwegian coasts. Some of the whales were described as having a length of 90 feet and a circumference of 40 feet. Such whales are not met with every day, but neither are they of exceeding rarity.

"The whaling business in Norway increases and engages larger capital every year. Whalers are now fitted out from several ports in Southern Norway, as well as from ports east and west of

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"The whales taken in Finmarken belong to the two species: Blaahvalen (*Balænoptera Sibbaldi* Gray), yielding 90 hectoliters of oil, and Finhvalen (*Balaenoptera musculus*), yielding 45 hectoliters; the Knolhval (*Megaptera boops* Fabricius) is also sometimes taken.

"The steamers used are built of iron, have a burthen of 32 R. T. nette and an engine of 25 to 35 nominal horse-power. The length is 22.5 to 26.7 meters, the breadth 4 to 4.3 meters, and the draught 2.5 to 2.8 meters. They are rigged as fore and aft schooners. Below deck are only the engine, the cabins, and a place for the cordage, as the whales are always towed ashore either by the steamer or by a tugboat. The crew consists of nine men, viz, the captain, one gunner, three engineers, one steward, and three sailors. The speed is 9 knots.

"The guns used are muzzle-loaders, of steel, with steel-coils and mounted on swivels. The length 1.2 meters and caliber 0.078. The charge 0.34 kilograms. They are fired at a distance of 20 to 40 meters. The gunner tries to hit the whale between the ribs as near the spinal column as possible.

"The gun-harpoon used was invented by Mr. Svend Foyn about 1860 and patented till 1882, when the patent ran out in Norway. It consists of: The shell, 0.104 meters in diameter, length 0.319, and charge 0.5 kilograms; the barb holster, length 0.319; the pole, length 1.307.

"The shell is screwed to the barb-holster, which contains a glass filled with sulphuric acid. To the pole is attached the rope, 0.143 in circumference and 733 meters long, with a ring running on the pole. The weight of the rope, which is of hemp, is about 1,450 kilograms.

"When the harpoon is to be used, the barbs, that are pivoting, are secured to the pole by rope-yarn, and the shell screwed on the holster. As the number of barbs are 4, the shell and the holster, that turn in the ring at the end of the pole when they are free, now form with the pole a solid mass. When the harpoon penetrates into the whale the rope-yarn slips off, the barbs turn as to make an angle with the holster, crushing the glass tube, and the sulphuric acid, that communicates with the powder in the shell through a channel in the screw, makes it explode.

"Most whales sink. When they do not sink, several whalers are of the opinion that the respiratory organ is filled with coagulated blood, impeding the inhaled air to get out again. The reason for this theory is that there comes very little blood through the nostril of a whale that do not sink. No hand-harpoons are used.

"The manner in which the fishermen kill the whale by means of arrows and cross-bow is the following: When a whale enters a bay the passage is barred with a strong net, and the whale shot. They let him go for two or three days inside. The arrows contain no poison, but later investigations have led to the discovery of a peculiar bacilla that lives on arrows already used, and which poisons the blood. Old arrows (of iron) are only esteemed, and now we know the reason why. After some days the whale becomes dying, and is dispatched with knives and harpoons. The flesh is eaten, with exception of the parts round the wounds, where is formed a tumor. The whale ordinary taken in this manner is the Vaagehval (*Balænoptera rostrata* Fabricius). The number may amount to 15 to 20 a year."

the North Cape, and five different companies were in 1881 represented by steamers. The first promoter of the whale and seal fishery in Norway, Capt. Svend Foyn, alone caught last summer one hundred and seven whales, and is now building two new steamers for whaling. Another vessel caught sixty whales on the same fishing grounds. Though it appears that whales are abundant on the shores of Finmark, it must be borne in mind from previous experience that these animals must finally be exterminated.

"The present fishing grounds are circumscribed, and there may come a time when these giant animals, who propagate but slowly, may disappear from the waters where they resort while devouring the masses of fish they drive in front of them.

"The value of an ordinary whale has been estimated at about 2,000 crowns [about $536], which, for two hundred and eighty whales killed last summer, gives a total sum of over half a million crowns [about $150,000]. To draw a comparison, we may state that the eleven steamers fitted out this year from Dundee, Scotland, for whale fishing off Greenland, caught forty-eight whales, valued at £35,000 or 630,000 crowns [$169,000, or an average of about $3,520 per whale].

"The fishermen engaged in the important cod fisheries off the Finmark shores have protested strongly against the whale fishing on their usual fishing grounds, and to the south of this country we find the same prejudice against whale fishing among the Swedes, who are this winter engaged in large herring fisheries. They have lately opposed the approach of a Norwegian whaler in the waters where they are engaged. The Norwegian whaler, which had been hired by a Swedish firm, was driven off on the plea that it was unlawful in Sweden to shoot where herring are being fished."*

GREAT BRITAIN.

The British whale fishery dates from about the beginning of the seventeenth century, as above stated in the discussion of whaling at Spitzbergen.

"Greenland was first discovered by the English; but in this, as in other branches of navigation, we long allowed the Dutch to take a lead. It was not till after 1750 that, Government having granted a bounty of 40*s.* a ton on every vessel employed in the whale fishery, a considerable increase took place in this branch. In 1750 the vessels employed were only nineteen; in 1756 they had increased to sixty-seven. The war soon caused a decrease of one half; but at the return of peace, in 1763, this fishery revived, and in 1770 the vessels employed amounted to fifty, in 1773 to fifty-five, in 1775 to ninety six. The American war again caused a decrease, and in 1782 the vessels so employed were only thirty-eight. In 1784 they increased to eighty-nine, and in 1785 to one hundred and forty. After this they exceeded two hundred annually till 1793; but the long continuance of the late war reduced them below half the number employed previously. In 1852 the whale fishery employed ships of the aggregate burden of 16,113 tons."†

The first whale ship to enter the Pacific Ocean is said to have sailed from England in 1787, and was sent by the colony of Nantucket whalemen who had gone to England at the close of the Revolutionary war. "Capt. Archelus Hammond," says Mr. F. C. Sanford, of Nantucket, "was first officer of that ship, and struck the first sperm whale ever known to be taken in that ocean. He afterwards sailed from London in the ship Cyrus, which ship he gave up to Paul West, his second officer, in 1801, and West made a fortune in her and left her to join his family in America, arriving in 1813. Captain Hammond came home to Nantucket in 1830."

The British whale fishery reached its greatest prosperity in 1815, when there were one hundred and sixty-four whalers on the ocean. About the year 1850 there were twenty-three British vessels in

* Commercial reports, State Department, No. 16, February, 1882, p. 293.
† Encyclopædia Brittanica.

the southern whale fishery, cruising chiefly on the Brazil Bank. In 1855 there were about fifty vessels in the Greenland and Davis Strait fishery. About the year 1865 some thirty-five vessels were employed in the northern or Greenland fishery. The southern fishery gradually declined until it is now practically abandoned. The northern fishery, however, has continued of importance, though the number of ports from which vessels are fitted has decreased. The vessels are now mostly fitted at Dundee and Peterhead.

The Scotch whale fishery at Greenland and Davis Strait is combined with sealing, and is carried on with the most powerful steamers, specially equipped for battling with ice.

The number of vessels in this fishery has decreased very much since 1830, as appears from the following statement of the size of the fleet in 1830, 1857, and 1868:*

Cities.	1830.		1857.		1868.	
	Ships.	Tons.	Ships.	Tons.	Ships.	Tons.
Peterhead	13	3,720	30	8,397	12	2,948
Fraserburgh	.....	.....	5	1,245	2	549
Aberdeen	10	3,035	6	1,482	1	239
Dundee	9	3,033	4	1,394	12	4,618
Kirkcaldy	5	1,597	3	1,058	1	452
Borrowstounness	.....	.....	1	357	.....	.....
Hull	33	11,009	11	2,805	2	530
Whitby	2	686	.....	.....	.....	.....
Newcastle	3	1,103	.....	.....	.....	.....
Berwick	1	310	.....	.....	.....	.....
London	2	642	.....	.....	.....	.....
Montrose	4	1,302	.....	.....	.....	.....
Burntisland	1	280	.....	.....	.....	.....
Leith	7	2,426	.....	.....	.....	.....
Greenock	1	316	.....	.....	.....	.....
	91	29,459	60	16,738	30	9,336

In a communication to the State Department, under date of November 16, 1877, United States Consul McDougall, at Dundee, Scotland, gives some information concerning the British whale and seal fisheries in Davis Strait. He says: "The success of the whaling fleet belonging to this port was considerably greater in 1876 than in 1875. All the vessels, twelve in number, prosecuted both seal and whale fishing in 1876. The only change in the course usually followed was by one vessel, which went to Labrador instead of Greenland with the other ships. The total catch at the seal fishing was in 1876, 57,776 seals, yielding 625 tons of seal oil. Seal oil last year was valued at £32 per ton, and the average price for skins was 6*s*. Taking the 625 tons of oil at £32 gives £20,000, and 57,776 skins at 6*s*. each produces the sum of £17,332 16*s*.; so that the value of the seal fishing in 1876 was £37,332.16*s*. Only one vessel returned clean from the seal fishing.

"The total catch at the whale fishing was, in 1876, 64 whales, yielding 824 tons oil and 45 tons bone. The selling price of whale oil in 1876 was £35 per ton, and although as high as £1,200 per ton was got for bone, £800 was the average price. The 824 tons of oil produced £28,840 and the 45 tons of bone £36,000; total for the whale fishing, £64,840; total for the seal fishing, £37,332 16*s*.; total for both fishings, £102,172 16*s*. Of course from this sum must be deducted the expenses of the fleet, which are very heavy.

"In 1875 the value of the seal fishing was computed at £27,026 7*s*. 6*d*. and the whale fishing at £50,325; total for both fishings, £77,351 7*s*. 6*d*. This shows an increase in favor of 1876 in the seal fishing of £10,306 8*s*. 6*d*. and in the whale fishing of £14,515; total increase in both fishings for 1876, £24,821 8*s*.

* Moritz Lindeman: Die arktische Fischerei der deutschen Seestädte, 1620–1868.

"This year two vessels went to the seal fishing in Labrador compared with one in 1876; and they were so successful, that the Dundee Seal and Whale Fishing Company have resolved to form a branch establishment at Newfoundland, and next spring two of their largest and most powerful screw steamers, instead of going to Greenland, will be dispatched to the Newfoundland seal fishing. The company has acquired a piece of ground, on which they are erecting the necessary buildings for carrying on the work connected with the fishing, including boiling-house, &c. There being no docks for the accommodation of the vessels, the company is constructing a wharf in close proximity to its premises, so that the steamers will be enabled to discharge their catches almost at the doors of the establishment. With the two steamers sent out by another company here (those which went this year), this will now make four Dundee vessels that will prosecute the Newfoundland seal fishing next spring. The effect of this change will of course be to give the remainder of the Dundee vessels going to Greenland a better chance of success, and it is hoped the results will prove satisfactory to all concerned.

"As all the vessels of the Dundee whale fleet have now arrived from Newfoundland and Greenland seal and whale fisheries for the year, I am able to give the number of seals caught and other particulars. The whole of the vessels (now thirteen in number) went both to the seal and whale fishing this year, two going to Newfoundland instead of to Greenland with the other ships. The number of seals caught in Newfoundland (Labrador) this year was for two vessels 46,600 seals, yielding 750 tons of oil; last year one vessel, 4,000 seals, yielding 47 tons oil; increase in 1877, 42,600 seals, 703 tons oil. The number of seal caught in Greenland this year was for eleven vessels, 29,400 seals, yielding 342 tons oil; last year for eleven vessels, 53,776 seals, yielding 578 tons oil; decrease in 1877, 27,376 seals, 236 tons oil."

*Statement of the British Davis Strait and Greenland whale and seal fishery, 1865 to 1877.**

Years	Ports.	Vessels.	Seals.	Whales.	Seal oil.	Whale oil.	Whale-bone.
			Number.	*Number.*	*Tons.*	*Tons.*	*Cwt.*
1865	Peterhead	10 sailers	17,291	5	195	71	
	Do	3 steamers	10,284	6	113	84	
	Dundee	7 steamers	64,041	50	734	546	650
	Kirkcaldy	1 sailer					
	Hull	1 sailer					
	Do	1 steamer		5		40	60
	Frazerburgh	2 sailers	12,219		156		
	Aberdeen	1 sailer					
1866	Peterhead	9 sailers	16,188	31	187	299	
	Do	3 steamers	16,632	9	210	100	
	Dundee	11 steamers	48,418	30	674	333	373
	Hull	1 steamer					
	Do	1 sailer		2		16	40
	Frazerburgh	2 sailers	4,571		62		
	Aberdeen	1 sailer		9		100	100
1867	Peterhead	8 sailers	13,208	16	160	151	
	Do	4 steamers	21,368	4	287	29	
	Dundee	12 steamers	53,822	2	619	22	20
	Hull	1 steamer		2		26	40
	Frazerburgh	2 sailers	8,217		124		
	Aberdeen	1 sailer					
1868	Dundee	13 steamers	16,458	107	199	856	944
	Do	1 sailer		1		7	5
	Peterhead	8 sailers	†13,774	16	165	262	90
	Do	4 steamers	18,038	4	228	23	17
	Frazerburgh	2 sailers	3,986		32		
	Aberdeen	1 sailer		6		80	108

*Report on Commercial Relations of United States with Foreign Countries for 1877, p. 449.
†Also 645 white whales.

Statement of the British Davis Strait and Greenland whale and seal fishery, 1865 to 1877—Continued.

Years	Ports.	Vessels.	Seals.	Whales.	Seal oil.	Whale oil.	Whale-bone.
			Number.	*Number.*	*Tons.*	*Tons.*	*Cwt.*
1868	Hull	1 steamer	230		3		
1869	Dundee	11 steamers	44,424	9	458	118	128
	Peterhead	9 sailers	*8,868	8	125	118	49
	Do	4 steamers	16,021	4	256	25	25
	Aberdeen	1 sailer					
	Hull	1 steamer		1		5	5
1870	Dundee	10 steamers	87,768	61	862	734	871
	Peterhead	7 sailers	8,373	18	132	125	144
	Do	4 steamers	32,087		487	5	5
	Aberdeen	1 sailer				98	91
1871	Dundee	10 steamers	64,497	133	652	1,163	1,313
	Peterhead	6 sailers	17,047	11	194	105	155
	Do	5 steamers	34,837	8	481	80	76
1872	Dundee	11 steamers	40,391	105	410	969	1,062
	Peterhead	5 sailers	1,851	9	25	131	132
	Do	6 steamers	8,442	24	129	293	292
1873	Dundee	11 steamers	25,480	158	262	1,303	1,344
	Do	1 sailer	4,131		46		
	Peterhead	7 steamers	37,827	2	754	16	16
	Do	3 sailers	6,784	12	73	110	115
1874	Dundee	11 steamers	44,087	190	575	1,419	1,436
	Peterhead	5 steamers	8,113		196	95	91
	Do	3 sailers	615		2	148	153
1875	Dundee	12 steamers	44,445	79	418	706	720
	Peterhead	6 steamers	†27,198	6	355	113	77
	Do	2 sailers		13		156	164
1876	Dundee	12 steamers	57,776	64	625	824	900
	Peterhead	5 steamers	‡4,180	13	75	222	138
	Do	3 sailers	371	5	5	69	94

* Also 859 white whales. † Also 360 white whales. ‡ Also 700 white whales.

The following additional account of the Dundee whale and seal fishery is from a report to the State Department by United States Consul Winter,* of Dundee:

"Nine steamers left Dundee for the Greenland seal fishing in 1881; their catches were 12,721 seals, yielding 201 tons of oil. Eight steamers went to this fishing in 1880; their catches were 29,100 seals, yielding 489 tons of oil, showing for 1881 a decrease of 16,379 seals and 288 tons of oil. Six steamers left Dundee for the Newfoundland seal fishing in 1881; their catches were 139,985 seals, yielding 1,797 tons of oil. Five steamers went to this fishing in 1880; their catches were 58,940 seals, yielding 726 tons of oil, showing for 1881 an increase of 81,045 seals and 1,071 tons of oil. Greenland, 1881, total catch, 12,721 seals, yielding 201 tons of oil. Newfoundland, 1881, total catch, 139,985 seals, yielding 1,797 tons of oil.

"At both fishings, 1881, total catch, 152,706 seals, yielding 1,998 tons of oil.

"At present the value of seal oil is about £29 per ton, while the skins average about 5*s.* each. Taking the 1,998 tons of seal oil got this year at £29 per ton gives £57,942; and the 152,706 skins at 5*s.* each gives £38,176 10*s.*; so that the total value of the seal fishery for 1881 is £96,118 10*s.* For 1880 it was computed at £52,385. There is therefore an increase for 1881 of £43,733 10*s.*

"Eleven steamers left Dundee for the Greenland whale fishery in 1881; their catches were 48 whales, yielding 514 tons of oil and 24¾ tons of bone. Twelve steamers went to this fishery in 1880; their catches were 712 whales (white, 600; black, 112), yielding 1,077 tons oil and 46½ tons of bone, showing for 1881 a decrease of 664 whales and 563 tons oil and 21¾ tons of bone.

* Commercial Reports, No. 17.

"The present selling price of whale oil is £33 per ton and of bone £720 per ton. The value of the 514 tons oil got in 1881, at £33, would be £16,692, and of 24¾ tons of bone, at £720 per ton, £17,820. The total value of the whale fishing for 1881 is £34,782; for 1880 it was computed at £62,706; there is therefore a decrease for 1881 of £27,924.

"Greenland and Newfoundland seal fishing: Total value for 1881, £96,118 10*s*. Greenland whale fishing: Total value for 1881, £34,782. Total value of both fishings for 1881, £130,900 10*s*. (From this sum the heavy expenses of the sealing and whaling fleet must be deducted.) Total value of both fishings for 1880 was computed at £115,091; accordingly there is an increase for 1881 of 15,809, which is attributable mainly to the success of the Newfoundland seal fishery this year.

"From the figures I have given it will be seen that the Greenland seal and whale fishings for 1881 have proved a failure, due, it is said, to the terrible severe weather that has prevailed in Greeeland this season. Dundee is the headquarters of this industry in this country, and has fourteen excellent screw steamers, whose total tonnage is 6,999, and nominal horse-power 1,008, engaged in the fishing. In addition to this there was another vessel (steamer) of 396 tons, but she was lost this season in Davis Strait, but the crew were all saved and distributed amongst the other Dundee ships, which brought them home. All accounts concur in representing the weather experienced in Greenland this year as being exceptionally stormy, for weeks gale succeeding gale, blowing the vessels in upon a body of heavy ice, and some of them have thereby been more injured than usual this year. However, there has been no loss of life except from natural causes. Seventy to eighty men go to make up a Greenland sealer's crew, and one hundred and twenty to one hundred and fifty that of a Newfoundland sealer, and fifty for a Greenland whaler. From forty to fifty men accompany the vessels from Dundee; others are got in Shetland and at Saint John's, Newfonndland. These men are paid in wages about £2 per month and an allowance of so much per ton as may be fixed upon for oil money; so that if the voyage does not turn out well, as is the case of the Greenland seal and whale fishing this year, the men and their families are badly off during the winter. Only two vessels will return anything to their crews in the shape of oil money this year. Formerly all the seal-skins that came to Dundee had to go to London to be cured or tanned. One large firm engaged in the seal-fishing business here has been erecting commodious and improved premises for carrying on the tanning process themselves, and they have an immense stock of skins of their own to commence operations upon. This is a new industry added to Dundee. A matter of interest in connection with the whale fishing has been discussed this year, viz, the use of steam for propelling the vessels while in the fishing grounds. The noise of the propeller scares the fish within a distance of a few miles, and a master of a ship, by ill-judged eagerness to approach a whale, may deprive a whole fleet of a rich harvest from the object of their common pursuit. An agreement between the captains of the Dundee ships, regulating the use of steam to meet the necessities of the case, was drawn out and subscribed by them, and was, it appears, fairly adhered to this year. The following is a complete detailed comparative statement showing the value of the seal and whale fishings to the community of Dundee for twelve years, and the yearly average value of same:

Dundee whale and seal fisheries, 1870 to 1881.

Year.	Number of steamers seal fishing.	Number of steamers whale fishing.	Number of seals caught.	Number of whales caught.	Tons of seal oil.	Tons of whale oil.	Tons of whalebone.
1870	9	6	45,450	61	870	760	43 11/20
1871	9	8	65,485	133	648	1,165	65 13/20
1872	11	10	40,621	105	429	1,010	53 2/20
1873	11	10	25,594	158	265	1,352	67 4/20
1874	11	9	46,252	190	577	1,290	71 18/20
1875	12	12	45,295	79	455	765	36 9/20
1876	12	12	57,776	64	625	824	45
1877	13	13	76,000	*1,016	1,092	955	42½
1878	12	13	77,411	6	1,106	114	6
1879	15	13	96,710	68	1,168	729	38 3/5
1880	13	12	88,040	†712	1,215	1,077	46½
1881	15	11	152,706	48	1,998	514	24¾
Total	143	129	817,340	2,640	10,448	10,555	541 3/20
Average per year	11	10	68,111	220	870	879	45 1/16

* 81 black, 935 white. † 112 black, 600 white.

Year.*	Average value of seal oil per ton.	Average value of seal skins, each.	Average value of whale oil per ton.	Average value of whalebone per ton.	Total value of seal fishing.	Total value of whale fishing.	Total value of both seal and whale fishing.
	£	s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1870	37	3 0	44 0 0	450 0 0	39,007 10 0	53,037 10 0	92,045 0 0
1871	33	3 6	37 0 0	500 0 0	32,843 17 6	75,930 0 0	108,773 17 6
1872	40	4 0	42 10 0	510 0 0	25,284 4 0	70,006 0 0	95,290 4 0
1873	40	3 6	43 0 0	460 0 0	15,078 19 0	89,048 0 0	104,126 19 0
1874	37	5 0	39 0 0	540 0 0	32,912 0 0	89,082 0 0	121,994 0 0
1875	34	7 6	36 0 0	500 0 0	32,455 12 6	45,765 0 0	78,220 12 6
1876	32	6 0	35 0 0	800 0 0	37,332 16 0	64,840 0 0	102,172 16 0
1877	32	5 0	35 0 0	1,400 0 0	53,944 0 0	92,925 0 0	146,869 0 0
1878	32	5 0	35 0 0	1,500 0 0	54,744 15 0	12,990 0 0	67,734 15 0
1879	30	5 0	33 0 0	1,200 0 0	59,217 10 0	70,377 0 0	129,594 10 0
1880	25	5 0	28 0 0	700 0 0	52,385 0 0	62,706 0 0	115,091 0 0
1881	29	5 0	33 0 0	720 0 0	96,118 10 0	34,782 0 0	130,900 10 0
Total	401	57 6	440 10 0	9,280 0 0	531,324 14 0	761,488 10 0	1,292,813 4 0
Average	33½	4 9½	36 14 2	773 6 8	44,277 1 2	63,457 7 6	107,734 8 8

The distribution of the bow-head whale in these regions and the movements of the Scotch whalers is discussed as follows by Mr. R. Brown:

"Whales appear on the coast of Danish Greenland early in May, but are not nearly so plentiful as formerly, when the Davis Strait whaler generally pursued his business on this portion of the coast; but they are now so few that they are generally gone north before the arrival of those ships which have first proceeded to the Spitzbergen sealing. It is rarely found on the Greenland coast south of 65° or north of 73°; indeed I have only heard of one instance in which it has been seen as far north as the Duck Island near the entrance of Melville Bay, and even for a considerable distance south of that it can only be looked upon as an occasional straggler. However, after crossing to the western shores of Davis Strait, it occasionally wanders as far north as the upper reaches of Baffin's Bay. The great body, however, leave the coast of Greenland in June, crossing by the 'middle ice,' in the latitude of Svarte Huk (Black Hook), in about latitude 71° 30′ N. The whaler presses with all speed north through Melville Bay to the upper waters of Baffin's Bay, and across to the vicinity of Lancaster Sound. If there is land-ice in Baffin's Bay at the time they arrive (about the end of July), there are generally some whales up that sound and Barrow's Inlet; but

they accumulate in greatest numbers in the neighborhood of Pond's Bay, and even up Eclipse Sound, the continuation of the so-called Pond's Bay, which is in reality an extensive unexplored sound opening away into the intricacies of the Arctic Archipelago. The whales continue 'running' here until the end of June, and remain until about the end of August or the beginning of September. The whalers think if they can reach Pond's Bay by the beginning of August they are sure for a 'full' ship. The whales now commence going south, and the whalers continue to pursue them on their austral migration, halting for that purpose in Home Bay, Scott's Inlet, Clyde River, and the vicinity. As the season gets more tempestuous and the nights darker, most of them towards the end of September, to avoid the icebergs dashing about in this region at that time of the year, anchor in a snug cove, or *cul de sac*, lying off an extensive unexplored sound, not laid down on any map, in the vicinity of Cape Hooper; others go into a place known by the euphonious name of 'Hangman's Cove';* whilst others go south to Kemisoak (Hogarth's Sound of Penny), Northumberland Inlet, or other places in the vicinity of Cumberland Sound and the Meta Incognita of Frobisher—localities intimately known to many of these hardy seamen, but by name only to geographers. Whilst the good ship lies secure in these unsurveyed and unauthorized harbors (each master mariner according to his predilection), the boats go outside to watch for whales. If they succeed in capturing one, frequently, if possible, the vessel goes out and assists in securing it. Though they are supposed to return to the ship every night, yet at this time the men are often subjected to great hardship and danger. This is known as the 'autumn' or 'fall fishing,' and this method of pursuing it as 'rock-nosing.'

* * * * * * *

"Where the whale goes in the winter is still unknown. It is said that it leaves Davis Strait about the month of November, and produces young in the Saint Lawrence River, between Quebec and Camaroa, returning again in the spring to Davis Strait. At all events early in the year they are found on the coast of Labrador, where the English whalers occasionally attack them; but the ships arrive generally too late, and the weather at that season is too tempestuous to render the 'southwest fishing' very attractive. Later in the year the ships enter Cumberland Sound in great numbers; and many of them (especially American and Peterhead vessels) now make a regular practice of wintering there in order to attack the whales in early spring. It is said that early in September they enter Cumberland (Hogarth's) Sound in great numbers and remain until it is completely frozen up, which, according to Eskimo account, is not until the month of January. It is also affirmed by the natives that when they undertake long journeys over the ice in spring, when hunting for young seals, they see whales in great numbers at the edge of the ice-floe. They enter the sound again in the spring and remain until the heat of the summer has entirely melted off the land-floes in these comparatively southern latitudes. It thus appears that they winter (and produce their young) all along the broken water off the coast of the southern portions of Davis Strait, Hudson Strait, and Labrador. The ice remaining longer on the western than on the eastern shore of Davis Strait, and thus impeding their northern progress, they cross to the Greenland coast; but as at that season there is little land-ice south of 65 degrees, they are rarely found south of that latitude. They then remain here until the land-floes have broken up, when they cross to the western shores of the strait, where we find them in July. I am strongly of belief that the whales of the Spitzbergen Sea never, as a body, visit Davis Strait, but winter somewhere in the open water at the southern edge of the northern ice-fields. The whales are being gradually driven farther north and are now rarely found, even by their traces, so far south as the Island of Jan-Mayen (71 degrees north latitude), round which they were so numerous in the palmy days of the Dutch whaling trade.

* From an Eskimo being found here hung by an allunak over a cliff.

I am not quite sure, after all that has been said on this subject, that the whale is getting extinct, and am beginning to entertain convictions that its supposed scarcity in recent times is a great deal owing to its escaping to remote, less known, and less visited localities. It is said to be coming back again to the coast of Greenland, now that the hot pursuit of it has slackened in that portion of Davis Strait. The varying success of the trade is owing not so much to the want of whales as to the ill luck of the vessels in coming across their haunts. Every now and again cargoes equal to anything that was obtained in the best days of the trade are obtained. Only seven years ago I came home to England ('shipmates,' as the phrase goes), with no less than thirty 'right whales,' in addition to a miscellaneous menagerie of Arctic animals, dead and alive, and a motley human crew—a company so *outré* that I question if ever naturalist, or even whaler, sailed with the like before."*

In 1877 the Scotch whaling and sealing vessels began the capture of the bottle-nose whale (*Hyperoodon rostratus*); in 1878 this fleet killed 9; in 1879, 8; in 1880, 32; in 1881, 111, and in 1883, 403. These whales are found in Davis Strait and adjacent waters and eastward of Greenland from Cape Farewell to Iceland, Jan-Mayen, and Bear Island, and as far north as seventy-seven degrees north latitude. They are about 30 feet long, and yield an excellent quality of oil.†

RUSSIA AND RUSSIAN AMERICA.

In a pamphlet by Dr. Grimm on Russian fisheries the whale fisheries of that country are thus discussed: "The beluga or white whale (*Delphinapterus leucas*) is from 14 to 25 feet long. Beluga fishing is carried on in the White Sea, where the beluga lives all the year round; also in the gulfs of the N. Dvina, Onega, Kondolon and Mezen; in the Arctic Ocean it is found to the east of the White Sea, near the mouth of the Petchora, along the Timan coast, chiefly near the river Piosha; near Nova Zembla, at the mouth of the Obi, and farther on. In chasing fish, it goes very high up the rivers, for instance, up the Obi. It is caught in nets, with which it is surrounded, drawn to a shallow place and killed in what is called the dvor, or yard; from four to six boats take part in the work. The quantity of oil got from the beluga is various. Sometimes a herd of large animals have been killed, each of which yielded about 12 poods [432 pounds] of blubber, and at other times one meets belugas that yield only some 4 to 5 poods [144 to 180 pounds]. The exact number of beluga caught in a year is not known, as in the statistics of the fisheries the beluga is classed with all the walrus, seals, whales, &c. The dolphin (*Delphinus delphis* and *D. phocæna*) is found in considerable numbers in the Black Sea. From this sea, in chasing fish, it enters the various gulfs and bays and into the Sea of Azof. The Turks come into the Black Sea after the dolphin, chiefly visiting Pischoonda. Our fishermen sometimes catch it, but generally content themselves with a stray dolphin that may get in among the fish. *Delphinus phocæna* is sometimes met with in the Baltic, and even has come up as far as Cronstadt, but very rarely.

"There are four kinds of whales in the Arctic Ocean: *Megaptera boops*, *Balænoptera laticeps*, *Balænoptera musculus*, and *B. Sibbaldii*. The last is the one that whalers chiefly kill, the first three being killed now and then. Notwithstanding the efforts of the Russian Government to increase whaling, it is still in a very primitive condition here. The Laps and Pomors, it is true, use whale-blubber, but it is procured from the carcasses of whales that are often driven ashore. They never kill whales, owing, perhaps, to the false idea that the whale drives the *moyva* (*Mallotus arcticus*) to the shore, and that therefore whales are useful to the fisheries, and that they ought not to be

* Notes on the History and Geographical Relations of the Cetacea frequenting Davis Strait and Baffin's Bay. By Robert Brown, F. R. G. S. Proc. London Zoolog. Soc., 1868.

† For a full discussion of this fishery see papers by Mr. Thomas Southwell in London Zoologist, and in Transactions of Norfolk and Norwich Naturalists' Society, vol. iii. In 1883 Mr. Southwell reports the Scotch fishery as fallen off in consequence of the number of small Norwegian vessels attracted to this new fishery.

exterminated. However, from one hundred and fifty to two hundred whales a year are killed on the Mourman coast by Norwegian whalers, who have their oil-works in Finmarken. How profitable whaling is will be seen from the fact that all the expenses of the trade are covered by the sale of the secondary products, such as whalebone, &c., and that the oil, of which each whale yields some 1,000 roubles' [$750] worth [from 36,000 to 72,000 pounds of blubber], forms the clear profit of the whaler. At present there is a company with a considerable capital being started in St. Petersburg, which intends next year to start whaling along the Mourman coast.

"We have no information as to the number of whales in the eastern part of the Arctic and in the Bering Straits. Putting aside the products got by the inhabitants of the Arctic coast, which, at any rate, is of some consequence, and only counting the products of regular whaling and seal fishing, we remark the very extraordinary fact that the wide-spreading Arctic Ocean, with its many gulfs, and the White Sea, yield a great deal less than the smaller Caspian does by nothing but its seals. As there are more animals (even seals) than in the Caspian, this can only be accounted for by the thorough way in which the business is carried on in the Caspian, where it is aided by natural conditions, by the comparative ease of killing seals, and by the presence of capital and enterprise. In the north, on the contrary, the danger and difficulty of the trade, and the absence of a population, counteract the possibility of its yielding as great a quantity of useful products as it might well do without destroying the natural abundance.

"In consequence of this, one cannot help wishing that whaling, &c., would increase in the north, and that more care would be taken in seal fishing in the Caspian, where seals may be completely exterminated in a considerably short time. We may remark that as many very valuable animals, for example, the Greenland whale, Kamtchadal otter, &c., are gradually dying out, and are in danger of the fate of their cousin, the sea cow (*Rhytina Stelleri*), and as it is next to impossible for one state to prevent it, it is very desirable that a committee should be formed for the working out of a set of rules for hunting, trapping, &c., which would be binding on all countries."*

Russian whaling at Alaska and the Okhotsk Sea.—In discussing the condition of the territory of Alaska prior to its cession to the United States, Mr. Petroff says of the whale fishery:

"The American whalers frequenting the Bering Sea previous to entering the Arctic through Bering Strait had frequently been the object of complaint to the Russian Government by the Russian-American Company. It was claimed that these whalers made a practice of landing on the Aleutian Islands to try out blubber, and that the offensive smoke and stench resulting from this operation had the effect of driving away the precious sea otter from the coast. In 1842 Chief Manager Etholin reported that in his tour of inspection throughout the colonies he had encountered several American whalers close inland, but that they refused to answer his questions or to obey his orders to leave the Russian waters. Some of the whalers learned that in 1841 fifty ships from New Bedford and Boston had been in the vicinity, and that they had succeeded in capturing from ten to fifteen whales each. From 1842 these complaints concerning the whalers were renewed every year, and during Tebenkof's administration he proposed to the company to go into the whaling business in the waters of Bering Sea and the North Pacific as the best means of keeping out foreigners. His plan was to hunt whales in boats from the harbors of Aleutian Islands, and to engage at first a number of American harpooners and steersmen until the Aleutians had been sufficiently trained to do the work.

"Under the terms of the treaty with England and America no vessel of either of those two nations was allowed to hunt or fish within 3 marine leagues of the shore; but as there was no armed Government craft in the colonies the provisions of the treaty were totally disregarded by the

* Dr. O. Grimm: Fishing and Hunting on Russian Waters; St. Petersburg, 1883.

whalers, until at last the company proposed to the Imperial Government that if a cruiser were sent out from Russia to guard the colonial coast against intruders the company would bear the expenses of such a vessel. The Emperor agreed to the proposal, and gave orders to the naval authorities to prepare estimates as to cost and expenditure. In reply a report was received stating that the sum of 270,000 rubles was required to fit out the ship for the cruise, and 85,000 rubles annually for its maintenance. This sum the company found itself unable to pay and the project fell through. At last, in 1850, the corvette Olivitza was ordered to the Sea of Okhotsk, and did some service in keeping foreign whalers out of that sea and breaking up their principal station near the Shanta Islands. In the mean time Tebenkof's suggestions concerning the fostering of Russian whaling interests in the Pacific had borne some fruit; a few of the shareholders of the Russian-American Company, together with some ship-owners in Finland, concluded to fit out whaling ships in Finland or at Cronstadt and send them around into the waters of Bering Sea and the Arctic beyond the straits.

"A capital of 100,000 rubles was quickly contributed, and active operations began as early as 1849. By order of the Emperor a sum of 20,000 rubles was appropriated from the special fund of the province of Finland to aid in the construction of the first whaling ship, and a sum of 10,000 rubles to be paid the company for the construction of each succeeding ship of the same class. The company also obtained the privilege of importing, free of duty, all the material necessary for building and fitting out the first twelve ships and to carry on the business without payment of duties for a period of twelve years. The name of this branch company was 'The Russian-Finland Whaling Company,' and its charter was approved on the 13th of December, 1850.

"The first ship, the Suomi, of 500 tons, was built in the port of Abo, Finland, in the year 1851. The command of the vessel was intrusted to a German captain, Hagshagen, and a crew of thirty-six men was engaged, which consisted principally of foreigners, among them three steersmen, three harpooners, and three coopers. The whale-boats had been imported from New Bedford. The cruise of the Suomi in the Okhotsk Sea in the year 1852–'53 was very successful, the catch being 1,500 barrels of oil and 21,400 pounds of whalebone; the cargo was sold in the Sandwich Islands, realizing 88,000 rubles, a sum that covered the price of constructing the vessel and fitting it out and left a clear profit of 13,000 rubles. Unfortunately the war with England and France broke out about that time and interfered with further operations in this line.

"The Suomi had sailed for home before the news of the war reached the Sandwich Islands, and consequently knew nothing of the circumstances when she made the first port on the English coast. The pilot came off and, strange to say, warned the captain of his danger, and gave him an opportunity to make his escape to Bremen. The presence of French and English cruisers in the channel made it necessary to sell the ship at Bremen for the comparatively small sum of 21,000 rubles.

"The second whale-ship dispatched by the new company was the Turko, which left for the Okhotsk Sea in 1852, having been fitted out altogether at Åbo. The captain was a German by the name of Schäle, and the crew consisted of twenty-five Finlanders, many of whom had served on American whaling voyages. A cargo of goods for the Russian-American Company was also forwarded in this ship, but by various disasters the vessel was delayed and did not arrive at Sitka until late in 1853. Shortly before reaching port a few whales were killed, 150 barrels of oil and 650 pounds of bone being secured.

"Early in the following spring the ship proceeded to sea under command of the first mate, Sederblom, the captain being disabled by disease. The voyage was very successful, resulting in a catch of 1,700 barrels of oil and 23,000 pounds of whalebone.

"During the siege by the Anglo-French fleet the Turko was in the harbor of Petropaulovsk, but succeeded in making her escape, discharging her valuable cargo at Kadiak for safe keeping, and finally reached Sitka, where she remained safely until the end of the war.

"The third whale-ship dispatched to the North Pacific from Finland was the Aian, 540 tons. She was commanded by a Finlander, Captain Enderg, and reached the sea of Okhotsk in 1854. The catch during the first year was not great, and in the spring of 1855 the naval commander of Kamtchatka ordered the captain to land his cargo and to transport the families of officers and soldiers from Petropavlovsk to the Amoor, and during this voyage the ship was captured by an English frigate and burned. At the end of the war the whaling company discovered that, though no actual loss had been incurred, the profits of the business were not what they had expected, and the subsequent operations do not seem to have been pushed with energy or vigor.

"A few more ships were fitted out, but as soon as they returned with their cargoes of oil and bone they were sold for whatever price they would bring. It was perhaps unfortunate for the interests of the Russian whaling industry in the North Pacific that the company engaged in the business was so closely connected with the Russian-American Company, which was then becoming more deeply embarrassed every year."*

WHALE FISHERY OF FRANCE.

"The whale fishery was established in France in 1784, by means of encouragements held out by Louis XVI, who ordered that no duty should be collected on the articles exported, and that the produce of the fisheries should pay no import duty. He guaranteed the adventurers against loss, and ultimately paid, in addition to £12,500, which he advanced without interest, an additional sum of £6,695, being the balance of loss on seventeen voyages; but notwithstanding these encouragements, the whole project was abandoned in 1787. In 1816 the offer of bounties attracted new adventurers into this branch of trade. The premium offered by the Government was 50 francs (£2) per man, and two-thirds of the crews were allowed to be foreigners. In 1819 40 francs were allowed to foreign vessels having a crew half French, 50 francs when the captain and one-third of the crew were French, the premium to be doubled if the vessel passed Cape Horn. In 1829 a new ordinance granted 90 francs per ton on vessels wholly equipped by Frenchmen, 40 francs when only two-thirds were Frenchmen, and 30 francs if the captain was a foreigner. The premium was doubled if the vessel passed Cape Horn. A supplementary premium was allowed to vessels fishing to the southeast of the Cape of Good Hope, and the double premium was given to all vessels fishing at a higher northern latitude than 60 degrees, and as the fishing is seldom or never prosecuted at a lower latitude, this premium of 180 francs per ton (£7 4*s.*) was invariably paid. The law of 1832, which regulates the whale fishery of France, established a bounty of 70 francs per ton from March, 1832, to March, 1833, if the whole crew were French; the bounty to be diminished 4 francs yearly till it reached 54 francs. If one-third of the crew be foreigners, the bounty to be 48 francs per ton, to diminish 2 francs yearly till it reached 40 francs per ton. A supplementary bounty to be given of 50 francs per ton if the crew be French, decreasing 3 francs per annum per ton; and 24 francs if one-third be foreigners, decreasing 1 franc per annum, to be paid to vessels doubling Cape Horn, or reaching 62 degrees of south latitude, if returning with less than half a cargo or after an absence of sixteen months; 500 tons to be the minimum for a single whaler.

"With these extraordinary encouragements capital was attracted to this new line of industry, and in 1831 three vessels cleared out for the Greenland whale fishery and thirteen for the South

* Report on the Population, Industries, and Resources of Alaska, by Ivan Petroff, special agent U. S. Census Office, Washington. 1884.

Sea fishery, which employed 6,412 tons of shipping and were manned by five hundred and fifty-one men. Notwithstanding all the bounties given to the whale fishery, France has very few vessels engaged in it. There were only seventeen ships in the trade in 1849, and seven only re-entered French ports. There were but five vessels left Havre in 1853, of a tonnage of 2,045 tons, and with a crew of one hundred and twenty-seven men. The return of the products was 112,485 kilograms of the whale, 1,589 of the eachalot, and 81,712 kilograms of the whalebone.

"It was estimated by the minister of commeree, in his report on this subject to the Chamber of Deputies more than twenty years ago, that the five hundred and fifty seamen employed in the whale fishery do not cost the state less than 1,000,000 francs, at the rate of £72 12*s.* per man, or £— a month. The wages granted by the budget to seamen employed in ships of war amounted to £1 per month, so that the allowance to the seamen employed in the Greenland fishery is six times the ordinary allowance of seamen in the public service. It is remarkable that France was granting these extravagant allowances for the encouragement of the whale fishery exactly at the time that Great Britain was withdrawing the bounties by which she had formerly endeavored to promote this branch of trade as a nursery for seamen. Yet in 1830 the number of vessels that cleared out for the fishery in England was one hundred and twenty-three, consisting of 40,166 tons, navigated by five thousand and forty-four seamen, being thus about eight times the quantity of tonnage employed by France. The Government of Louis Philippe, alarmed at the large outlay in bounty, endeavored to lessen it and to render it transitory and temporary only. M. d'Argout, the minister of commerce, insisted that those bounties exhausted the resources of the state, and decreasing bounties were after a period adopted, but M. Cunin Gridaine, who was minister of commerce, relapsed into the old error by introducing supplemental bounties. The provisional government of 1848 by one decree augmented the bounties, and by a second extended the term of the law to December 31, 1851. On the 22d of July, 1851, the National Assembly voted for the continuance of the bounties to 1861."*

AUSTRALIA, TASMANIA, AND NEW ZEALAND.

Shore whaling has been practiced to a limited extent on the south and west coast of Australia, under the direction of Americans who had left their vessels while cruising in that vicinity. One of these whaling stations was at Vasse, in Geographe Bay, on the southwest coast of the island, and another was at Bunby, some 30 miles farther north. "At certain seasons of the year the right and humpback whales resort to various bays on this coast for the purpose of producing their young. A lookout is stationed on an eminence ashore, and several boats' crews being near at hand, at the appearance of a whale the alarm is given and they start in pursuit. At times their work is very easy, but if the whale should run out to sea, after being struck, they are obliged to tow him to the shears, and frequently a day and night are consumed in this arduous employment. If the whale is attended by a calf they always fasten to the latter first, knowing that the mother, in her solicitude for her offspring, is very careful not to use her tremendous flukes, or, if a humpback, her sweeping fins; but woe betide the boat, unless an experienced boat-header directs it, that is in the vicinity when she discovers that her calf is dead. She then remains close to the lifeless body, striking right and left with flukes and fins to avenge her loss, and, as the slightest tap from these formidable weapons would cause destruction, it requires all the boat-header's adroitness to avoid them. The officers, boat-steerers, and, if they can by any means be procured, two-thirds of the crews are Americans. We have a world wide reputation for skill in this pursuit." †

* Ency. Britannica, vol. x, p. 266. France has had no fleet since 1866.

† W. B. Whitecar, jr.,: Four years aboard the Whale Ship: Phil., 1860, p. 91.

Decennial return showing the number, tonnage, and crews of Tasmanian vessels engaged in the whale fisheries; also the number and tonnage of such vessels entered inwards, and the quantity of oil, &c., which they brought into port.

[Compiled from statistics of the colony of Tasmania for 1879.]

Year.	Vessels employed.			Vessels entered inwards.		Produce brought into port.					
	No.	Tonnage.	Crews.	No.	Tonnage.	Black oil.		Sperm oil.		Whalebone.	Value.
						Tuns.	*Gallons.*	*Tuns.*	*Gallons.*	*Pounds.*	
1870	15	3,446	376	(*)	(*)	1	0	448	0	.....	£35,880
1871	19	4,917	470	18	4,275	5	0	659	0	100	46,350
1872	19	4,917	488	12	3,070	14	18	339	0	.....	27,420
1873	18	4,765	444	18	4,642	13	18	558	0	.....	44,000
1874	16	4,088	389	13	3,405	.....		352	0	.....	30,780
1875	13	3,525	315	6	1,628	.....		139	28	.....	12,465
1876	13	3,525	315	15	3,955	9	126	470	0	.....	41,740
1877	12	3,295	324	11	3,054	.....		451	126	.....	31,605
1878	11	3,156	321	11	2,733	.....		282	0	.....	16,920
1879	11	3,156	326	8	2,317	.....		268	126	.....	13,425

* Not given in the returns prior to 1871.

The whale fisheries of New Zealand are discussed as follows in a report to the Department of State by U. S. Consul G. W. Griffin, dated Auckland, New Zealand, May 16, 1881:

"The presence of a fleet of American whaling vessels from New Bedford, Mass., now in the waters of New Zealand, has directed my attention to the condition of the whale fisheries of this colony. The principal ports of New Zealand for whaling vessels are Russell and Mangonui. There appears to be no just reason why these ports should be preferred to others of the colony, unless it is that Russell and Mangonui are small places and do not offer as great inducements for the men to desert their ships as the larger cities, and that it is always difficult to supply the loss of trained men for whaling purposes.

"The whale fisheries of New Zealand, like those elsewhere, have declined rapidly during the last thirty years, but they now appear to be rallying again. The cause of their decline has doubtless been the substitution of other material for whalebone and the discovery of kerosene and other lubricating oils which have taken the place of whale and sperm oil. A large number of whaling stations were established along the coast of New Zealand as far back as 1825. The industry has been a very lucrative one. Few ships that ventured to those shores were unsuccessful in obtaining full cargoes of oil and bone.

"I find that the industry was most successfully pursued by what was known as 'shore parties,' who located themselves at eligible points all round the coast of the islands. The method of catching whales by shore parties was first started in New Zealand by some of the rough white adventurers from the Australian colonies, who had for many years previously pursued the arduous life of catching seals in boats and small crafts along the coasts of the Middle Island and Foveaux Strait. They were encouraged to engage in the pursuit of the whale and to form establishments for that purpose on the shores of Cook Strait. Upon hearing of the success of these shore fisheries the people established whaling stations at Wellington. Some also were started at various points on the west coast of the North Island, near New Plymouth, and a large number at various places on the east coast of the North Island, between Cape Palliser and East Cape.

"These stations were fitted out for the capture, chiefly, of the black or 'right' whale (*Balæna antipodum*), which approached the shores of New Zealand in large numbers during the calving season, from May to October, inclusive. Very frequently the sperm whale, the humpback, the pike-headed, and other species came near enough also to be captured by the shore parties. The stations were generally established near a projecting headland, close to which there was deep

water, and where, from the lofty summit of the headland, a good view could be had of the offing and of any whales which might chance to sport there. The advantages rendered the site an eligible one. The season for which the men engaged themselves began with the month of May and lasted until the beginning of October, extending through a period of five months, which in New Zealand includes the winter season. During these months the cow whales resort to the coast with their young calves.

"It required a large sum of money to equip a whaling station. A pair of shears, such as are used for taking out or putting in the masts of ships, had to be erected in order to raise the immense carcasses above water, so that they could be more conveniently and expeditiously cut up. It was also necessary to build 'try-works,' as they were called, being furnaces for melting the blubber. Storehouses were erected and well supplied with spirit, cord, and canvas. Three or four well-built and well-found boats completed the outfit. All these establishments seem to have been conducted on the same system. The men employed in the active part of the work received a certain per cent. of the oil procured, and the remainder was the share of the merchant at whose expense the station had been fitted up, and who had also the advantage of taking the oil at his own valuation, which very generally was largely in his favor. In looking over some old records kept at one of the stations near the East Cape I find that in one year forty-one whales were caught, which yielded 145 tons of oil and 1½ tons of bone. I have been informed by old whalers here that as much as 14 tons of oil had been obtained from one whale. A breeding cow and calf produce about 1 cwt. of bone to 1 ton of oil, but a small fat whale a much less proportion.

"The flourishing condition of the fisheries attracted vessels from all parts of the world. In 1843 as many as twenty whaling vessels were seen at one time in the harbor of Otago, Middle Island. At a later period Russell, Bay of Islands, became the favorite resort of the whalers. The fisheries, however, began to decline rapidly, notwithstanding the employment of an increased number of boats and men. The places which were once the favorite haunts of whales soon became entirely deserted by them. The country at that time was without a representative form of government, and no laws were enacted to protect the fisheries. The whales frequenting the coast of New Zealand were soon extirpated or driven off to other regions. They were attacked by the shore parties the moment they reached the coast, when they had generally by their side a calf too young to support itself without being suckled by the mother, and which perished as a natural consequence of her loss. Had an act been passed making it unlawful to kill the whale until a later period in the season, many of the calves would have been spared to return the following year.

"In 1858 the legislative assembly of New Zealand, with a view of improving the condition of the whale fisheries, passed an act, which is still in force, requiring the proprietors of whaling-stations to give valid security on future produce of oil and bone. There had been very general complaint among the whalers that the merchants would not advance money or goods without legal security. The act enabled the merchant to receive a mortgage on the oil and bone which the proprietors of the whaling stations might obtain during the ensuing season. The mortgage must be in duplicate, and recorded, so that no subsequent sale by the whaler can affect the security. If the whaler should refuse to deliver the oil and bone specified therein the owner of the security can take possession of the same.

"This security is made transferable by deed, and by indorsement, and every transferee has the same right, title, and interest as the person in whose name such security was originally taken. The security can also be canceled by the registrar at any time at the request of the owner. The act further provides that if fraud should be practiced on the owner he can recover double the amount of the consideration named in the mortgage, and every one found aiding or abetting such frauds shall be fined double the amount of the consideration.

"The proprietor of one of the whaling stations on the North Island has described to me the method of catching the whale by the shore parties. The men are enrolled under three classes, viz, headsman, boat steerer, and common man. The headsman is the commander of the boat, and his post is at the helm, except during the time of killing the whale, which honor also falls to his lot. The boat-steerer pulls the oar nearest to the bow, always steering under the direction of the headsman, and fastens the harpoon to the whale. The headsman then kills the whale. The common men have nothing to do but to ply their oars according to orders, except one called the tub-oarsman, who sits near the tub containing the whale line, and sees that no entanglement takes place.

"The wages are the shares of the profits of the fishery, apportioned to the men according to their rank. The headsman gets more than the boat-steerer, and the boat-steerer more than the common man. The leader of the party commanding the boat is called the chief headsman. A certain code of etiquette or laws exists among the whalers. This code has been handed down by tradition, and is in all cases faithfully adhered to. It regulates and settles the various claims to the whale. Each station has its own laws and customs. It is a fundamental rule, however, among all of them that he who once made fast has the right to the whale even should he be obliged to cut his line, provided his harpoon still remains in the whale. Each harpoon has its owner's private mark, and there can be no dispute about the ownership of the weapon. The boat making fast to the calf has a right to the cow, because it is well known that the cow will not desert her young. A boat demanding assistance from a rival party must share equally with the party granting the assistance. These unwritten laws are universally recognized among whalers. A dispute seldom occurs as to the ownership of the whale. Should such a dispute arise it is always satisfactorily settled according to the code.

"The whale-boat used by the shore parties differs in size and construction from those used by whaling vessels. The former is clinker shaped, sharp at both ends, and is higher out of water at the bow and stern than it is amidships. It is usually about 30 feet long and narrow in width, and especially adapted for riding on the surf. A platform is erected at the stern, reaching forward about 6 feet, even with the gunwales. To this is attached a cylindrical piece of wood used for checking the whale-line, and it is a custom to cut a notch in this wood for every whale killed by the boat.

"A constant lookout for whales is kept from a site near the station, and when a whale is sighted three or four boats are immediately launched and proceed at racing speed, the spout of the whale, like a small column of smoke on the horizon, indicating the direction to be taken. When the fastest boat reaches the whale, the boat-steerer drives the harpoon straight into the animal. A turn is taken around the loggerhead to check the rapidity with which the line runs out, and the boat flies through the water, forming ridges of foam above the sides. The skill of the headsman is now shown in steering and watching the course of the whale. Other harpoons are thrown into the animal, which, after diving several times, soon becomes exhausted. The headsman then lets fly his lance into the spot where life is said to be. The animal soon afterwards spouts thick blood and is a sure prize. This method of catching whales is, however, not so satisfactory or profitable as that pursued by whaling vessels, and is principally practiced now by the Maori, or native race.

"The sperm whale is more frequently met with in the New Zealand waters than any other kind of whale. Mr. Eldridge, the first officer of the American bark Janus, informed me that during last March he saw forty or fifty of these whales near the East Cape. The sperm whale travels at the rate of 4 or 5 miles an hour. Adult females or those with young in their company evince a strong affection for each other, and when one is killed or sustains injury the parents or companions hover about, and even render assistance. The whalers take advantage of this trait and kill a number before the others make off. When, however, a company of male whales are found, and

one is attacked, all the others desert their wounded companion. The whale will sometimes lie with its mouth wide open, as if waiting for the 'squid,' its principal article of food, and will close upon it like a trap. Some say that the squid is attracted by the pearly teeth of the whale. The sperm whale is known by the act of blowing, which is performed with regularity every ten minutes. The spout sent up can be seen at a distance of 3 miles. Mr. Eldridge tells me that when one is sighted the boats leave the ships very quietly, the men making as little noise as possible with their oars and paddles. When struck, the whale generally sounds, or descends to a great depth, taking out the lines belonging to the boat. When spent with the loss of blood it becomes unable to sound, but passes rapidly along the surface, towing after it the boats. If it does not turn, the men draw in the line and dispatch him. When a whale is killed, the boats are fastened to its body and brought alongside the ship. A hole is cut back of the head, a hook is inserted, and the fat or blubber is cut in long, spiral-shaped strips and hoisted on deck. The head is then opened and the spermaceti taken out. The fat is then boiled on board in the furnaces, the scraps serving as fuel. The oil is then put in casks. It is generally supposed that it is water which the animal propels through its vents, but such is not the case. It propels the vapor of water, just as all animals expire their breath, only the vapor on coming in contact with the cold air immediately condenses, at first in a white cloud and afterwards in a small fine rain. The volume of air thrown up along with the surrounding moisture and condensed vapor often rises in a great jet. Sperm whales travel the seas in great herds, from one hundred to three hundred, and they are said to acknowledge a leader, who swims in advance and gives the signal of combat or flight by uttering a peculiar roar. It can remain under water for an hour and twenty minutes at a time; sometimes it leaps out of water fully 25 feet into the air and shows its entire body. The neck vertebræ of the sperm whale are fused together. The upper surface of the broad, shoe-shaped skull has a large, basin-like cavity, wherein the spermaceti is lodged.

"The sperm whale is also remarkable for the ambergris which is sometimes found in it. Ambergris is the most precious of all the ingredients used in the manufacture of perfumes. It is now very generally acknowledged to be a morbid secretion of the liver of the spermaceti whale. It is remarkable that the two most precious products of the sea, ambergris and pearl, are the results of disease. Ambergris is found floating on the ocean and is sometimes washed ashore. It is a little lighter than water and bears some resemblance to the bark of a tree. It is described as of a waxy ure, streaked with yellow, gray, and black, and emitting a peculiar aromatic odor. It fuses at 140° and 150° F., and at a higher temperature gives out a white smoke, which condenses in a crystalline fatty matter. It varies in size from 1 to 30 pounds, but occasionally pieces are found in whales weighing from 100 to 200 pounds. Its use in the manufacture of perfumes is not so much on account of its fragrance as its peculiar property of causing other ingredients to throw out their odors. It is compared in this respect to mordant in dyes, without which the color would fail to become permanent. Perfumes that contain ambergris are very expensive, and those made without it smell of alcohol. It varies in price from $12 to $50 per ounce.

"Among the whales peculiar to this colony is the New Zealand *Berardius*. It is a species of ziphoid whale. One was captured not long ago off the coast of Canterbury. It was described by Dr. Julius Haast as 30½ feet long, of beautiful velvety color, with a grayish belly. The female *Berardius* gives birth to a single young one in the autumn. They feed chiefly on cuttle-fish. The skull is most peculiar in having two crests at the occiput, of most unequal size and figure, and the cheek-bones at the roof of the beak are raised into a pair of huge elevators. The upper jaw is toothless, and the lower jaw has only two or three small teeth. The neck vertebræ are united, and, moreover, the stomach is remarkable, even among cetacea, for the number of chambers it contains there being six or seven divisions.

"The right whale (*Balæna antipodum*) is often caught in the New Zealand waters. In this animal the baleen plates take the place of teeth and hang suspended from the roof of the mouth. Captain Grant, of Horatio, is said to have captured a whale off this coast, New Zealand, yielding over 2 tons of whalebone. The baleen plates vary in size from a few inches to 12 feet in length. Their chemical composition is albumen, hardened by small particles of the phosphate of lime. In their natural state they are of a bluish black color, striped with white. They are covered with small fibers, which are carefully scraped off; the plates are then boiled until they are soft enough to cut; the color being objectionable, they are dyed black before being sent to market. The dyeing is generally done during the process of boiling.

"In 1878, the number of American whaling vessels which arrived at the various ports of New Zealand was thirteen, with an aggregate tonnage of 3,422. In 1879, the number was fifteen, and the tonnage 3,792. Captain Fisher, of the American whaling bark Alaska, now at Russell, Bay of Islands, New Zealand, informs me that he has cruised off the coast of these islands for a period of six years, and during that time he has taken over 7,000 barrels of sperm oil, which he thinks is above the amount taken by any other vessel in the same length of time. He took home with him on his last voyage, according to the New Bedford Republican Standard, the most valuable cargo of sperm oil ever brought to that place, which is a good deal to say, inasmuch as New Bedford is the largest port for whaling vessels in the world. Captain Fisher writes me at Russell, Bay of Islands, New Zealand, under date of the 13th of May last, 'that he will sail for New Bedford on the 20th instant with 930 barrels of oil (800 sperm and 130 whale oil) and about 660 pounds of whalebone.

"I give below a table showing the quantity and value of whalebone, whale oil, and sperm oil exported from the various parts of New Zealand for each year since 1869 to 1880:

Year.	Whalebone.	Whale oil.	Sperm oil.	Value in American currency.
	Pounds.	*Gallons*	*Gallons.*	
1869	5,143			$1,525
		18,509		17,190
			7,640	5,835
1870	5,959			1,698
		23,769		20,095
			29,978	33,500
1871	3,017			1,260
		3,893		2,840
			42,920	58,625
1872	6,712			3,800
		40,070		41,285
			2,982	3,160
1873	3,544			560
		5,787		4,205
			6,958	10,285
1874	6,234			2,200
		11,799		9,650
			6,964	10,550
1875		14,108		10,500
			12,812	24,470
1876		4,536		2,250
			22,827	32,275
1877			15,004	20,160
1878			18,483	25,205
1879		4,640		3,640
			15,717	18,725
1880	3,584			3,015
		3,861		2,395
			20,969	26,255

WHALE FISHERY AT BARBADOES.

Mr. Alleyne S. Archer, in an article in The Field, the Country Gentleman's Newspaper, for October 22, 1881, thus refers to the whale fishery at Barbadoes:

"The whale fishery was started by me some fourteen years ago in this island, and I have carried it on every year up to the one last past. I find that the whales have not decreased, nor do they appear any wilder or harder to be caught; on the contrary, with the improved weapons that have been introduced of late years, and with the experience that has been gained by all who engage in it, the catching and killing of them may now be considered as pretty easy, although at times a very tiresome work. When first I engaged in it Demerara offered a very remunerative price for the oil, which is made from what we call the black or humpback whale. I then readily obtained 5*s.* 6*d.* per imperial gallon for the oil, which at that time was largely used there for lubricating as well as for burning. Year by year has witnessed its decline in value in every market in the world. A few years after I had first started, Demerara rejected it, and would not purchase it at any price, kerosene having superseded it as a burner, and lard oil as a lubricator. Trinidad for a year or two then afforded a good market; but from the great influx of oil from Grenada, St. Vincent, &c., the market became glutted, and the price has never gone back to anything like a remunerative figure. The United States was then tried, but the heavy duty of 20 per cent. ad valorem on foreign catch entirely hindered any further exportation to those shores. The only market now where the oil or bone can be sold to any advantage is the English, that is to say, in London. This oil is of much the same value as that procured from the large 'right whale,' which sometimes yields 150 barrels of oil, while these humpbacks never give more than 90 to 100 barrels, 45 being the average. Right whales and sperm whales are never seen in these waters, but the latter are often taken amongst the Leeward Islands. The bone obtained from the humpback is about from 1 to 3 feet long, while the bone from the right whale is from 6 to 12 feet long, and now worth £500 per ton. The carcass of the whale has recently been utilized for the purpose of manure manufacture, and all the bones thereof have been used up; and this, with the oil and baleen (or bones from the mouth), would make the business profitable, notwithstanding the low quotation of oil and bone as given before.

"The fishery is carried on now in the central part of the island (to leeward). The boiling-house, where we try out the blubber, is on the shore, close to the beach; the boats are hung on davits on a jetty, which is about 200 feet long, and built in very smooth water. The whale is taken to the end of the jetty, where we have a depth of water of 2 fathoms. A large whale is generally about from 50 to 60 feet in length, and makes from 50 to 60 barrels of oil; and we rarely catch larger. This is cut in in about twenty-four hours, and then boiled out in forty-eight hours. Four boats lower every week day; two go north, and two go south. Each boat has seven men: one officer, who sticks and kills the whale; one boat-steerer, who steers and attends to the line when the whale is struck; and five men to use the paddles and oars, &c.

"Whales make their appearance here in January and leave in June, but we do not employ men to go after them until March; we, however, keep the boats ready in January, and if an opportunity offers we avail ourselves of it; and I have many times killed whales in January and February. In the month of March they begin to arrive pretty plentifully, and the cows then begin to calve, or bring their young calves with them to feed close in shore in smooth water. Whenever we see a cow and calf we generally succeed in taking them; but when the bull is with them our chances are not so good, as he seems to keep a first-rate watch, so that we cannot approach as we otherwise should do. However, the way we set to work is this: the boat is provided with 300 fathoms of manila whale-line, four toggle-irons (harpoons), three hand-lances with spear-shaped

heads (the lance being six feet long on a wooden pole 5 feet long), one breech-loading bomb-gun and five or six explosive-bomb lances. All the whaling is done under sail when there is wind enough to propel the boat; otherwise we use oars and paddles. We endeavor to keep a little behind the whale, but on one side or the other, and when we get a favorable chance to get onto it unperceived, we do so. We always strike the calf first if there is one; if not, strike any whale we get near enough to; the officer puts two irons in if he gets a chance, if not only one. He then directs the men to haul the boat close up to the whale (right on top of it very often), when he shoots a bomb into it and darts his hand-lance as near the heart as he can get it, some two or three times, when he slacks off the boat to allow the whale to kick and tumble about in the agony produced by the lances. When the lancing has been effective the whale generally at once spouts blood (but not at all times) and soon expires, perhaps in ten minutes; again, perhaps not in twelve hours, as I have known them spout thick blood at sunrise, and to get away at sunset, but such cases are now very rare, half an hour being about the average time required to kill it.

"It is very interesting to see the whale at feed in the shallow and clear water, and to notice the manner in which the mother protects her offspring and the way it suckles her. A whale on being struck darts off with velocity, and the men have to be very careful in their movements, otherwise they may lose their lives. I was once taken out of the boat by the line getting round me while I was in the act of shooting a large 70-barrel whale, yet I managed to get off safely; but such an escape is very rare, as the line takes the man down so quickly that he is at once drowned.

"Sometimes the boats get knocked to pieces by the flukes of the whale, then the other boat comes to the rescue. Six years ago we struck a calf at daylight close in to the shore, and soon after we fastened to the cow. She spouted blood in a few minutes, notwithstanding which she took us to the windward of Saint Lucia before dark; she then died after we gave her some sixteen bomb lances. I happened to be in the boat that killed her, and directed the whale to be taken into Martinique, where we boiled it out, getting 8 tuns of oil. The flesh of the whale is very much consumed here by all classes, and is considered to be not unlike beef, and is preferred by many to the bad cattle usually slaughtered in the leeward parishes of Barbadoes. I give an abstract of the catch for ten years past."

Abstract of whale oil taken at Barbadoes from 1869 *to* 1878.

[Tuns whale oil of 252 gallons each.]

Year.	Tuns.	Year.	Tuns.
1869. ..	10	1874. ..	65
1870. ..	5	1875.....	60
1871. ..	80	1876 ..	55
1872. ..	50	1877....	60
1873	47	1878 .	40

WHALE FISHERY OF CHILI.

There are several whaling stations or shore parties along the south coast of Chili. A small fleet of whaling vessels is owned by some Chilian companies. Their cruising grounds extend from Panama Bay to Chiloe, in latitude 47° south, and from the coast as far seaward as 120° west longitude. The sperm oil is chiefly shipped to England and the other oils consumed in Chili.

WHALE FISHERY IN THE GULF OF SAINT LAWRENCE.

The Canadian fisheries yield annually about one thousand white whale or porpoise hides, and about $15,000 worth of whale oil. The skins are prepared as leather, producing an excellent article, largely used for sportsmen's boots and for other purposes.

In the report of the Commissioner of Fisheries of Canada for the year 1875 is the following reference to the whale fishery:

"Whaling expeditions on our coasts began only when the New England loyalists settled on the shores of Gaspé, after the peace of 1763. Experienced in whale hunting, which they had practiced on the coast of New England, these settlers were not long in discovering what profits could be made by following a pursuit which they were well versed in. Such were the beginning of the first whaling expeditions. Vessels engaged in them were not at first numerous, being composed of small craft, but their number became larger by degrees, and in a short time not less than one dozen fine large schooners were reckoned as being engaged in that fishery. This was the golden time for Gaspé, and the oldest inhabitants, who still remember the enormous profits realized in these expeditions, cannot sufficiently condemn the improvidence of whalers who were not prudent enough to secure at that time the wealth and abundance which was pouring on them. The number of schooners engaged in this pursuit has gradually decreased until it is now reduced to three.

"The waters of the Gulf of Saint Lawrence are frequented by three kinds of whales, but the species most sought after is that called the humpbacked, so named from the peculiar formation of their backs. Whales had been so eagerly pursued for some years past by Gaspé fishermen that they disappeared for the same causes, I presume, which led them to abandon the shores of Europe and America. This fishery having become unremunerative was abandoned. Helped by this short breathing time whales had an opportunity to reproduce their species, and during the past two years they have been noticed in as large quantities as formerly. Whalers engaged in fishing this season state they saw thousands of them in the Gulf, but that bad weather prevented the making of a large catch. Three vessels fitted out at Gaspé Basin during the month of June, and had fair success—the Admiration, Captain Tripp; the Lord Douglass, Captain Baker, and the Violet, Captain Suddard. The results of these expeditions were as follows:

Name of vessel.	Oil.
	Barrels.
Admiration	240
Lord Douglass	220
Violet	120

"The fishing mostly took place on the coast of Labrador and in the Strait of Belle Isle; the cargo of the Violet was secured within a short distance from Gaspé. This fishery would have been twice as productive had not rough weather and floating ice made navigation dangerous during the summer and fall. Oil sold for 50 cents a gallon."

For the season of 1880 the following report is made by Mr. George H. Hall, United States consul at Gaspé Basin:

"Whaling has proved so unremunerative a pursuit for a number of years past that there remains but one small vessel employed in that business. The voyage occupies the summer months, and generally is in the vicinity of the Strait of Belle Isle. About 9,000 gallons of oil, a few hundredweight of small whalebone, and a few barrels of whale meat were the product of this summer's cruise. Price of oil, 45 cents per gallon; whalebone (small), $10 per cwt."

The condition of the whale fisheries within the Gulf of Saint Lawrence in 1852 is discussed by Mr. M. H. Perley, as follows:*

* Reports on the Sea and River Fisheries of New Brunswick. By Mr. M. H. Perley, Fredericton, 1852.

"The extent to which the whale fishery is carried on within the Gulf of Saint Lawrence by vessels from Newfoundland is very little known, nor is its value appreciated. The Jersey houses who have fishing establishments in Gaspé also fit out vessels for this fishery, which cruise about Anticosti and the northern shore of the Saint Lawrence. Mr. MacGregor, in an official report to the Board of Trade, thus describes this fishery:

"'The whales caught in the Gulf of Saint Lawrence are those called humpbacks, which yield on an average about 3 tons of oil, some having been taken 70 feet long, which produced 8 tons. The mode of taking them is somewhat different from that followed by the Greenland fishers; and the Gaspé fishermen first acquired an acquaintance with it from the people of Nantucket. An active man, accustomed to boats and schooners, may become fully acquainted with everything connected with this fishery in one season. The vessels adapted for this purpose are schooners from 70 to 80 tons burden, manned with a crew of eight men, including the master. Each schooner requires two boats, about 20 feet long, built narrow and sharp, and with pink-sterns; and 220 fathoms of line are necessary to each boat, with spare harpoons and lances. The men row towards the whale, and when they are very near use paddles, which make less noise than oars. Whales are sometimes taken in fifteen minutes after they are struck with the harpoon. The Gaspé fishermen never go out in quest of them until some of the smaller ones, which enter the bay about the beginning of June, appear; these swim too fast to be easily harpooned, and are not, besides, worth the trouble. The large whales are taken off the entrance of Gaspé Bay, on each side of the island of Anticosti, and up the river Saint Lawrence as far as Bic.'

"Mr. Bouchette, in his work on Lower Canada, represents the whale fishery of the Gulf as meriting the attention of the legislature, and needing encouragement, by which, he says, the number of vessels employed would be considerably increased, and this important branch of business would be as effectually carried on by the hardy inhabitants of Gaspé as to compete, in some degree, if not rival, that of the Americans, who were, at the time Mr. Bouchette wrote, almost in the exclusive enjoyment of it, and carried on their enterprising fisheries in the very mouths of the bays and harbors of Lower Canada.

"Sir Richard Bonnycastle, in his work entitled 'Newfoundland in 1842,' says, 'The coast and Gulf whale fishery is now being of much value to Newfoundland.' Sir Richard states that the vessels employed are large schooners, with crews of ten men each; that the fishery is pursued during the whole of the summer months along the coast of Labrador, and in and through the Straits of Belle Isle, and that whales of all sizes are taken, from the smallest 'finner' up to the largest *mysticetus*, or great common oil whale of the northern ocean, which occasionally visits these regions.

"It is believed that hitherto no attempt has been made by the people of New Brunswick to enter into this whale fishery, and it is a very proper subject for inquiry, whether it might not be profitably conducted by New Brunswick vessels, and the active and enterprising fishermen of the Bay of Chaleur, who are equally well placed for carrying it on as their hardy comrades on the Gaspé side of the bay."

WHALE FISHERY OF GERMANY.

Bremen and some other German ports were formerly largely interested in the whale fishery. An excellent historical review of this industry is given by Dr. Lindeman, in his work entitled "Die arktische Fischerei der deutschen Seestädte, 1620–1868."

The whale fishery of Bremen in 1864 employed five vessels, in 1865 three vessels, and in 1866 four vessels. The imports of oil and bone into Bremen in 1865 and 1866 were as follows:

	1865.		1866.	
	Quantity.	Value.	Quantity.	Value.
Whale oil ..... gallons..	427, 050	$293, 380	386, 190	$259, 444
Whalebone..... ..... pounds..	169, 212	192, 428	252, 722	304, 349

Some German vessels have engaged in the North Pacific whale fishery. Among these vessels were the ship Comet, cruising from 1861 to 1868; the Oregon, from 1864 to 1867, and the Julian, from 1865 to 1868.

2.—THE WHALEMEN, VESSELS AND BOATS, APPARATUS, AND METHODS OF THE WHALE FISHERY.

By James Templeman Brown.

1. THE WHALEMEN.

Nationalities.—As to the nationality* of the crews now employed in the whale fishery, I should say that the captains are almost always of American birth, usually residents of the New England States, and rarely a native of the Western Islands. The mates are usually New Englanders, but occasionally Portuguese, or perhaps a half-breed Indian from Gay Head, Mass., or Montauk Point, Long Island, may fill the office. As a rule the boat steerers are foreigners, principally Portuguese, Indians, or Kanakas. Formerly the crews were composed almost entirely of Americans, and were made up, for the most part, of residents of New Bedford or the New England States, with an occasional delegate from almost every State in the Union. Subsequently there seemed to be a gigantic funnel, with its nozzle inserted in New Bedford, through which all classes and conditions of men from all parts of the United States found an outlet to the broad ocean. Still later, the intelligent American-born citizen withdrew from the forecastle of the whaler, and his place was supplied by a foreign element from the various islands and coasts visited by the vessels during their voyages. Though the foremost hands are representatives of almost all nations, they are mainly natives of the Azores, or Western Islands, Cape Verde, Annobon, St. Thomas, or some of the numerous other little islands on the west coast of Africa, with a sprinkling of Kanakas, Guamies, Lascars, New Zealanders or Maories, West Indiamen, half-breeds—a mixture of Spaniard and Indian—from the coasts of Peru, Colombia, and other parts of the South American coast, English, Dutch, Scotch, Irish, Italian, French, and occasionally an American. A more heterogeneous group of men has never assembled in so small a space than is always found in the forecastle of a New Bedford sperm whaler.

In case of death or desertion during the voyage vacancies are filled by some of the above-named classes, or by an amalgamated class of comparatively worthless men of different nationali-

* Of the three thousand eight hundred and ninety-six men composing the crews of the New Bedford whaling fleet in 1880, it is estimated that one-third were American born, one-third Azorean and Cape Verde Islands Portugnese, and the remainder negroes, Kanakas, and other nationalities.

ties, known as "seasoners,"* "beech-combers," and "shoalers." Some of them may be engaged for the season, and others for the balance of the voyage; although the terms are specified when the papers are signed, they are seldom respected or observed by this class of men. Upon their arrival at New Bedford the crews are not disposed to ship again as whalemen, preferring to try their luck with the coasters in the carrying trade, or perhaps in the fisheries. But these branches of the service rarely suit them, and as they are constitutionally opposed to manual labor ashore, being accustomed in their native islands to the open sea, many of them are compelled to ship again in self defense as whalemen, or to be shipped, *nolens volens*, by their boarding masters for debt. They rarely return to this country, however. No one seems to know or care where this vagabond element goes or how it disposes of itself.

The natives of the Azores, Cape Verde, Annobon, and St. Thomas, though of the negro element, speak a corrupt form of the Portuguese language. The "Cape Verdes," as they call themselves, are mulattoes—a mixture of negro and Portuguese—and more intelligent than the Brävas, Fogoes, and Annobons, who are exceedingly black. Both classes may mingle freely in business matters, but socially the Cape Verdes consider themselves superior. The Kanakas, Maories, Guamies, Lascars, Annobons, West Indiamen, and some of the Portuguese, make good whalemen, but indifferent sailors. On their native islands their eyes have been educated in distinguishing remote objects on the surface of the sea; hence they are especially desirable at the lookout of a whaling-vessel, since they can often detect the slight puff of the sperm whale's breath amid the surface mist peculiar to low latitudes. More especially is this true of the Kanakas. They know no fear and never hesitate to approach a whale and harpoon it; but on the vessel they are lazy and shiftless.

The remnants of the Chilmark Indians (half-breeds) at Gay Head (Martha's Vineyard) and Montank Point (Long Island) furnish excellent material for the whale-fishery, and upon them New Bedford relies more or less for her boat steerers. The mate and two boat-steerers of ship Niger, which sailed from New Bedford in October, 1882, were Indians. In the early days of whaling, and indeed after this industry had established a solid footing, the white man relied in part upon the Indian to man his boats and to perform other duties in this fishery.†

Few Americans below the rank of mates and captains are to be found on whaling-vessels now sailing from our ports. In former days, New England's best sons were trained in this nursery; commencing as they did as cabin boys or foremast hands, they worked their way through the various gradations of promotion. The sons and other male connections of the commission mer-

* The "seasoners" are men who may be obtained on any coast to ship for the season, but the term is, in a measure, synonymous, or nearly so, with "beach-combers"; the principal difference is, that if there is any respectable element at all in either class it may be found in the former. Many of them are adventurers, growlers, and deserters from whale ships. They prowl about the shores of the various islands in the Atlantic and Pacific, and can only be induced to again enter the service when necessity drives them to it. It is seldom they can be depended upon to discharge their duties, even after they sign the articles. The "beach-combers" may also be found about the shores. They are a lazy, shiftless, degraded class of men who have no respect for themselves and, consequently, receive none from others. They embrace different nationalities, many of them are deserters, and the majority of them are unreliable. They are at times compelled to ship as whalemen to obtain means of subsistence, but as soon as they get several "able-bodied meals," and receive supplies of clothing from the "slop chest," they desert at the first opportunity, and sacrifice their lays, being no better off than before, excepting that they have had a temporary home in the ship and leave with better clothing on their backs. The "shoalers" are half-breeds, a mixture of Spaniard and Indian, frequenting the coasts of Peru, Chili, and Colombia. They are usually engaged for the season, and are fair whalemen. Formerly masters of well-regulated whaling vessels declined to ship any of the above-named classes; but at present they are compelled to make up their crew from this element when they are short-handed on the voyage.

† In 1672 the town of Southampton, Long Island, passed an order for the regulation of whaling and the employment of the "Indyans to go a-whaling," in which it is stated that an Indian should not receive "for his Hire above one Trucking Cloth Coat, for each Whale hee and his Company shall Kill, or halfe the Blubber, without the Whale Bone, under a Penalty therein exprest."—ALEXANDER STARBUCK: Hist. Amer. Whale Fishery.

chants and ship-owners of Nantucket were not deemed competent as business men until they became familiar, by actual experience, with every detail of the fishery; and, according to "Miriam Coffin," so strong were the prejudices against any man who was not a whale-fisherman, that the daughters of Nantucket formed an organization of "female Freemasons," and refused to marry a man who had not first killed his whale.*

The New England fleet at this time was manned almost exclusively by American-born citizens. Crews for the New Bedford vessels were made up from neighboring towns. Capt. Isaiah West, now eighty-six years of age, tells me that he remembers when he picked his crew within a radius of 60 miles of New Bedford; that oftentimes he was acquainted, either personally or through report, with the social standing or business qualifications of every man on his vessel; and also that he remembers the first foreigner, an Irishman, that shipped with him, the circumstance being commented upon at that time as a remarkable one.

The Provincetown vessels are engaged exclusively in the Atlantic fishery, and consequently the natives of the numerous islands of the Pacific Ocean are seldom found in this fleet. The main dependence is placed upon Portuguese† from the Cape Verdes and Azores, and a small percentage of white men from Maine, Vermont, New Hampshire, and Massachusetts. Occasionally an Irishman is shipped. Probably about one-fourth of the Provincetown crews is composed of Americans. The crews shipped at San Francisco are composed of negroes, Mexicans, Kanakas, and Americans, and, rarely, an Indian from Cape Flattery.

Discipline on the vessels.—There is a certain kind of relaxed discipline on all whaling-vessels; for, as might be expected from the character and morale of the present crews, if the captain once "looses his grip on his men," the voyage will result in a failure. Manacles and handcuffs are usually carried, though seldom used, the captains preferring in all cases to rule and govern their men by moral suasion. Occasionally, however, it may be necessary to iron an insubordinate, pugilistic, or drunken man. He is then placed in the run of the vessel, or between decks in the blubber room, and kept on bread and water until willing to comply with the rules of the

* The author of Miriam Coffin, in continuation of his remarks in regard to Freemasonry upon the island of Nantucket, says:

"It was never fairly understood what were the secret obligations of these female Masons; and it was even doubted whether they had any 'secrets worth knowing,' inasmuch as no important operations, either of good or evil tendency, were known to be put in practice in the little town of Sherburne [Nantucket], or to disturb the world at large. This much, however, came afterwards to be divulged: an obligation, if not under the solemnity of an oath or affirmation, was at least assumed by the novitiate under the charge of the officiating mistress, that she would favour the courageous whale-fisherman, under every circumstance, in preference to a stranger and a landsman, if the alternative should ever occur. The letter and the spirit of this charge were for a long time pertinaciously adhered to by the unmarried members; and some of them were known to carry it so far as to make it a *sine qua non* in permitting the addresses of their suitors, that they should have struck their whale, at least, before the smallest encouragement would be given or a favouring smile awarded as the earnest of preferment.

"It has been shrewdly suspected that the chivalric ordeal, thus enforced by the fair maidens of the isle, was set on foot by some of the patriotic whale-fishermen and oil merchants of the place, in order to perpetuate a nursery of peculiar seamen; while in doing so, they were sure to secure valorous husbands, and a certain competency for their daughters, as well as a monopoly of the trade to the island. The intermarriage of so many whale-fishermen with the daughters of whale-fishermen, until almost all the inhabitants did, in reality, claim near relationship, and call each 'cousin,' at all events would seem to point that way, and to favour the presumption. Certain it is, that the daughters of some of the wealthiest men of the island had already formed a compact not to accept the addresses of sighing swains, much less to enter into the holy bonds of matrimony with any but such as had been on a voyage, and could produce ample proof of successfully striking a whale."—*Miriam Coffin, or The Whale-Fishermen*, pp. 57, 58.

† The Portuguese are gaining a foothold on some parts of the eastern coast. Through an increasing importation by whaling-vessels, they are becoming quite numerous in New Bedford, and have quartered themselves in one section of the city which is known as "Fayal." Some of them are property-holders, and make good citizens, and, like the true negro, believe in the unfailing powers of conjuration. The Cape Cod Portuguese usually engage in the cod fishery, and as they find this branch of industry remunerative, they rarely ship as whalemen again, unless they do so purposely to invite a difficulty with an officer at sea and to seek redress at the end of the voyage, the law for the protection of seamen being very stringent.

ship. When a rebellious seaman is guilty of a misdemeanor, it lies within the province of the captain, so long as he keeps within the bounds of the law, to determine what punishment should be commensurate with the offense. In early days complaints of harsh treatment were frequently entered against overbearing masters; but such is rarely the case now. The present captains in the fleet are intelligent men with broad and enlightened views, and kindly disposed towards their men. By the judicious system of pay which grants each man a certain interest in the proceeds of the voyage, the men are kept in a better state of subordination than would be the case if they received stipulated sums in compensation for their services. On the one hand, they have every motive to promote the interests of the ship; in doing this, they contribute to the success of the voyage and put money in their own pockets; on the other hand, they would naturally feel as a wage-earning people, whether they worked early or late, their pay would still go on, and the successful termination of the voyage would be a matter of indifference to them.

LIFE ASHORE.—One word in regard to the ordinary whaleman's boarding-house. I visited several of these institutions, both in the day-time and at night. Those located in the section of New Bedford known as Fayal are two-story frame structures with no pretensions whatever to anything but plainness and simplicity. On an average, they compare favorably with other cheap boarding-houses patronized by the laboring classes in almost any section of the country. The fare is plain and substantial, and while there are no superfluous articles of domestic furniture, there is no lack of such articles as the actual necessities of a boarder require I noticed a marked difference between the houses kept by the Cape Verdes and those kept by the Brävas. The former were cleaner, better furnished, and more homelike and inviting. The Cape Verdes also are more particular as to the kind of men they entertain, while the Brävas indiscriminately take any one who applies for board, provided he is able to pay for it. The price for board and lodging varies from $3 to $5 a week. The boarding-house keepers "drum up" customers in different ways. Some of them write letters to their friends or relatives in their native islands, requesting them to notify the whalemen who ship on American vessels that touch at their ports for supplies and men that board and lodging can be obtained upon their arrival at such and such a number on a certain street in New Bedford. As soon as a whale-ship is reported, the boarding-house keepers and outfitters charter a small vessel and board the whaler, usually after she gets into the harbor. In some cases, I am told, the foreigners arriving in this country for the first time, have letters from parties in their native islands addressed to the New Bedford boarding-house keepers. In this case, the immigrants gladly avail themselves of their opportunities; but if they have no letters, they become the prey of the "sharks."

The Portuguese have their regular weekly dances on certain nights. The spare moments of late arrivals seem to be occupied in sitting idly about the wharves or stores, or in standing in little knots or groups about the streets, awaiting the settlement of the voyage. Those who live at a distance sometimes take the train, shortly after the arrival of the vessel, for their homes, and return within a few days for their lays; those who have no homes repair to the boarding-houses, and impatiently wait for their money, and hasten to ship again. The truly unfortunate and indigent whaleman may find a temporary abode at a charitable institution, the Mariner's Home, until he is enabled to shift for himself, provided he does not stay too long. The Seamen's Bethel is open for divine service every Sunday.

THE PERSONNEL OF A WHALING VESSEL.—The personnel of a whaling bark or ship carrying four boats consists of the captain, four mates, four boat-steerers, a cooper, a blacksmith or carpenter, a cook, a steward, a cabin boy, and about sixteen or eighteen forecast hands, making all told about thirty-one or thirty-two men. Sometimes an ordinary seaman, or a green hand, may also be shipped

as a carpenter or blacksmith. Three-boat vessels usually have about twenty-one men, and two-boaters about sixteen. A fifth mate is usually shipped on steam whalers to head the starboard bow-boat. He is shipped as "fifth mate and boat-header," but does not receive as profitable a lay as the other mates, although he ranks as an officer. He may sometimes be required to stand watch, more especially if another officer is sick. The steam whalers usually carry a cabin steward and a cabin boy. A whaling vessel does not always leave New Bedford with her full complement of men, since she may obtain the balance of her crew at the Western Islands, where she almost always stops for supplies on her way to the Pacific.

The captain.—The captain has of course absolute command of the ship, and is responsible for her well-doing and safe return to port. When the wide nature of his functions are taken into consideration, it is not surprising that he should be a man above the average ability, and peculiarly adapted to his profession; for he has sometimes to serve in the capacity of physician, surgeon, lawyer, navigator, peace-maker, and *pater familias**; besides, he must have good executive ability. The captain's is also an office of both dignity and responsibility, and if he acquits himself in it zealously and circumspectly, he may, in the course of time, be enabled to retire to private life with all of the honors of his profession.

Formerly the captain always participated in the capture of whales, but at present, especially on large vessels, he remains on board when the boats are down. It was the custom, and I believe it is now practiced on some ships, for the master to lower during the first part of the voyage. The captains of the steam barks in the Arctic regions seldom if ever engage in actual capture. There seems to be a diversity of opinion as to the captain's place at such times, but it is generally conceded that when the boats are down he should remain on his vessel, as the boat-crews have more confidence in him as a ship-keeper than they would in a subordinate who takes his place in his absence. The master can, of course, take upon himself more responsibility in managing the ship and in directing the movements of the boats.†

The mates.—There are as many mates on a whaling vessel as there are boats for active duty, or, to use a technical expression, "on the cranes." The mates are the executive officers of the vessel, as is well known, and also the officers in charge of the boats when engaged in the capture, and in this capacity they are known as "boat-headers." They are, of course, subordinate to the captain and act under his orders; but when down for whales they oftentimes exercise their own discretion and carry out their own plans, subject, however, to the directions of the master signaled from the ship.

The mates kill the whales, cut off the blubber, superintend the "boarding," and have direct charge of boiling out the oil and of stowing it away.

The boat-steerers.—The boat-steerer has several names. His legitimate title is perhaps harpooner; but his comrades, and others intimately connected with the fishery, seldom call him by that name. If shipped to enter immediately upon the duties of his office, his name is recorded on

* The captain is known to his own crew, behind his back, as the "old man"; but to the crew of another vessel as captain or skipper. A man serving on one vessel recognizes his commander as his "old man"; but when he ships on another vessel, his present commander becomes the "old man" and his former commander the captain.

† The Provincetown captains sometimes lower with their boats, but usually only on rare occasions, as when they strike a large school of whales or when the boat gets fast to a vicious whale. If a Provincetown captain lowers he takes charge of his own boat, and the third mate strikes the whale; should the captain decide not to lower, the third mate heads the captain's boat, and either the ship-keeper, steward, or one of the foremast hands, usually the former, if competent, strikes the whale; but on three-boat vessels the mate usually lowers his boat first and "takes the lead of the whaling."

If the captains from New Bedford think it policy to lower for whales, they leave the vessel in charge of a competent person, usually the cooper—the office being known as "ship-keeper"—who takes entire charge for the time being, assisted by about six men, when all the boats are down, to "work ship."

the ship's papers simply as boat-steerer*; if shipped to take the place of a regular boat-steerer, who may be disabled by accident, or whose office may become vacant by death, he is entered as "spare boat-steerer" or as "preventer boat-steerer."† He is known in the fishery as boat-steerer, and out of it as harpooner. He should be a man of unusual personal courage, and with firm and steady nerves. This class of whalemen has won a name and record which, for bravery and the faithful performance of duty, is honored and respected throughout the fleet; so much so, that the expression "coward harpooner" would seem at once contradictory and out of place. But the harpooners of the fleet have degenerated with the fishery. In the palmy days of whaling the flower of New England's sons won the right to dart the harpoon by that spirit of fearlessness and gallantry‡ which characterized the early American patriot; but now almost every harpooner that sails from New Bedford is the representative of an inferior race.

The boat-steerers are petty officers and rank next to the mates. Their duties are manifold; they are required to stand their watches at the mast-head on the lookout for whales, to act as oarsmen in approaching whales, to dart the harpoon, to go down upon the whale while "cutting in," to stand before the try-works when "boiling out", and during the intervals they are expected to keep the boats and apparatus always ready for the capture. They take great pride in their boats and equipments, more especially the harpoons. They are in the line of promotion, and if capable and efficient both as whalemen and seamen, the chances for commanding whaling vessels are in their favor. Great care is exercised by the captains in the selection of their harpooners. As a rule they are picked men, who have made one or more voyages, who are skillful in managing boats, and courageous enough to face death without shrinking. If they become confused or frightened, and miss their whales, they may be deposed until they have an opportunity to regain their former prestige, provided the captain gives them the chance. This is what might be termed "hard luck," but it is one of the cast-iron rules of the fishery. Some captains may perhaps give their boat-steerers two or three "chances," as they are termed, but if they miss several chances in succession, other men are put in their places. The success of the voyage depends in a great measure upon the boat-steerers, and the captains cannot have a personal preference in their appointments.

The office of harpooner has always been one of prominence and importance, and the scarcity of suitable men or the incompetency of incumbents has often occasioned serious drawbacks. Both the English and Dutch relied solely upon the Biscayans for their harpooners when they first embarked in the Greenland fishery. England soon found it to the interest of her fleet to prescribe certain laws in regard to the selection of her harpooners.

Scoresby says that at the inception of the Greenland fishery the English harpooners commanded the whaleboats, harpooned the whales, and killed them with the lances. Also that they

* It is but natural to suppose from the terms "boat-header" and "boat-steerer" that the position of the former was at the head of the boat, and that of the latter at the stern simply attending to his duties of steering the boat, as the term would imply. Such, however, is not the case when approaching a whale, and to avoid the confusion of these terms I will more fully explain the duties of these two men in a subsequent account of the capture of the whale.

† Although the term "preventer" is more generally used in the Provincetown fleet, some of the vessels hailing from New Bedford record their extra harpooners as "preventer boat-steerers"; but the crew invariably call them "spare boat-steerers." The terms "spare" and "preventer" are employed for anything held in reserve. The term "boat-steerer" owes its origin to the fact that the harpooner, after striking the whale, takes the steering oar and so directs the movements of the boat as to enable the officer to kill the whale. The term "slewer," a slang expression, is also sometimes used.

‡ In the prosperous days of this industry the "chock-pin," a slender wooden peg for holding the whale-line in its proper place at the head of the boat when fast to a whale, was the badge of the harpooner, the emblem of his office, and attested his fitness for the position he proudly maintained and his skill and courage in striking whales. More particularly, I am told, was this the case at Nantucket. When the fortunate boat-steerers returned from successful voyages, they inserted chock-pins in the two upper button-holes of their coats as insignia of rank, to distinguish them from the common foremast hands or "deck wallopers"; they walked the streets of their native island, attracting the attention of the fair 'Tucketers in their sea-girt home.

ranked next to the captain of the vessel, and "had unlimited control of the people of the fishery," while the captain acted properly as navigator during a whaling voyage to the Greenland seas.*

The same author also speaks of the consideration with which the English harpooners were treated: "All the harpooners (seven in number) were invited to dine with me. I usually call them together on our entrance into fishing stations, to deliver to them such instructions as my own views of the business, the success of our exertions, and the liberal treatment of other adventurers who may happen to become our competitors, seem to require. On this occasion I urged them to activity, perseverance, and unanimity among themselves; to a benevolent exertion for the assistance of all ships, of all nations, to whom it might be useful, whenever that assistance could be rendered without evident detriment to their own prosperity; and gave them a code of rules to assist their judgment in cases of difficulty or danger."†

During the wars between the Dutch and English in the middle part of the seventeenth century, Holland endeavored to cripple the British whaling fleet by issuing a proclamation prohibiting, among other officers, the Dutch harpooners from engaging in the whale trade of any foreign country.‡

Oarsmen; foremast hands.—In the whaleboat the foremast hands are the oarsmen. Commencing at the bow of the boat, the oarsmen are placed as follows: (1) the harpooner, or boat-steerer, who has the extreme forward thwart; (2) the bowman, who occupies the bow-thwart, pulls the bow-oar, assists the boat-steerer in setting the mast and taking it in; makes himself useful in various ways to the boat-steerer, or boat-header, as the case may be, and also attends to the line when bowing on. Among the oarsmen his is the most important position, as will hereafter be seen, and the best-trained man on the ship is usually selected for the position. (3) The midship oarsmen occupies the midship thwart, and pulls the midship oar. (4) The tub-oarsmen has the tub-thwart, and manipulates the tub-oar, his duties being to "wet line" when the whale is running or sounding; and (5) the stroke oarsman, who is usually the lightest man in the boat; he occupies the after thwart, and pulls the stroke-oar; he also assists the boat-steerer in coiling the line when recovered from the whale, and in disposing of the mast after the whale has been struck; he also bails the boat, keeps the water-kegs supplied with fresh water, and assists the boat-steerer in "rigging" the boat.

* All the early adventurers on the whale-fishery, both English and others, were obliged to be indebted to the Biscayans for their superintendence and help. The office of harpooner requiring great experience as well as personal courage, was only suited to the Biscayans, who had long been inured to the dangers and difficulties attendant on the fishery of the fin-whale. The Biscayans were likewise looked to for coopers, "skillful in setting up the staved cask." At this period, each ship carried two principals; the commander, who was a native, was properly the navigator, as his chief charge consisted in conducting the ship to and from Greenland; the other, who was called by the Dutch *specksynder*, or cutter of the fat, as his name implies, was a Biscayan, and had the unlimited control of the people in the fishery; and indeed every operation belonging to it was entirely confided to him. When, however, the fishery became better known, the commander likewise assumed the superintendence of the fishery. The office of specksioneer, as it is called by the English, was nevertheless continued, and remains to this day, though with a more limited prerogative. The specksioneer is now considered the principal harpooner, and has the "ordering of the fat," and extracting or boiling of the oil of the whale: but he serves entirely under the direction of the commander of the vessel.—SCORESBY: vol. 2, 38–40.

Whence also are derived the terms *speck-trough* (a receptacle for blubber) and speck-falls (the cutting falls used in hoisting in the blubber), peculiar to English whalemen.—J. T. B.

† Whale ship *Baffin*, of Liverpool, William Scoresby, jr., commander; on her third voyage to the Greenland whale fishery, in the spring of 1822.—SCORESBY: N. Whale Fishery, 1823, p. 33.

‡ The Dutch being at war with England in 1653, and having neither men nor ships of war to spare for the protection of their whale fishery, this lucrative branch of commerce was obliged, for the season, to be suspended. In the war of 1659, as well as in that of 1665 and two following years, the fishery was also conditionally prohibited. As at such times their unemployed fishing officers might be induced to engage in the service of foreign nations, and thus carry the trade abroad to the disparagement of their own country, a proclamation was issued, prohibiting, under severe penalties, all commanders, harpooners, boat-steerers, &c., from embarking in the whale-fishery trade in the ships of any other nation during the war.—SCORESBY: Arctic Regions, Vol. 2, p. 55.

The foremast hands, besides performing all kinds of work incident to the life of a common seaman, stand watches aloft and below, heave at the windlass when cutting in a whale, assist in stowing away the blubber, in preparing it for the try-pots, stowing it down, and scrub decks after the fare has been boiled out.

THE MANNER OF SHIPPING A CREW.—The crews at New Bedford are generally furnished by a class of merchants known as "outfitters," assisted by boarding-house keepers. The outfitters keep stores containing different kinds of merchandise, usually ready-made clothing, men's furnishing goods, boots, shoes, hats, and the cheaper grades of dry goods, and the latter keep the common sailors' boarding-house. Both of these classes are known locally as "sharks." When the agent of a ship wants a crew he notifies the outfitters, who draw upon the "shipping masters" in New York or Boston, or the boarding-house keepers in New Bedford, for the number of men required. The expenses of men coming from a distance are paid as far as New Bedford; the outfitter meets them at the depot and conducts them to a boarding-house. If the men go on the voyage, the shipping-master receives $16 per capita, which amount, as well as the cost of their outfits, is charged to the men individually, and at the end of the voyage deducted from their profits; but upon their arrival in New Bedford, if the men refuse to go on the vessel, the shipping-master loses the fares to New Bedford, as well as his bonus, and the outfitter may be the loser on account of the men's board bill. The men are therefore placed under the closest surveillance, but they sometimes depart clandestinely with a portion of their outfit at the eleventh hour. An outfitter's business is attended with great risk. His profits, however, must be large, to cover deficiencies, for all of the men engaged in this business seem to prosper. Some of them also have the patronage of the citizens of the community, keeping, as they do, a general stock of goods. When the ship is about to sail, the outfitter, having every confidence in his men, furnishes each with a small wooden chest, or "donkey," of clothing, a straw bed, and other necessary articles; but he never permits the men to acquire a title of possession until they go aboard the ship; nor does he pay the boarding-house keepers the amounts due them until he is satisfied that the men are on board. The "outfit" of a whaleman consists of money, board bills, and clothing advanced by the outfitter; and the stock and trade of the latter consist of the profits he makes on the supplies, which profits are large, the goods being almost invariably charged above the regular prices. The agents may select a captain and mate; but oftentimes it is difficult to find competent officers, and the outfitters, taking advantage of this situation of affairs, furnish both officers and men, the profits being derived mainly from the officers. If a four-boater is fitting out, and the outfitter is granted the privilege of furnishing the captain or first mate, time-honored custom gives him the right to ship four additional men, either able-bodied seamen or green hands, and to supply the five with outfits. If he furnishes a second mate, he is entitled to outfit three men; if a third mate, two men; if a fourth mate, boat-steerer, cook, or steward, one man each. The "outfit" of a foremast hand varies from $75 to $125; of a boat-steerer, from $100 to $200; and of a mate, from $100 to $800, depending altogether upon the desires or actual necessities of the men, or what they think may be their necessities in the future. The "outfit" of each man is charged to his account with the vessel, and deducted from his profit at the end of the voyage; but the outfitters having expended both labor and cash in obtaining a crew, or part of a crew, and furnishing them with the necessary supplies—acts of kindness which are duly appreciated, under the circumstances, by both the agents and owners—are not compelled to wait until the ship receives its equivalent from the men, but settlements are usually made from thirty days to six months after the departure of the vessel. The outfitters therefore look to the agents for their pay, and the agents, in behalf of the owners, run the risk of getting their money from the men at the expiration of the voyage. Some of the

crews, both officers and men, more especially those living at New Bedford or near by, among whom may be numbered the thrifty, intelligent, and expert whalemen, purchase their outfit on their own account, thereby saving about one-half the amount it would cost them if their supplies were furnished by an outfitter; but the green hands, owing to their inexperience, must be initiated into the mysteries of the whale fishery, and whether they are so disposed or not, they fall into the toils of the outfitter, and must pay their fees without grumbling for their first degree. The improvident and reckless whaleman who has just returned from a four years' voyage is almost always compelled to ship again, and, although he "knows the ropes" as well as the outfitter does, on account of his straightened circumstances, he must, in self-defense, but contrary to his own inclination, go to the men who dispense favors.

So much has been said concerning the character and practices of the "sharks"—this term should not be so construed as to refer to outfitters only—I deem it of sufficient importance to say that the former method of dealing with seafaring men at the port of New Bedford and elsewhere has been so leavened with the ennobling spirit of civilization and the influence of Christianity that the past and present should not be associated. The modern outfitter is simply a sharp, shrewd tradesman, who, like many others in this broad land, resorts to every means to induce a liberal supply of patronage, and to dispose of the largest stock of goods at the best profit.

The outfitters are also "infitters," that is, they furnish the men with such supplies and articles of clothing as they may need when the vessel returns. A whaleman purchasing supplies under such conditions is merely a customer who requires goods, but has no money to buy. He was also a customer when he entered the service, but his vessel, after he had signed the "articles," was his surety, and the agent held him as a hostage. The merchant is as anxious to "infit" as he was to "outfit" him, but the man must now bring an order from the agent or owner of the vessel. If a poor voyage has been made, or if the man has drawn on the "slop-chest" during a voyage to such an extent as to ruin his credit, he becomes bankrupt ashore, and may be obliged to change his mind instead of his raiment; for, instead of "infitting" himself with long togs, consisting of ready-made suits, the luxurious white shirt, collars, cuffs, gay-colored neckties, handkerchiefs, gloves, scarf-pins, and other jewelry, fine shoes, and fashionable hats, for all the outfitters keep an abundant supply of these things, he must "outfit" himself with wearing apparel of coarser materials suitable for voyage at sea, and ship for another voyage.

Quarters on the vessels.—The captain, mates, and boat-steerers are quartered in the after part of the ship. The former, on large vessels, has a state-room on the starboard side, and a private cabin or kind of office in the central portion of the after part of the vessel. Both rooms are plainly but comfortably furnished, and the cabin usually contains a bedstead, the only one, by the way, on board ship, the balance of the ship's company occupying bunks. The captain is sometimes accompanied by his wife and children, and his apartments have a home-like and comfortable appearance. The state-room, or bunk, of the first officer is just forward of the captain's quarters on the port side adjacent to the pantry; forward of the latter are the bunks of the third and fourth mates, and just opposite, on the starboard side, is the second mate's cabin. The boat-steerers, cooper, and carpenter occupy separate bunks on the port side. The foremast hands are confined to the forecastle. Their bunks are arranged in tiers about the forward end and on either side of the ship as far aft as the forecastle extends. They are made of ordinary plank, and usually painted when the ship is fitting for a voyage, but during the cruise they become well worn and greasy enough. The first man on board ship has the first choice of bunks, and writes his name, or initials of his name, on the side with chalk, or pre-empts the spot by depositing his bed-sack, and retains possession during the voyage. The conveniences of living and the accommodations

of the quarters for both officers and men depend upon the size of the vessel; in schooners and brigs the apartments are necessarily circumscribed, and the domestic felicity is sometimes marred by too intimate association or unfriendly contact, while on barks and ships there is much more latitude.

Messing.—The modes of life and customs of whalemen are essentially in keeping with their surroundings, and common to the majority of seafaring men engaged in the mercantile marine service in all quarters of the globe. The bills of fare are not varied or comprehensive, since the vessels are confined principally to what may be termed out-of-the way places. Seldom touching a port, the men are deprived of those things which, though called by landsmen the necessaries of life, are regarded by whalemen as luxuries. Although wanting in variety, ample provision is otherwise made; for well-cooked, wholesome food, and plenty of it, such as it is, constitutes a bond of sympathy between the men and the ship, and while there is a disposition on the part of some men to "growl," the majority feel satisfied that the best that can be done under the circumstances is being done for their welfare, and so accept it.

A whaling vessel is furnished with all the large and small conveniences known in the housekeeper's economy. Since the improved methods of preserving fish, meats, vegetables, and other food stuffs have been introduced, the vessels sailing from New Bedford are provided with all of the modern conveniences in the way of provisions that may be kept in any climate; but the mainstay after all is salt beef, salt pork, commonly known as "salt horse," or "salt junk," and ship-bread. The last-named article occupies an important place in the whaleman's dietary. It is better known perhaps as "hard tack," to distinguish it from the bread sometimes made on board ship, which is called "soft bread." About 50 barrels of flour produce 100 barrels of bread, which amount was usually included in the outfit of a vessel of the largest class; but at present so large a quantity is seldom taken by one vessel, since fresh bread may be "freighted" by others.

When fitting the ship for a voyage several casks of bread, pork, beef, and other provisions "in bulk," are placed in accessible places where they may be opened as required, the remaining and larger number being brought to light from time to time during the voyage when stowing down the oil or as they may be needed. A careful and closely calculating master will order the entry in his log of every cask of bread, pork, beef, and the like, opened during the voyage. Beef and pork for immediate use are oftentimes kept on deck in a wooden receptacle called a "harness-cask," lashed to the deck in a convenient place for the cook, who draws his daily supplies from it. There are two apartments in such a cask; one for pork and the other for beef; and as fast as their contents are exhausted, they are replenished from the original packages. Potatoes and other vegetables may in warm latitudes be kept in a wooden compartment called a "potato pen," a structure which is made with a view to a thorough ventilation.

The cook is an important personage on board a whaler, as he is indeed everywhere. He is usually a colored man, and generally known as "Doctor," or perhaps "Skillet." The "cook's office," or galley, is furnished with all the modern appliances in the way of "cooking gear" for vessels, which embraces a range or "caboose," and the accompanying boilers or steamers, usually called "coppers," cast-iron baking-pans, and articles of this kind. The captain and the mates mess together in the forward cabin; their tables are furnished with glassware and chinaware; the boat-steerers, cooper, and carpenter, mess in the steerage. The foremast hands mess in the forecastle; their meals are cooked in the galley and served to them on the commonest tinware. They use their "donkeys" as tables and keep their pans and dishes in a locker in the after part of the forecastle. They wash their own dishes and clean up everything after meals.

The hours of meals for all hands are as follows: breakfast, 7 a. m.; dinner, 12 m.; and supper, 5 p. m. These are the regular hours, but they may often be changed when the boats are down for whales, or when the men are cutting in a whale under stress of weather. The bill of fare also varies, but rarely.

The officers' breakfast is usually salt beef, pork, hard bread, soft bread or "lobscouse"*—or perhaps bread hash, or if potatoes are plentiful potato hash, coffee, sugar, and butter, when it is to be had, and sometimes slapjacks. The boat-steerers' bill of fare embraces about the same, except they do not always have sugar and butter, which is served regularly in cabin. The breakfast of foremast hands consists mainly of salt beef, salt pork, hard bread, scouse, bread hash, coffee, and molasses.

For dinner in the cabin: salt pork, salt beef, and hard bread. Tea or coffee, and sugar are not usually served for dinner; the boat-steerers have about the same as the cabin, and for the forecastle salt junk and hard bread. For supper in the cabin: salt beef and pork, warm soft tack, butter, sugar, tea, and sometimes hash, and probably pie. The boat-steerers have the same, and the foremast hands, salt beef, pork, and hard tack, and occasionally pie.

To the above-mentioned fare should be added, when they can be had, the "manarolins" of the whalemen—that is, fresh meat, vegetables, milk, butter, eggs, and fruits, which may be obtained when the vessel touches upon a foreign shore, but these are the luxuries of life that cannot always be had. Duff† is served generally three times a week for dinner fore and aft, and perhaps "lobscouse," "dandy-funk," "sea-pie," or "dough-boys" (a kind of flour dumpling with the flesh and bones of porpoise), but the foremast hands do not usually get as much of these dainties as the officers. When a porpoise is caught, all hands are regaled with "sea-pies" and "forced-meat balls."

Captains of all whaling vessels discourage the use of whisky by the crew. Formerly it was the custom to include in the outfit of a whaler, about seven or eight barrels of whisky or New England rum. This was dealt out from time to time as grog. Some vessels carry whisky now, but principally for trade. Liquors are also carried in the medicine chest, but they are under the immediate supervision of the captain, who dispenses them as he sees fit. Capt. Isaiah West was the first master sailing from the port of New Bedford, who refused to carry whisky on his ship. This was in 1831, in consequence of continued intoxication of one of his officers on a previous voyage. Such a thing at the time was unheard of; the owners thought that it was impossible to ship a crew or to make a voyage, but Captain West adhered to his resolution and carried his point. Since that time whisky has not been included as a part of a whaling outfit.

* Lobscouse is the most common of the fancy dishes. It is made of hard bread and salt meat, seasoned with pepper. For a mess of this kind for all hands, about three buckets of hard bread, seven pounds of pork and beef, and about a quarter of a pound of pepper are required. The meat, usually the remnants of a former meal, is cut into small pieces and the bread is broken into fragments. Water is added and as the pot boils and simmers, the ingredients are mixed and stirred together with a large iron spoon; pepper is added, and the dish is served smoking hot in a wooden vessel, called a "kid," by one of the watch who carries it forward to the forecastle. Potato-scouse is similar to the above except that a smaller quantity of bread is used, potatoes being highly esteemed as a substitute.

When potatoes are plentiful potato hash or lobscouse is usually made for breakfast; but when the vessel has been out for two or three months, bread hash is mainly relied upon.

† Duff is served to all hands; one for the cabin, one for the boat-steerers, or steerage, and one for each watch forward. It is the favorite dish, and Sunday is always a "duff day," duff and molasses being served for dinner. Dandy-funk, dundee-funk, or dundee pudding, is made of hard bread, molasses, and a little salt fat pork. The bread is broken up and the pork chopped and deposited in a copper; a little water is added, and when the mixture becomes lukewarm, enough molasses to sweeten it is poured in. It is then stirred until the boiling point is reached, at which time the copper is removed, and the dish is served hot in a kid. About two pounds of fat pork are usually required for a mess for all hands. Dundee pudding was also a favorite dish with the fishermen of the eastern coast frequenting Georges Bank in 1830, but is only occasionally used on fishing vessels now. It was made of hard bread pounded up, sweetened with molasses, with enough flour added to give it adhesiveness.

CHOOSING THE WATCH.—When fairly under way the ship's company is told off in two divissions, or parties, which alternately relieve each other in the performance of the duties connected with the vessel during the voyage, in order that one-half of the crew may obtain recreation, while the other half is at work. Each subdivision is known as the "watch;" reckoning from 12 m. there are seven watches; five of four hours each, and two of two hours each; called dog-watches.

The divisions of the crew are known as the starboard and larboard watches, commanded respectively by the first and second mates or the second and third mates, who are known as "watch-headers." The officers select their own men when the subdivision is made. These divisions are again divided into boats' crews. One watch, or half of the crew, is always on deck, except at the beginning of the voyage, when both watches are usually employed during the day in rigging the boats, besides standing their watches at night. When a ship is making her passage the crew stand whole watches, or sea watches, four hours on and four off, usually called "watch and watch." On the whaling ground in the southern fishery, when a ship is hove to in mid-ocean they stand "quarter-watches," one-fourth of the working hands, or half of each watch being on duty, headed by the boat-steerers; but in the Arctic regions when near the shore the usual watches are kept.

In the southern fishery the men in bad weather stand four hours on deck and eight below on a three-boat vessel, and four hours on deck and twelve below on a four-boater.

On three-boat vessels they stand "boats' crews" watches, the time being divided between supper and breakfast when outward bound and sometimes on whaling grounds. When not engaged in whaling the watch may be employed in making sennit of spun yarn, mats for chafing-gear, overhauling cutting gear, and in many other duties connected with the vessel.

The day on a whale ship begins at an early hour; the crew usually get breakfast at sunrise, after which sail is set, the decks scrubbed, and men sent aloft to look out for whales. The duties of the men at the mast-head will be mentioned elsewhere.

At 4 p. m. the decks are swept and washed off; from 4 to 5 being the first hour of the dog watch, all the watch, except the men on the lookout for whales and the man at the wheel, engage in this work. At 5 p. m. the watch has supper, and at 5.30 the men at the mast-heads and the wheel are relieved. From 5 to 7 the watch is allowed to loaf, smoke, and spin yarns, the only time for such liberties during the day.

On the whaling ground in the southern fisheries the men are recalled from the mast-heads at sunset, and all hands—both watches—are summoned to shorten sail; the starboard watch takes in the main and the mizzen sail and the larboard watch the foremast and head sails. During this work the mate has charge of the forward part of the vessel and the second mate the afterpart, and in reefing the topsails the bóat-steerers haul out the earings and the foremast hands knot the points.

SELECTION OF BOATS' CREWS.—One of the first duties to be attended to is the selection of the boats' crews. If the vessel has four boats on their cranes, her crew must be subdivided into a corresponding number of boats' crews. The captain and his mates select their own crews; and the men are chosen with reference to the positions for which, in the opinions of the officers, they are best adapted.

The following account of the manner in which boats' crews and watches are selected may vary somewhat when applied to all vessels; but it is the custom usually adopted on the average New Bedford sperm whaler. The captain has first choice, and picks his harpooner; the mate, second mate, and third mate, severally and consecutively in the order of their rank, select their boat-steerers, and the fourth mate takes "Hopkins' choice" from the remaining material available for harpooners, and, as is sometimes the case, gets the best man after all. The oarsmen are selected

in the same manner in their regular order, the captain commencing with the bowman for his boat, and so on with the rest of the crew. The supernumeraries help the ship-keeper to work the vessel when the boats are down for whales.

The boats' crews and watches being disposed of, the captain makes a short address * to the ship's company, explaining the nature and object of the voyage; defines the positions and duties of all on board; establishes his rules and regulations to which he enjoins strict obedience, and also calls attention to the penalties of disobedience. He reminds each one, man and officer, that he has certain positions to fill and duties to perform, and endeavors to impress upon him the importance of a strict compliance with every law he may see fit to establish at the outset.

RIGGING BOATS.—As whales may be raised at any time by an outward-bound vessel, one of the first duties of the captain, after the watches and boats' crews have been chosen, is to rig his boats for the capture. This work is usually commenced on the first or second day of sailing, provided the weather is propitious, and some captains keep all hands engaged in this work until the boats are properly equipped.

There is considerable work to be done even in rigging old boats; but when an entirely new vessel is under foot, this kind of work is vastly augmented and the time proportionately extended. Everything is new and "stiff"; and the feeling seems to be unanimous with the officers and men, that, so far as the labor of rigging the boats is concerned, they prefer to sail on an old vessel rather than on a new one. The officers "cun"† their own boats when getting them ready for whaling; the boat-steerers perform most of the skilled labor, in which they are assisted by the oarsmen. The officers generally have the care of the hand-lances, and the boat-steerers of the harpoons.

On vessels that have made one or more voyages, the greater part of the apparatus may again be used, but it must be carefully overhauled. When making the home port, the smaller implements of capture, and accessories, are stowed away in a large cask, and marked "boat gear." The harpoons lances, boat-spades, and boat-hooks, are bundled and stowed away. On arrival, the casks and bundles are placed in the lofts of buildings usually belonging to the owners of the ship. When, the vessel is about to leave for another voyage, these implements are again placed aboard, and as everything belonging to a whale-boat has its proper place and appropriate marks, there is no trouble in redistributing the gear. The harpoons and lances are "set up"—that is, they have their poles and necessary ropes attached—and sharpened, and placed in the boat as soon as possible. Everything necessary for the capture of the whale, except the heavy line-tub, is kept inviolate in its proper place in the boat when on the cranes.

If the vessel is an old one, the boat-sails may be rigged up and used until time and opportunity is offered for making new ones. If it is necessary to make new sails, cotton drilling is gotten out, and as many good sewers, as can be spared from the crew, are sometimes set to work upon them,

* The following is about the style of speech delivered by the captain on such occasions: "Now, my men, I suppose you all know what we are here for. We have started for a cargo of oil, and I expect that every man will do his best. First, I want good, sharp, lookouts kept, and sing out for everything you see. Go, when you are sent, and come when you are called, and always repeat the order that's given you. You shall have enough to eat of what is in the ship; but I want nothing wasted. If your food is not properly cooked, or if you do not get enough of it, come to me, and I will see that *you do have enough* and that it is properly cooked. I want no growling with the cook. No fighting on board. If any of you want to fight, come to *me*, and *I* will attend to your case. Now, boat-steerers, your place is abaft the try-works; bear that in mind. I want you to sing out for everything you see at the masthead, if it is nothing more than a porpoise. You will have two *chances;* if you *miss* them, you can't have *any more aboard* this ship."

† To *con* (or *cun*, as it is more generally pronounced), implies to direct the movements of the vessel, or more properly, to direct the helmsman in steering the vessel; and in this instance means to oversee or have general charge and direction of equipping the boats.

but generally the officers and boat-steerers make the sails themselves. Meantime the carpenter is busily engaged in fitting the boat-masts, and the cooper makes or overhauls the line-tubs, boat-buckets, lantern-kegs and other like utensils.

The green hands are allowed a certain time to become familiar with their duties. At the expiration of the given time those who have failed to improve their opportunities lose their watch below during the day until they learn more thoroughly. There is always plenty of work on an outward-bound whaler, and it is of a varied character, and any one disposed to learn may soon become master of the situation.

PASTIMES.—When not at work the men amuse themselves during week days according to their several dispositions, by patching and mending their clothes, playing cards or back-gammon, spinning yarns, smoking, reading, and manufacturing various articles of utility and fancy. As a rule the captains do not allow card playing; but some of the crew usually provide themselves with cards and manage to have games in the forecastle, the only available "stake" being tobacco. The owners of the vessel usually furnish the men with illustrated papers, magazines, and books, and many of these, like the playing cards, become so well worn and greasy from excessive manipulation that scarcely a trace of legibility is left by which they may be identified. But the greatest delight of the whaleman was on the Sabbath day, when in olden times it was his custom to overhaul his chest of clothing and trim his ditty box.* This was called the "sailor's pleasure." All of the "sea clothes" were taken out, unfolded, shaken, examined for holes or rents, carefully folded again and put away in their accustomed places; the "home clothes," or "long togs," were also taken out and viewed with a feeling of peculiar delight; the photographs of friends and relations were brought to light, and old letters were read again and again. Every Sunday was alike in this respect. On the Sabbath day also the whaling captains of the old school, after certain routine work had been performed in the forenoon, distributed Bibles, tracts, or other religious publications, among the men; some of whom, in good weather, in the southern fishery, congregated about the deck in little knots, and digested the contents of the books and papers, while others, not so disposed, showed their outward and invisible sign by gentlemanly demeanor and polite conduct, in letting those who wished to do so, read in comfort.

One of the most fruitful sources of amusement to a whale-fisherman, and one which often so engrosses his time and attention as to cause him to neglect his duties, is known as "scrimshawing."† Scrimshawing, which, by the way, is the more acceptable form of the term, is the art, if art it be, of manufacturing useful and ornamental articles at sea; and its chief aim is to fight off the dull monotony, which, at times, environs the life of the whaleman. Many of the objects produced in this manner, however, prove valuable to the makers as souvenirs, or trophies, of their exploits and adventures, or useful to themselves and families in the economy of the domestic household; and also possess a certain degree of interest, as well as intrinsic value, to curiosity-seekers, besides forming interesting acquisitions to museums. One of its most prominent features is the development of the ingenuity and artistic tastes of the whalemen: and some of them attain a high degree of skill in the production of numerous articles of this kind. Some of these have an appreciable

* A small wooden box for needles, buttons, thread, pieces of cloth for patches, bits of wax, an old brass or steel thimble, and a pair of scissors. In addition to these necessary domestic utensils and material, the ditty box contains the most varied collection of pieces of old iron or wood, shells, probably an old pack of cards, or may be a New Testament, small stones or minerals, foreign nuts, and curios obtained from the natives of the islands in the Southern Pacific.

† This word appears to be of doubtful orthography, being variously written "skrimshoning," "scrimshorning," "skrimschonting," and "skrimshander," and has, like many of the idioms that form the very pith and essence of the whaleman's language, gained currency at the leading whaling centers, though seldom heard in the interior of the country. As to its etymology, I can only say that I have traced its antecedents to the island of Nantucket, and although I am unable to substantiate my theory, I am of the opinion that it is a corrupt form of an Indian word.

artistic merit; while others, for example, implements made at sea for use in whaling, for the ship's use, and for the use of the men during the voyage, are generally improvised under stress of circumstances; therefore, many of them are exceedingly rough and ungainly in appearance.

Scrimshawing has been principally confined to the southern fleet, mainly the sperm whalemen, as the voyages were longer and the men had more leisure time; but it is also indulged in, to a certain extent, by the men in the Arctic fishery. In the first-named fishery, a vessel may often cruise for weeks, and even months, without "raising a whale," and, in fact, without encountering anything to break the monotonous routine of life at sea.

It would appear that the officers have much better opportunities and facilities for promoting the art of scrimshawing than the foremast hands, since the latter are not allowed, except on duty, in the after part of the ship, where the material available for this or other like purposes is kept; they are therefore compelled to rely upon their own fertile imagination and fruitful genius for the ways and means of carrying out any cherished plan, and to make the best of what may accidentally fall in their way. Some of the common seamen, however, excel in this work.*

2. THE WHALING VESSELS AND THEIR OUTFIT.

The American whaling fleet in 1880 numbered one hundred and seventy one vessels, measuring 38,633.38 tons, and valued with outfits at $2,891,650.† In the fleet there were one hundred and seven barks averaging 264.10 tons each, seven ships averaging 358.88 tons, nine brigs averaging 138.11 tons, forty-six schooners averaging 98 08 tons, and two steam barks averaging 430.06 tons. The average size vessel in the entire fleet was 225.95 tons. The largest vessel was the steam bark *Belvedere*, measuring 440.12 tons,‡ and the smallest employed in ocean whaling was

* Let us examine some of the scrimshaw work. We find handsome writing desks, toilet boxes, and work boxes made of foreign woods, inlaid with hundreds of other pieces of precious woods of various shapes and shades; cribbage boards and chess boards, inlaid with rare wood or mother-of-pearl; work tables for ladies, or center tables for the whaleman's parlor at home, veneered with mahogany and finished in the most approved manner; wall brackets and pockets made of satin wood, walnut, or mahogany; picture frames made of ivory of the sperm whale teeth or walrus tusks; photograph frames, made of the same material, suspended upon two or three finely finished and highly decorated walrus tusks, ready for the photographs of the maker, await the wife or sweetheart when the vessel returns to her home port; canes made of baleen wrapped spirally with highly polished cords and strips of the same, surmounted by fanciful or grotesque designs, carved from the tooth of the sperm whale or a section of walrus tusk; canes made full length from the ivory of the "pan" of the sperm whale, turned and polished, with a hand-piece of the same material, and a ferrule of copper or perhaps silver; canes made of the tusk of the narwal, or from the backbone of the shark—the vertebræ being strung on an iron rod and turned in a lathe, or from a piece of wood of some favorite ship, the handle inlaid with ivory or pearl; folding and expanding reels, or "swifts," for winding yarn, elegantly made of strips of ivory, and decorated with bits of gay-colored ribbon; whips made from the long elastic and gracefully tapering slabs of baleen; useful articles for the writing desk, rulers, pen holders, paper cutters, as well as butter knives, jagging knives, chopping knives, finger rings, collar and sleeve buttons, bodkins, watch stands, jewelry caskets, charms for watch chains, masonic emblems, small blocks and pulleys, man-rope stanchions, splicing fids, and small toggles, made of ivory and bone, and various other implements whose mention would form too long a list.

† Messrs. Swift & Allen, commission merchants and ship owners of New Bedford, tell me that the whaling vessels of that port are seldom wholly owned by their agents; but the agent is usually the largest owner, and conducts the business affairs of the vessel on commission without the aid of the other owners. At present, 1883, the only incorporated whaling company that they know of is in San Francisco; it has six steam whalers and one sailing vessel. They think all the other whalers are owned by individuals, seldom less than five, and often ten in number, and each owner, however small his share may be, is responsible for any deficiency on the part of the other owners in the payment of the ship's bills or drafts during the voyage. They also say they know of an instance where two owners who held only one-sixteenth each had to make up for the deficiencies of the others. At Provincetown, the vessels are owned for the most part by private parties. Perhaps fifteen or sixteen stockholders have as many shares or "pieces," as they are called, in one vessel. When the vessel is at her home port the captain is her agent; but on a voyage one of the resident owners, called the "shore agent," on whom the captain may draw in foreign ports for money or necessary supplies, is appointed, whose duty it is to transact all business connected with the vessel. The whaling vessels at San Francisco are also owned each by several parties who hold shares, and each vessel has its own agent.

‡ Some larger steam vessels have since been added to the fleet. One of these, the steam-bark Bowhead, 533 tons, was lost in the Arctic in 1884.

the schooner Union, 66.22 tons. Most of the schooners and smaller vessels of the other classes were employed in the Atlantic Ocean whaling, while the largest and best equipped vessels were sent to the Pacific and the Arctic Oceans.

The typical whaler in the southern fleet may be a little old fashioned, and perhaps a trifle more rusty and greasy when on a cruise, than her sister ships in the merchant service, and becoming well saturated in oil she lives to a green old age, unless some fatal talisman finds a place aboard of her. She is heavily built, full bodied, with bluff bows, and high square stern, and designed more for seaworthiness and carrying capacity than for speed or graceful lines; consequently we do not find in this fishery the graceful type of the modern fishing vessel peculiar to the Gloucester fleet. Some of the whaling schooners have the old poop deck and an after house for the officers, but the tendency has been for many years to supersede the former by a flush deck, and to place the quarters of the officers below. The steam whaler, however, possesses all of the advantages and improvements that have been applied by modern science to naval architecture. The old whale ships frequently cruised in unfamiliar waters and visited unknown and hostile shores; they therefore adopted the plan of painting their sides to resemble the ports of men-of-war, to give them a formidable appearance and intimidate the natives, by whom the crews were sometimes attacked. This custom is also adhered to at the present time, but it is confined to the old ships.

The vessels composing the present fleet may roughly be divided into two classes—the sailing craft and steamers. The former, embracing vessels of all types except the sloop, are employed in the southern fishery, and the latter exclusively in the Arctic fishery. At the inception of open-sea whaling, sloops, such as were used at that time in the coasting trade, were principally relied upon; brigs and schooners were subsequently introduced, and these three types were mainly depended upon until deep-sea whaling began; at which time larger vessels were needed, and although ships and barks were employed, the former were more popular. At present there is not a sloop in the whaling fleet; brigs and schooners are employed principally in the Atlantic fishery and in the Hudson Bay region, ships and barks in the Southern Pacific, and steam barks in the Arctic regions on the western side of the continent.

The Atlantic fishery was formerly prosecuted with the smaller class of vessels known as "plum pud'ners," which made short voyages called "plum-pudding voyages," leaving their ports in early spring, and returning, if possible, before the September gales "came on to blow;" but in some instances the cruises were more extended. The crews therefore had fresh provisions and an abundant supply of plum pudding, or plum duff; a kind of dish though sometimes made of "Nantucket raisins," that is, dried apples, has always been relished by seafaring men. Hence we have the origin of the term "plum-pudding fleet."* As the fishery increased in magnitude and importance, and the green pastures of the vast feeding ground of the sperm whale in the Pacific were disclosed to the whalemen, the "plum pud'ners" of New Bedford gave way to larger vessels, principally ships This change brought a system of discipline in the whaling fleet. The master became a commander, and occupied his cabin and state-room in the after part of the ship; the mates and boat-steerers also lived aft, and were not allowed to mingle familiarly with the foremast hands; the latter bunked and messed in the forecastle and were not tolerated socially on the quarter deck, and the former name of the fleet was transferred to the schooners of Provincetown, which are still sometimes called "plum pud'ners," though the term is now becoming obsolete.

* I have been told that in the old Provincetown fleet the men had an abundance of duff and plenty of raisins, or other dried fruit; but the New Bedford owners for sanitary reasons prohibited fruit, but sanctioned the use of plain duff; and for this reason the term was applied to the Provincetown fleet.

When making her passage, a whaling vessel may readily be distinguished by her large wooden davits and the unusual display of boats suspended over her side, as well as by the square set, bulky try-works on the forward part of her deck, and by the presence of the large number of men comprising her crew. When cruising for whales, in addition to the above-mentioned peculiarities, she is rendered conspicuous by having her sails shortened, and men at her mast-heads on the look-out for whales; or perhaps by the absence of a topmast which may have been sent below; or she may have "grease alongside," or boiling out the oil, which last are unmistakable signs of her profession. Going aboard such a craft when she is outward bound, or even on her home passage, you may be somewhat surprised to find her deck so free from oil, and that she is as clean and as shipshape as the average merchantman. It is only when the whale is being cut in, or when the oil is cooking, that we find her decks objectionable. After these processes, the first duty of the whalemen is to scrub the deck and wash the bulwarks, and between catches she is as clean as any other vessel. I have seen the decks of some whalers that had been scrubbed until they were, as the whalemen expressed it, "as white as chalk." As might be expected, her rigging, spars, and sails may be somewhat begrimed with smoke from the try-works, or perhaps her mainmast and cutting-falls may have a greasy appearance, or probably be coated with pieces of black skin. On the home passage, however, the ship is painted, masts are scraped, rigging overhauled, and a new suit of sails bent; for the average captain takes pride in going into his home port with all the becoming honors and dignity appropriate to the occasion.

The main hatch is used as a temporary store-room for the blubber; and the fore, main, and after hatches for stowing away provisions and supplies at the beginning of the voyage and oil during the voyage. A long, stout wooden strip extends fore and aft inside the bulwarks on either side of the vessel. This is called the "lash rail," and is peculiar to whaling vessels. When cooling the oil to be stowed away in the hold, the casks are rolled to the side of the vessel out of the way of the bustling and hurrying gangs of men, and lashed to this rail to prevent them from rolling in heavy weather. The main deck is always sheathed; an after house on barks and ships is built over the quarter-deck for the transportation of spare boats, and sometimes a forward house is erected over the try-works.

The terms "blubber hunter" and "whaler," sometimes applied erroneously to the men employed in this fishery by landsmen, are the legitimate titles of the whaling vessel. The vessel also has a name, peculiar to whalemen, which she derives from the number of boats carried on her cranes, such as a "three boater," or "four boater," and some of the old Nantucket whalemen used the name "hooker."

The quarters of both the officers and men on the larger vessels are as cleanly as it is possible to keep them during a voyage of three or four years' duration. The ventilation being defective, we must expect an odor more or less mephitic, to which, however, the men become accustomed through the remarkable power of association. The quarters of some of the schooners, however, that I have seen, more especially the forecastles, which are filled by the most degraded types of man, were fairly reeking with filth, and the most abominable stench fairly arose through the companionway in a cloud of putrid vapor. This should not condemn all the small vessels, for the quarters on many of those I visited, more especially in the fleet hailing from Provincetown, were as cleanly, comfortable, and home-like as on most of the larger vessels of New Bedford.

Formerly all the oil obtained by any one vessel during her voyage, more especially when she cruised beyond the Western Islands, was conveyed to this country in her own bottom. Later, however, it was found more profitable for the vessel to ship her cargo by returning whalers or by

common carriers, and continue her voyage in pursuit of other whales. Oil shipped in this manner is known as "freight oil," to distinguish it from the oil the vessel herself has derived from her own captures. A vessel may be spoken at sea and report 1,425 barrels of sperm oil and 380 barrels of whale oil, "all told," and 500 barrels of whale and 150 barrels of sperm "on board." This would make her total catch, at the time she was spoken, 1,805 barrels, 1,155 of which amount had been shipped by another vessel. Or a vessel may arrive at her home port and hail for 1,200 barrels; 500 barrels of this amount may be freight oil and belongs to another firm, upon which the owners of the vessel realize merely the cost of transportation, and the balance, 700 barrels, the property of the vessel, upon which her owners realize the full market value.

Taking into consideration the great distances traversed by whaling vessels, sometimes circumnavigating the globe during their voyages; the dangerous localities visited in both the northern and the southern hemisphere, the treacherous coral reefs and the insidious teredo of the South Pacific, and the dangerous ice-fields of the Arctic regions; the unusual risks to which they are exposed from the nature of their calling, the imminent danger of attacks on the part of revengeful and ferocious whales, or of complete destruction by conflagration through fire communicated by the try-works, or by the act of incendiarism at the hands of mutinous crews, it is a matter of surprise that so few are lost at sea.* Unless, however, some fatal talisman has found a place aboard the whaler, her life on the average is as long as that of other vessels employed in other branches of the service. The destroying angel, the emissary of three several wars, has done more to annihilate our whaling fleet than all the elements combined. Harassed and annoyed in its infancy by the depredations of French and Spanish privateers upon the English commerce in 1741, when the fleet was excluded from the grounds of the Davis Strait fishery, and crippled by the French privateers in 1755 and the ensuing years, it was again despoiled by the French and Spaniards in 1771. Paralyzed by the Revolution, it had scarcely regained its footing when it was exposed, in 1798, to the ravages of the French privateers, which ravages gave rise subsequently to the French spoliation claims. It was then kept in a state of feverish excitement and annoyance until just prior to the war of 1812, when the Pacific fleet was exposed to the depredations of the Peruvian pirates, who plundered the vessels and prevented them from entering Chilian ports where the fleet was accustomed to obtain its "recruits."† The war of 1812 burst upon the American whaling fleet like an angry storm-cloud, and so disastrous were the effects when the cloud passed over, that, with the exception of a few vessels belonging to Nantucket, it may be said the whale fishery was practically abandoned; but the whalemen with their characteristic energy built and equipped other vessels, and when the late rebellion came upon us like a thief in the night, the majority of the vessels were scattered over the seas in all parts of the world; or, with a sense of security under the American flag, those which were at that time in port were fitted out and dispatched on their accustomed voyages; but in both cases they were exposed to the attacks of the Alabama or Shenandoah, whose commanders lay in wait for them on the highways of commerce, and by making bonfires of some, attracted others to the scene in order that they might be treated in a similar manner. During this war some of the ships were also transferred to the merchant service, and forty were purchased by the Government and sent with the two "stone fleets" which were sunk off the harbors of Charleston and Savannah to blockade these ports. Scarcely had the fleet recovered from the disastrous effects of the rebellion when the news of the terrible destruction of the Arctic fleet in 1871 reached our ears. Thirty-three vessels were crushed in the ice off Point Belcher, representing a loss that exceeded $1,000,000.

* The reader is referred to a chapter of accidents, by Alex. Starbuck, entitled "The Dangers of the Whale Fishery," in Report of Commissioner of Fish and Fisheries, Part IV, p. 114 *et seq.*

† Provisions, supplies, &c.

STEAMERS.—The American whaling fleet was composed entirely of sailing vessels until the hazardous fishery of the Arctic regions, as well as the ever-increasing demand for quicker trips from one whaling ground to another, and for rapid transportation to market, suggested the steam whaling barks now successfully used in the North Pacific. The first steam whaler from the United States was the bark Pioneer, 212 tons, Ebenezer Morgan master. She was originally built at Charlestown, Mass., as a Government transport, and rebuilt in 1865 for the whale fishery. The projectors of this enterprise were Messrs. Williams & Havens, of New London, Conn., whose names are prominently connected with the Grinnell Expeditions. The Pioneer sailed from her port April 28, 1866, for the Davis Strait fishery, and returned November 14, 1866, with 340 barrels of whale oil and 5,300 pounds of bone. During her second season, in July, 1867, she was crushed in the ice and abandoned. I am indebted to Mr. John A. Tibbits, collector of customs, New London, Conn., for the above particulars in regard to the Pioneer. The bark Java sailed from New Bedford October 2, 1872, with a donkey engine, which was used as a power for hoisting purposes. This gave rise to the report, which gained currency in the fishery, that she was the first steam whaler from America; but, after diligent search, I am convinced that the Pioneer has the precedence.

The most prominent vessel of this type, however, both so far as the initial step in the North Pacific is concerned, as well as in a historical point of view, was the late Rodgers, formerly the Mary and Helen, which was lost in the search for the Jeannette in 1881.

In 1879 William Lewis, of New Bedford, as agent and part owner, with others, caused to be constructed a bark with all modern appliances, including auxiliary steam-power as a motor, which, among other advantages, enabled her to make quick passages in calms, as well as to proceed through the ice at a rate of from 6 to 8 miles per hour when necessary. The space occupied by the boiler and engine was about one-eighth of the vessel. She was also provided with a separate engine forward for working the anchor and rotating the windlass when hoisting in blubber. She was christened Mary and Helen, in honor of the daughters of Edward Haskell, and granddaughters of Alexander H. Seabury, who was also one of the owners, all of New Bedford. She sailed from her home port September 12, 1879, and was sent into the ice in 1880 under the command of Captain Leander C. Owen. After a successful cruise she was sold to the United States Government for $100,000, and under the name of Rodgers proceeded in search of the missing research steamer Jeannette and the whalers Mount Wollaston and Vigilant. She went into winter quarters at St. Lawrence Bay, Siberia, in 1881. On November 30 of that year, a fire broke out in her fore-hold and she was abandoned. Her officers and crew were rescued by Captain Owen, her former commander, then master of the steam whaler North Star. The North Star, in a remarkable succession of events, was afterwards, during the same season, crushed by ice while cruising for whales, at an almost total loss to her owners. Immediately after the sale of Mary and Helen to the Government, orders were given to build a twin ship, and Mary and Helen (No. 2) is now afloat in the whaling service. She is a counterpart of her predecessor.*

* The steamer Bowhead, 553 tons, lost in the Arctic in 1884, was in her day the largest vessel afloat in the whaling service. The Mary and Helen (No. 2), 508 tons, ranked next in size. The Orca, 462 tons, of San Francisco, is now the largest steam whaler, and the Lucretia, 276 tons, of New Bedford, the smallest. Eight steam whalers are now employed; six of them hail from San Francisco and two from New Bedford.

The following particulars respecting the dimensions and the construction of the present steam whalers were supplied by Messrs. Goss, Sawyer and Packard, Bath, Me.

Length between perpendiculars, 150 feet; length over all, 160; breadth of beam, 31½ feet, and depth of hull, 16 feet; tonnage, 512 tons gross and 343 tons net. The engines are single, direct-acting, with two boilers of the Scotch type. Either anthracite or bituminous coal may be used; 7 tons are consumed in twenty-four hours' steaming. The rate of speed is about 10 knots an hour. The propeller is non-hoisting, has two blades, and is made of yellow metal. In the ice it is protected by the stern and rudder posts, the blades being in a line. The planking is of oak and yellow pine. The bow is sheathed with three-eighths of an inch yellow metal, and solidly timbered. Provisions are made for thirty

England, however, preceded the United States in the use of steamers in the whale fishery. She dispatched a vessel of this character to Davis Straits in 1857, a note of which event was made at the time by one of our Eastern papers.* Mr. Southwell records this event, together with other items of interest in connection with the seal fishery, which I quote in full. He says:

"Steam was first introduced into the whale fishery in 1857, when the iron steamship Innuit was sent out to Davis Strait, and the following spring she proceeded to the Greenland seal fishery, returning to Peterhead after a voyage of three weeks with 150 tuns of oil. Her success raised the cupidity of the iron steamship owners of Hull and Newcastle; and as the Baltic, where most of these steamers were employed, is often closed during the months of March and April, it is not surprising that the prospect of earning some £10,000 in about thirty days was irresistible to them. The consequence of this was that in 1859 fifty-two vessels were lying in Bressay Sound, bound for the seal fishery. So difficult was it to make up their complement of men that some of the vessels had to go on to Orkney to complete their crews. The result of the voyage has been given above.

"Iron steamships, however, had but a short reign. In due course they sailed, but some never returned. Meeting with rough weather several of them came in contact with the ice, and the Empress of India, the Recruit, and the Innuit went to the bottom. Since this disastrous voyage (with one exception, the River Tay, from Dundee, which met with a like fate in Davis Straits in 1868, her first year), no iron steamships have ventured to brave the thick-ribbed ice.

"The Dundee whaler Tay, a fulled-rigged ship of 600 tons, was fitted with an auxiliary screw in 1858; and the introduction of steam soon proved so advantageous that new wooden steam-vessels were speedily built, and the old sailing vessels converted, so that in 1869 the whole of the Dundee fleet were screw-steamers. At first the crews of the steam vessels, from want of knowledge of the habits of their prey, were not very successful; but after a time it was discovered, that if the seals were sighted in the water and followed till they took to the ice to produce their young, by allowing two or three days to elapse, they became so reluctant to desert their offspring that both parent and young fell easy victims. The men were then let loose, and shot down every mother seal which ventured upon the ice to suckle its young or even showed its head above water; the young seals being of little value so early in the season were allowed to crawl away and die. It need hardly be said that this mode of hunting the seals simply meant extermination, and rapidly produced most disastrous effects."†

Outfits for a whaling voyage.—When a whaler goes into commission, she is overhauled inside and out; her rigging is set up, new sails are made and bent, and the wood and iron work is painted. If an old vessel, she may be heeled over, and her bottom and sides planked and calked; old masts are unstepped and new ones put in, and the spars and rigging critically examined. Meantime the cooper has taken measurements of the ship's hold, and his gang of men are busily

men in the crew, and the quarters are heated by pipes leading from the boilers. The Thrasher, to which the above measurements refer, was the last steam whaler constructed, and is the most complete in her equipment. She has patent try-works and iron tanks in the lower hold; her engines are single, direct-acting, with independent condenser and pumps. The cylinders are 22 by 36 inches. This type of engine is, in the opinion of the firm, better adapted for whaling purposes than the compound engine, and more economical. The bow of the Thrasher is protected and strengthened in every way possible, and the vessel is a great improvement on the steamers Mary and Helen, Belvedere, and North Star, which were also built by this firm for the Arctic whale fishery.

*Whaling by steam.—During the present year, steamers fitted with the screw have for the first time been engaged in the Greenland fisheries from England. Last month an iron vessel of 600 tons, fitted with a propeller, left the Tyne for Davis Straits, and it is anticipated that she will be able to penetrate many of the haunts of the whale and seal in the small bays and inlets into which sailing vessels are unable to find their way.—*Gloucester Telegraph, June* 17, 1857.

†On the Beaked or Bottle-nose Whale (*Hyperoodon rostratus*). Seals and the Seal Fishery. By Thomas Southwell, F. Z. S., read 19th December, 1882. pp. 448–489. Reprinted from the Transactions of the Norfolk and Norwich Naturalists' Society, Vol. III.

engaged pounding away at the enormous casks in a neighboring shop. While the ship is "abeam ends," and the carpenters are pottering away at her bottom and sides, there is little of interest to the outsider. But when she has been righted upon an even keel, and the carpenters, calkers, painters, riggers, and blacksmiths, swarmed about her sides, decks, and masts, the scene becomes a lively one. It is not, however, until the mechanics have progressed far enough in their different kinds of work to permit the approach of the stevedore, with his troup of never-tiring longshoremen, with their incessant tramp, tramp, tramp, up and down the gang-plank, carrying packages of provisions of all kinds, that the actual busy scene commences. During the operation of fitting out a whaler for a four years' voyage, her wharf presents a scene of unusual bustle and activity; and when one sees the vast amount and variety of provisions, and the great quantity of domestic utensils stowed away in the different parts of the ship, the idea of housekeeping on a gigantic scale naturally suggests itself. The long rakish oil-jiggers, drawn by two stout horses, come rumbling and jolting along, laden with oil-casks, try-pots, cutting-tackles, blubber-hooks, and other heavy articles; the light jobbing wagons, with parties who are interested in fitting the vessel or, perhaps, filled with provisions or clothing, drive along cautiously, keeping clear of the strong wheels of the jigger; light express wagons, with packages from Boston or elsewhere, endeavor to deliver their loads and get away; wagons of all descriptions—from shops, stores, factories, and warehouses, representing almost every branch of the industries, hasten to deposit their loads and depart; or perhaps the outfitters, owners, or agent of the vessel, in their light and stylish buggies or carriages, persist in threading their way carefully through the blockade of incoming and outgoing wagons, to see what is going on, or to give an order to the "ship-keeper" or "boss stevedore." Letter-carriers hasten to deliver their mail, and the swiftly running Western Union Telegraph boys hunt in vain the owners or agent. In the mean time, also, comes the long skeleton boat-wagon, drawn by one horse, consisting of a light running gear with slender upright recurved arms extending from the axles and embracing the whale-boat as it is transported from the shop to the vessel.

The outfits for a whaling voyage consist of the ordinary vessel supplies, provisions, clothing, domestic utensils, carpenters', coopers', and blacksmiths' tools, apparatus for the capture of the whale, for removing the blubber and hoisting it in, for preparing it for the try-works, and for boiling out the oil, and for stowing the oil away.

The oil-casks must be stowed away carefully and compactly; and in order to economize space, they are filled with salt water, both to ballast the ship and to preserve the wood, with fresh water for the ship's use, provisions, clothing, and other supplies, consisting of the heads and hoops of other casks, spare sails, and cordage. To convey an intelligent account of the manner in which the hold is broken out to stow down a fare of oil at sea, it will first be necessary to describe the manner in which the casks are stowed away at home. Oil-casks are always stowed lengthwise, or "fore and aft," as it is called, and never athwartships, with bung-holes up.* The largest casks are laid off in the ground tier, and filled with fresh water from the Acushnet River, by means of a flexible hose attached to a hydrant on the wharf. The water is then "salted," about three pecks of salt being the proper amount for a 44-inch cask, and proportionate quantities for the other sizes. The manner of stowing away the riding casks is practically the same on all of the large vessels belonging to New Bedford; but the positions of the casks which contain fresh water and other supplies vary to a large extent, depending upon the desires of the master and upon the size of the vessel. It is important that the fresh-water casks should be stowed in accessible places.

* "Bung up and bilge free" is the Excelsior of the whaleman in stowing his cargo. This expression, originally applied to a well-stored cask, has become an idiomatic phrase as applied to a person in good health or in a prosperous condition.

Sometimes all of the riding casks contain fresh water, and as fast as they are emptied they are either filled with oil, if the vessel has "greasy luck," or, if not, with salt water from overboard to preserve the wood, to prevent them from falling to pieces and to ballast the ship. Two large tanks, with a capacity of from 50 to 100 barrels each, were formerly used on the largest ships for fresh water. At present some of our northern barks have such tanks; but as a smaller class of vessels is now employed in the southern fisheries, the captains, though they appreciate the convenience of such receptacles, feel that they cannot spare the space these tanks would occupy; therefore the oil-casks are temporarily utilized for the purpose. When the large full-rigged ships were fitted out from Nantucket and New Bedford three tiers of casks were stowed in the lower hold; but the present vessels, even of the largest size, can stow only two tiers in the lower hold The largest vessels were rated as "three-tier ships," and the smallest as "two-tier ships." In the former class the ground-tier casks were always salted; some of the second-tier casks were filled with salt water and some with fresh water, and those in the third tier with fresh water, hard bread, slops, shooks, cask-heads, and other supplies not immediately needed. Although the ground casks in a modern "two-tier ship" are usually filled with salt water, they may sometimes be filled with fresh water; the second tier contains fresh water and other dry and wet supplies. In this tier the shooks, spare heads and hoops of the oil-casks may be stowed forward of the fore hatch; packages of meat, molasses, and other provisions abaft the mainmast, and fresh water forward of the fore hatch. Between decks the casks are usually stowed "on the head." They contain a general assortment of ship's stores. The empty casks are carried under the main hatch. The fore-hold abreast the hatches contains a miscellaneous assortment, and often in the most dire confusion, of cutting-gear, such as blocks, falls, hooks, chains, and toggles, spare rigging, spare pots, old craft, or junk, and bears the same relation to the ship that the garret does to an old dwelling-house. Lumber, oars, spare harpoon poles, and boat boards may be stowed between the carlines on each side of the vessel between the fore and main hatchways. The small stores, tobacco, soap, canned meats and vegetables, articles for trade, duplicate harpoons, and other similar material may be stowed in the run.

There are two ways of stowing casks, technically known as stowing "bilge and cuntline," and "stowing square tier"; both processes being essential in fitting ship. The process of stowing the casks, when fitting a ship for the voyage and when stowing down the oil is practically the same; the principal difference is that, with the exception of the ground tier, which always receives the strictest care and attention in both cases, greater care is taken in "chocking off a hold" than with supplies.

From the time the vessel arrives at her wharf until she sails, unless she is laid up for a considerable length of time, she is in charge of a ship-keeper, who has absolute control. He never leaves his post of duty or relinquishes his command until the vessel leaves her wharf. The day of sailing is made a day of rejoicing and festivity aboard the whaler. The day before her departure the crew are sent aboard; the vessel leaves her wharf and swings into the stream and anchors to prevent the crew from going ashore. The whale-boats are sent out to the ship, and hoisted on the cranes. The next morning, the sailing day, the owners with a goodly number of invited guests go aboard; the steam-tug "hooks on" and the vessel is towed out of the harbor, and well out to sea. The owners and guests, the stay-at-homes on a pleasure trip, are as jolly as can be, and the whalemen who are to endure the hardships of a long voyage affect an air of jollity, but their countenances belie it. There is an abundance of eatables, wines, and cigars; it is a gala day, and every one is free to mingle with the happy crowd of smiling faces and to partake of the good cheer of the occasion.

Towards night the guests are transferred to the tug, the lines are cast off, and with farewell greetings of good luck, and a boisterous hurrah, the tug steams back to the harbor of New Bedford; the whaler heads for the Pacific, and the whaleman realizes for the first time, perhaps, that he is just commencing a voyage of four years' duration; but he feels that the unpleasantness of leaving home has been tempered by a warm "send off" of friends and acquaintances who have accompanied him at least part of the way.

3. THE WHALE-BOAT.

General description.—The vessel being too large to take an active part in the capture of the whale, carries boats to the cruising grounds and sends them off to kill the cetacean and to bring back its body. The whale-boat, therefore, becomes the most important factor in the capture. Owing to its unparalleled seaworthiness and peculiar adaptation to the whale fishery, this type of boat has been employed in almost its present shape for over a century. It was formerly "clinker-built"; a term arising from the noise made when going through the water; but as the whales grew wary, it was found unsuitable, and therefore a smooth-bottomed boat, to glide comparatively noiselessly upon the unsuspecting animal, was suggested and finally adopted. As this kind of craft must be propelled backward, the moment the harpoon is darted the stern should necessarily be sharp. It is therefore a "double ender," progressive motion being obtained with equal facility by either head or stern. The boats originally built for the whale fishery were heavy, unwieldy, and much shorter and narrower than those of the present; but it is very generally conceded from the outset that they were made sharp at both ends. They had round or canoe bottoms also, and were made without center-boards.

Boat equipment.—Few people outside the whale fishery have an adequate idea of the number, character, and varieties of implements of all kinds employed on the various vessels engaged in this industry. When we look into a whale-boat which is almost filled with utensils scattered here and there, we naturally feel slightly incredulous, when we are told that six men must get into it before the outfit is completed. Such a craft should of course carry not only all the instruments required for the capture, and for working the boat, as well as those necessary for the comfort of the men when separated from the ship, but other instruments which may be termed accessories. We have in such a boat six long oars, the largest and heaviest used steadily in any branch of the service, varying from 16 to 22 feet in length; six paddles; two tubs, one of them almost as large as an ordinary wash-tub, for the whale-lines; one bucket for wetting the line to prevent friction when carried out by a whale; one wooden keg for fresh water; one piggin for bailing the boat; one utensil, in the shape of the frustrum of a cone, termed the lantern-keg, for the lantern, tinder-box, matches, candles, pipes, tobacco, hard bread, &c.; one drag, or "drug" as it is called, to impede the motions of a wounded whale or calf; a "blackfish-poke" and several small flags with very long poles for "waifing" dead whales; several pairs of canvas nippers for handling the whale-line; one boat-hatchet for cutting harpoon handles from dead whales and other purposes; one fog-horn; two knives to cut the whale line should it "null" or foul when fastened to the whale; one bomb-gun or a darting gun; a bag containing bomb-lances; five or six harpoons; three hand-lances; a boat-spade for cutting holes in the lips of the whale to reeve the tow-rope; one large mast, a mainsail, and jib. We should also remember that the boat has a center-board and five thwarts which take up considerable room, and 300 fathoms of whale-line, a portion of which must be led both fore and aft over the oars, and around the loggerhead to communicate with the harpoons. Yet when the boat is lowered from the side of a vessel, every man takes his place, and she skims over the water without the least confusion, provided the men are trained.

The harpoons, hand-lances, and boat-spades, are usually called "craft," and the other implements "gear." Each boat has its own crew, consisting of the "header," "steerer," and four oarsmen, and its own gear and craft.

DIMENSIONS OF THE WHALE-BOAT.—According to early records the length of the whale-boat used in 1724 was 20 feet; and from the statements of our oldest builders we learn that it was increased to 25 feet before 1800. Mr. James Beetle, of New Bedford, tells me that in 1827 he built boats from 27 to 28 feet long, and that they remained of this length until 1840. Meantime, however, the boats carried by the smaller class of vessels were 25 feet long. During the decade of 1840–'50 Mr. Beetle made whale-boats 36 feet long, with 7 pulling oars, for the whaler Sallie Ann, of New Bedford. That vessel used the boats in Delago Bay whaling, but they were employed chiefly for towing and were finally condemned, being too heavy and unwieldy. Mr. George W. Rogers, boat-builder, of New London, tells me that he made 9-oared whale-boats 38 feet long, 6 feet beam and 2 feet and 2 inches deep amidships. These boats were used by the ship Hannibal, of New London, Captain Royce, for capturing sulphur-bottom whales near Spitzbergen and Nova Zembla. These, however, are exceptional lengths. In 1860, when the Arctic fishery made a successful footing, the length of the whale-boat was increased to 28 and 29 feet, and since that time to 30 and occasionally to 31 feet. The 28 and 29 foot boats are now more generally used, and it may be said that the largest boats are used in the Arctic fishery, and the smallest ones in the Southern fishery. The small schooners generally carry 28-foot boats. Mr. Eben Leonard, boat-builder, of Long Plain, Mass., tells me that the usual dimensions of whale-boats are as follows: The 28 foot boats are 6 feet 2 or 3 inches wide and 26 inches deep; the 29-foot boats, 6 feet 4 or 5 inches wide and 27 inches deep, and the 30-foot boats 6 feet 6 inches wide and 27 or 28 inches deep. He also tells me that he has made whale-boats 30 feet 6 inches long, 7 feet wide, and 28 inches deep, but the large boats are not popular. Capt. J. W. Beaty, in 1880, sent me the following dimensions of the Provincetown whale-boat: Length on top, 28 feet; length on keel, 20 feet; keel, 4 inches in rocker; width of boat, 5 feet 8 inches; depth, 26 inches. Forty-eight timbers are used in the straight-keel boat, and fifty-eight in a center-board boat. The keel, gunwales, timbers, stem and stern post, are made of the best white oak, and the outside planking of half-inch white cedar with galvanized fastenings. The boat has two sets of ribbons made of oak, and twelve knees made of white oak or hackmatack steamed.

BOAT WORK AND MATERIAL.—White oak, yellow bark or gray oak, cedar, spruce, and northern pine are employed in the manufacture of the whale-boat. Mr. James Beetle, of New Bedford, the oldest whale-boat builder in America, speaking of the New Bedford boat trade, tells me that the white oak, from which the stems and the timbers are made, and the cedar for the planking and ceiling, are obtained principally from Bristol County, Massachusetts; the yellow bark oak, although found in Massachusetts and Rhode Island, is for the most part obtained from Connecticut, in the region between Hartford and Norwich. The boat-builders claim that the timber from that section is better suited for their work as it is free from knots for a length of 30 feet or more. Cedar is invariably used for the strakes. It is not so hard as oak, but more durable; and although it "splinters" when dry, it is tough and leathery when wet; besides it has the necessary qualification of lightness.

THE SAIL AND SPEED OF THE WHALE-BOAT.—The locomotive appliances of the whale-boat are common to all small craft, embracing oars, sails, and paddles. The steering-gear consists of an unusually long and heavy oar and a light rudder; the former is used when "laying the boat on the whale," and the latter when sailing free. The tireless, never-complaining motor, steam, has been employed in the larger craft, such as launches and schooners, for "going on to whales,"

but, for reasons which we shall presently have occasion to mention, it has never, as a rule, come into general use. Few sails were used in whale-boats in early days, but now they are exclusively used. The rate of speed varies with different boats. Whalemen take pride in having a fast sailer, and as it is a difficult matter to combine both sailing and pulling qualities, they prefer the former in all cases. The present boat is capable of making about 7 or 8 knots per hour in a smooth sea with a good fresh breeze well aft on the quarter. Under favorable conditions some whalemen claim a speed of 8 knots under sail and others 10; but from 4 to 6 knots per hour perhaps would be a fair average when down for whales. Sails are invariably used in connection with the paddles whenever the wind gives a rate of speed of about 2 miles an hour in approaching a whale, as the boat moves much more quietly under sail than when propelled by oars. As to the speed by means of oars, a well-trained crew may in smooth water pull at the rate of 5 knots an hour during the first hour when lowered from the ship, but generally they do not make more than 4 during the second. Pulling to windward with a fair breeze, they would probably make about 4 knots an hour; with a green crew probably not over 3 knots.

THE LIFE OF A WHALE-BOAT.—As to the durability or life of this kind of boat I should say that some vessels return with the same boats they took out, which have, however, undergone many repairs during the voyage; but usually the boats are so much disabled in the service as to render substitutes imperative. One of the most destructive agents is the flukes of the whale. In the Arctic regions the boats are frequently stove by collision with ice. As a rule, however, they suffer the greatest damage when hoisted and lowered to and from the vessel, particularly in rough weather. This has a tendency to split the strakes, break the gunwales, and rack the boat to pieces generally. Towing dead whales to the ship also weakens the boat and sometimes "starts" the nails.

THE COLOR OF A WHALE-BOAT.—When finished the boats are generally painted white unless otherwise ordered, since this color is more popular. But the color depends upon the localities in which the ship is expected to cruise; for example, the boats used about the Gulf Stream are sometimes painted of a leather or salmon tint, and others may be painted of a lead color or a light blue. White is preferable in the Arctic regions as it assimilates to the color of the ice and diminishes the chances of "gallying" the whales. Some builders simply prime the boats and the whalemen paint them on board ship. The top strake is usually of a color differing from that of the rest of the boat; it is green, black, or perhaps blue, dependent upon the fancy of the officer in charge. Previous to 1818 I am told it was not customary to paint whale-boats at all; they were, however, pitched with hot resin.

THE WEIGHT OF THE WHALE-BOAT.—Messrs. Reeves and Kelley, boat-builders of New London, tell me that the boats of their manufacture weigh from 500 to 550 pounds. The whale-boat in the U. S. National Museum, the gift of Messrs. I. H. Bartlett & Sons, of New Bedford, weighs, with the masts, sails, oars, and all necessary apparatus of capture and accessories, 1,528 pounds. If we add to the above the weight of a crew of six men, we shall have the average weight of a whale-boat when engaged in the capture.

THE PRICES OF THE WHALE-BOAT.—In 1880, the 28-foot boats sold for $90 and the 30-foot boats for $100 each, at New Bedford; at Provincetown the price was from $110 to $120 each. When the smooth-bottom boats were first made, the difference in price between them and the lap-streak boats was $10 each in favor of the former.

TRANSPORTATION OF BOATS ON WHALING VESSELS.—Ships and barks in the whale fishery carry four boats for immediate use, and two or perhaps three spare boats; the former on the cranes suspended out-board and the latter with reversed bottoms lashed to the after deck house.

These vessels are denominated "four-boaters," and carry one boat on the starboard side and three on the port. The Arctic steamers, however, carry five boats on the cranes,* two on the starboard and three on the port side. Schooners and brigs carry from two to three boats for immediate use and a spare boat at the stern on projecting timbers called "tail feathers." The captain's boat (so called from courtesy and habit, but usually headed by the fourth mate) occupies its position on the starboard quarter; the mate's boat on the larboard† quarter; the second mate's boat at the waist, and the third mate's boat on the larboard bow. They are familiarly known as (1) the starboard, (2) larboard, (3) waist, and(4) bow-boats. Steam barks carry a fifth boat‡ on the starboard bow. Boats are not carried at the starboard waist, as this portion of the vessel is used on all whalers, for cutting in the whale.

On a three-boat vessel the captain has the starboard boat, the first officer the port-quarter boat, the second officer the waist boat, and a third man is shipped as a "third mate and boat steerer," to take charge of the captain's boat or to steer the captain as the case may be. On a two-boat vessel the captain has charge of the starboard boat and the mate the port boat. The boats are lowered from and raised to the parts of the ship in the order just referred to; but on short vessels the third mate's boat may be lowered from the starboard side, forward of the waist.

The manner of transporting the boats for active use to the whaling grounds is by means of davits and cranes. The principle of suspension is common to all vessels; on whalers the boats are invariably suspended outboard. The attention of the reader is directed to the accompanying plate, which represents the manner of carrying the starboard-quarter boat and the spare boats,§ one of which latter is visible.

The davits (*d d*) are made of white oak "butt timber," squaring about 8 or 9 inches when dressed, with a length varying from 12 to 16 feet. Two scarfs are sawed lengthwise in the upper end, in a wedge-like form; the timber is steamed, bent on a frame, and fastened with iron bolts to retain the curve from the perpendicular.‖ On the starboard quarter (of a ship) the distance between the davits is from 21 to 24 feet, as the requirements may be, in order that boats of varying lengths may be accommodated. On the port side the interval between each pair is about 9 feet, affording sufficient room for the boats to "swing" without coming into collision. The heads of the davits, about 10 feet above the main rail, are mortised for sheaves with friction rollers. The falls (*f*) are of manila, 2½ inches in circumference, and connect with a two-sheaved 9-inch block, which hooks into the "hoisting straps" (*e e*). The hoisting straps are the iron rods or "boat-iron," with rigid eyes at the head and stern of the boat respectively.

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* Triangular-shaped wooden brackets upon which the keels of the boats rest.

† The whalemen are the only class of seamen who have not adopted the term port instead of larboard, except in working ship. The larboard boat was this boat to their great-grandfathers and it is so with the present generation. More especially is this the case in the Atlantic and South Pacific fleets; but recently the term port-boat has come into use in the Arctic fleet.

‡ Some of the new steamers built since 1882 carry sixth and seventh boats.

§ Nomenclature of starboard quarter of a whale ship, showing the manner of transporting the captain's boat and the spare boats: *s*, starboard quarter of the ship; *a*, whale-boat on cranes transported to the whaling grounds; *b b b b*, bearers against which the inboard side of boat rests; *c*, *c*, cranes upon which keel of boat rests; *d d*, davits. These are the usual form of davits, although two pieces of conjoined wood have been used; *e e*, hoisting straps into which the fallen hooks of davit-tackle are inserted when lowering or hoisting the boat; *f f*, davit-tackle falls for hoisting and lowering; *g g*, gripes for lashing boat to prevent chafing, &c.; *h h*, iron braces to hold cranes in position when boat has been hoisted; *i i*, spare boat on skids or gallows-frame; *j*, end of skid resting on stanchion; *k*, lashing to hold boat in position; *l l l l*, shrouds; *m m m m*, back-stays, topmast, topgallant, and royal back-stays; *n*, main brace; *p p p p p*, running rigging; *q*, mizzen mast; *r r*, ratlines; *s*, spanker-boom; *t*, spanker jack-stay; *u*, channels; *v*, chain-plates.

‖ The davits on whalers are usually made of wood; iron davits have been tried, but were found too stiff.

These rods are strong enough to bear the weight of the boat and its necessary apparatus when suspended. The irons now in use are technically termed "long irons," in contradistinction to those formerly used, which were called "short irons." The boats may be hoisted and lowered, as it is termed, "loggerhead and clumsy cleat," or "by the ends." This depends upon the positions of the hoisting straps in the boats, and it very materially affects the distances between the davits.*

During an ordinary gale the cranes may be flected up,† and the boats "davy-headed." During a heavy gale the lee boats may be turned up on their sides, especially if the davits are short, by means of tackles from aloft, and lashed with their gunwales resting on the cranes, to prevent them from filling with water when a heavy sea comes aboard, or they may be turned up on both sides of the ship when running before a gale.

The cranes (*c c*) have the form of a right-angle triangle, and are made of pieces of oak from 3 to 4 inches square; the cross-piece, upon which the keel of the boat rests, is about 3½ feet long. The upright piece at the back is fastened to the bearer with pintles and eye-bolts. This triangular contrivance swings freely to either side. When the boats are hoisted, the cranes, two to each boat, are swung under and held in position by iron braces (*h h*). In some cases the top pieces of the cranes have cleats with notches, or "jogs," from 1 to 1½ inches deep, covered with mats for the keel to rest in, while in others cleats are dispensed with and mats only are used.

Slide-boards (*b b*) are bent over the channels (*u*) to prevent the boat from fouling when hoisted and lowered. The lower ends of these boards are bolted to the ship, and the upper ends usually to the bottom of upright tapering pieces of timber called "bearers."

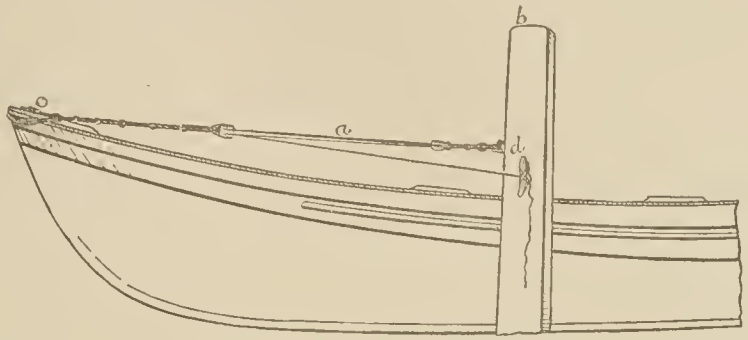
When the boats are in position on the cranes the heavy line-tubs are removed and placed upon wooden gratings, which are made fast to the bearers and the stanchions of the after-house, to relieve the bottoms of the boat from unnecessary weight. The grating is triced up when the boat is hoisted, and then lowered and fastened with two laniards. Sometimes, however, the tubs are transferred to the after-deck house and lashed.

To prevent the boats from chafing when the vessel pitches, they are held by the head with gig-tackle, and to prevent them from chafing when she rolls, they are lashed with gripes. The former consists of a double and single block connected by a 9-thread manila rope. The long strap, made fast to the double block, has a crupper-like arrangement at the forward end, covered with leather, which fits over the bow-chocks of the boat. The short strap, made fast to the single block at the after-end, has a small hook, which, when in use, should be inserted in an eye attached to the bearer. The tackle being adjusted, the falls are hauled taut. A reference to the illustration will better explain this contrivance. The bearer is represented by *b*; the crupper or loop of forward strap, hitched to the port bow-chock, by *c*, and the falls fastened to the cleat *d*, by *a*. Some of the gig-tackles are plain and commonplace enough, while others are made with extraordinary care and taste, and are quite attractive in appearance. The boat-steerers make them usually on board ship, and formerly they took great pride in this work. The blocks and sheaves were often-

*The forward iron strap was formerly inserted in the eyes of the boat, and ruffed to the stem; the after one pierced the stern about 4 inches from the head of the stern post and was ruffed to the toe of this post. This arrangement rendered it imperative that the boats should be hoisted "by the ends" or "stem and stern." But on account of the heavy strain brought to bear upon them, the mechanical and philosophical principle of which is obvious to the reader, it became necessary that the hoisting tackles should be brought closer together; consequently, some builders shortened the distance between the irons by running them through the clumsy cleat and cuddy board respectively, and boats were hoisted "clumsy cleat and loggerhead." Other builders, however, instead of the removing the first-named set, placed the additional set in the parts of the boat I have just named. By this arrangement boats of this construction may be adapted to any davits, which are not always placed at regular intervals from each other.

†Two or three gudgeons are inserted in each bearer, and the cranes may be raised in this manner.

times made of ivory—the teeth or pan of the sperm whale; the straps were nicely laid, covered with canvas, grafted, and fancifully painted. The "boat gripes," about 8 feet long, are made of a 2¾-inch rope, double, and seized together with canvas. The middle portion is covered with leather



HEAD OF WHALE-BOAT, SHOWING GIG-TACKLE.

to prevent chafing. One end is made fast to a hook on the side of the vessel, and the other, with a laniard attached, is passed around the boat and hauled tant.*

From one to three spare boats are held in readiness to be lowered in case of accident to the boats on the cranes, one on schooners and brigs, and two or three on barks. It is also customary to carry duplicate parts of boats, such as keels, knees, gunwales, timbers, stem and stern posts, and boat boards, as well as boat nails, for repairing boats which may be stove by whales or broken when lowered or hoisted. During the voyage, as the boats are destroyed by accident, others may be purchased at some convenient port where whaling supplies are kept, and usually at exorbitant prices; but they are of American manufacture, having been sent out to supply the demand, or they may be obtained from homeward-bound ships. The manner of transporting the extra boats on barks and ships is inboard on skids or deck-houses, and on schooners outboard at the stern.

The skids or gallows frames are merely a timber frame-work. Four wooden stanchions, two on each side of the ship in the after part, resting upon the plank-shear on the outside of the vessel, are bolted to the bulwarks. Two pieces of timber, extending athwartships, rest upon the stanchions, and are held in position by a mortise-and-tenon joint. To impart additional strength, some of the frames are kneed at the junction of the overhead timbers and stanchions. Such a frame is high enough above the deck to "clear the head of the longest man of the crew." The spare boats are turned upside down, with their heads and sterns resting upon the transverse timbers, and lashed. The skeleton frame is seldom found on the present New Bedford ships; and it is my impression that it was one of the peculiarities of the craft belonging to Nantucket and Edgartown. The storage-house, with which I am familiar, may be found on the largest vessels hailing from the first-named port. It is a kind of shed called the "after-house," or "after-deck house," built over the quarter deck. Its roof and sides are weather proof, and the ends are open. It affords an excellent shelter for the after deck. On its top may be found the spare boats, harpoons, lances, boat-sails, rudders, oars, and other articles of boat-gear; and under it, implements with long poles, such as cutting spades, flukers, porpoise irons, and grains.

Although the spare boats are carried at the stern of brigs and schooners, they are never lowered from the after part of the vessels, as, in heavy weather, great difficulty would be expe-

*After the boats have thus been provided for, spreaders are, in some instances, placed transversely in them. The spreaders are merely wooden sticks, which, in the words of an old Provincetown whaleman, are "just as long as the boats are wide," with shoulders or notches cut in each end to hold them in their proper positions on the gunwales, to keep the boats from warping. They are used in the southern fishery only, where the boats are exposed to the powerful rays of a tropical sun.

rienced. This is the method of transportation on small vessels, the object being to economize space by placing the boats outboard. The manner of carrying a spare boat on a schooner is as follows: Two pieces of timber, or "bearers," bolted to the stern-frame, project outboard perhaps 4 or 5 feet. These projections are facetiously termed "tail-feathers." On some vessels the boat merely rests head and stern upon the bearers; but on others, the keel of the boat rests upon a heavy plank extending athwartships and fastened to the outboard ends of the bearers. The boats are held in position by means of a piece of plank at each end bolted to the bearers.* Spare oars, harpoon poles, and other implements of this kind, are also stowed outboard with the boats.

THE STEAM CUTTER.—Owing to the noise made by the escape of steam, boats propelled by this motor have not, until very recently, been used to advantage in approaching whales. The Norwegians employ steamers in the capture of the whale, heavy guns placed on deck being used to throw the projectiles. Americans have also used steamers entirely decked over, as the Whitelaw and the Rocket, off the San Francisco heads, in the capture of fin-backs, and I am told that the Northwest Whaling Company employed a small steam launch on the south coast of Alaska for fastening on to whales by means of the whaling rocket, a weapon also used by the California steamers. It should be borne in mind that the above-mentioned steamers operated near the coast and used pieces of ordnance or rocket guns, and consequently were enabled at times to prosecute this branch of the fishery successfully; but the necessities of open-sea whaling require small boats that may be lowered from the vessels to intercept the whales, as such large objects as ships would galley them. The desideratum of the whaleman is to fasten his whale to the boat by means of the harpoon and line, in order that the animal may, in a measure, be under control. Having accomplished this object the whale may be dispatched with bomb-lances. The early method adopted for the capture in deep-sea whaling was to approach the whale in boats propelled by oars, or, whenever the whales evinced the slightest timidity, by the use of paddles. As little noise as possible should be made at such times. It soon became evident, however, that speed in "going on to a whale" was of the utmost importance; and although sails were suggested, it was believed that such conspicuous objects would not only frighten the whales, but probably also be the means of swamping the boat, or otherwise endangering the lives of the crew during the actual capture. But James Beetle, of New Bedford, applied the patent mast-hinge to this kind of craft; sails were set, the boat swiftly approached the whale, and the mast and sail were lowered together with the greatest ease soon after the harpooner darted his instrument into the whale. All whales are now struck under canvas, and a whaleman who does not sail on his whale under favorable conditions does not understand his calling. But the whales are becoming educated or getting their eyes open, so to speak, to the present system of warfare waged upon them; and it now becomes necessary to introduce a motor for facilitating the transit of boats to the objects of capture. To this end Prof. Spencer F. Baird, United States Commissioner of Fish and Fisheries, and Lieut. Z. L. Tanner, United States Navy, Commander United States Fish Commission steamer Albatross, suggested the use of one of the Herreshoff steam-cutters as an experiment in this fishery. Acting upon the advice of these gentlemen, Messrs. I. H. Bartlett & Sons, of New Bedford, introduced one of the proposed launches in the North Pacific during the year 1882. This launch is 28 feet long, with a beam of 7 feet. It has an upright boiler, uses "arctic coal" as fuel, and is of the same kind as those now employed by some of the steamers of the Navy. It was not intended, however, by the projectors of this scheme that the launch should be used in the actual capture; its object being solely to

*According to Manby's account (Voyage to Greenland, 79) English whalers carried spare boats at the stern. "While on the English ship Baffin, the Greenlandman Vigilant, of London, homeward bound to that port, was spoken. In the boat hanging over her stern was a coffin containing the remains of one of her boat-steerers who had been killed by a whale."

tow the whale-boats nearer the whale, thereby economizing time, and to afford means of approaching whales during calms, when they might otherwise be inaccessible, and afterwards to tow dead whales to the vessel. But from the account of Capt. Bernard Cogan, who first used this cutter in connection with the bark Rainbow, in the Arctic regions, it appears that the steamer has been employed in killing wounded whales as well as in getting fast "second boat." In a letter to Mr. William H. Bartlett, Captain Cogan says that the cutter was "used to advantage towing boats to windward and towing whales to ship in light winds. Found her most useful in chasing wounded whales that got loose. It is hard for a wounded whale to get away from her in open water, and she always got fast second boat. We used the darting gun, hand lance, and bomb lances. We got two whales with her, and saved one wounded whale that we would have lost if we did not have her. Used properly, one steam-launch is a big advantage to a ship." The career of this little craft will be watched with much interest, not only by the whaling fraternity, but by sea-faring men of every nation, and as it is the first attempt in this direction, it will undoubtedly prove an important record in the history of the American whale-fishery.

4. THE APPARATUS OF CAPTURE.*

IMPRACTICABLE SCHEMES.—NETS, PRUSSIC ACID, AND ELECTRICITY.

It was my first intention to describe only the ordinary methods of capture; but in arranging and elaborating the results of my investigations, I find that I have several accounts of extraordinary and impracticable schemes for the destruction of the whale.

Among the most remarkable schemes that have fallen short of successful application should be mentioned (1) nets, (2) prussic acid, and (3) electricity.

THE CAPTURE OF WHALES WITH NETS.—Attempts have been made by both English and American whalemen to capture the "white whale," or white dolphin, in nets. So far as the English are concerned, or were concerned, I have no data except that which has been published by Scoresby, who tells us that this species was taken in the large rivers flowing into Hudson Bay and Davis Straits by "harpoons or strong nets"; but in regard to the steps taken in this direction by American whalemen I am prepared to speak more definitely. Mr. H. L. Crandell, home manager of the firm of Messrs. C. A. Williams & Co., New London, Conn., tells me that the old firm of Williams, Haven & Co. made two attempts to capture the white whale with nets at the months of the large rivers in Cumberland Inlet. The nets were made of manila lobster twine capable of lifting 200 pounds. This net had a 9-inch mesh and was 500 fathoms long, 3 fathoms deep in the bunt, and tapered to 2 fathoms at the ends. It was hung on manila whale-line with weights and corks, and cost $1,000. It was used by bark Concordia, in 1871, at Kingaun, Cumberland Inlet. It was set from a platform built across two whale-boats and towed from shore to shore by five boats of the same type. At one setting five hundred white whales or "white grampuses," as they are also called by whalemen, were entrapped and killed with guns and lances in less than an hour. This catch stowed down 750 barrels of oil. Thirty-seven men were employed at each ebb-tide, and 1,000 barrels of oil were taken during the season. A second net was made of the same material and with a mesh of the same size; it was 1,000 fathoms long; the bunt was 300 fathoms long, and fished 4 feet deep; the next 300 fathoms on either side fished 3 feet, and the remaining 400 fathoms at each end fished from 2 feet to 1 foot. It was also strung with whale-line, and had adjustable cast-iron sinkers weighing from 8 to 24 pounds each. This net was used in 1872 at the locality above mentioned by the steamer Tigress, of St. John's, Newfoundland,

* For more detailed description of apparatus see the section of this report on APPARATUS OF THE FISHERIES.

chartered by Williams, Haven & Co. This steamer was accompanied by the schooner Helen F., owned by that firm. The net was set from a seine-boat, made at St. John's, at a cost of $500, with a carrying capacity of 25 tons and a deck 24 feet wide. This craft was towed into position by six whale-boats. At the first setting the net was cut into three pieces by the sharp rocks and for the time being rendered useless. The men endeavored to keep the whales in deep water until ebb tide, when they could have an opportunity of mending the net. It appears, however, that the cunning dolphins did not like this mode of imprisonment; the entire school made a violent rush, and carried away 150 fathoms of the bunt, and almost swamped the whale-boats. The net was again rigged and a second attempt was made; but operations were delayed by the boats running afoul of the rocks, and the whales escaped. It is estimated that about 2,000 dolphins were in the net each time, but only about two hundred were captured. Neither of the above experiments was regarded with much favor by the projectors of the scheme, and they have since practically abandoned nets.

In the fall of 1882 I met Capt. Josiah Ghenn, the veteran Provincetown whaleman, and he told me that when he was master of the schooner Council, about the year 1848, he was cruising off the coast of Labrador, and undertook to capture a bowhead whale by means of a net. The net was made of whale-line on board his vessel; it was 159 fathoms long, 8 fathoms deep, and with meshes of extraordinary size. It was set from the shore 50 fathoms in a straight line in an easterly direction; turning at right angles the remaining 100 fathoms were carried north parallel to the shore, leaving the northern end open for the whales to enter. A bowhead whale entered this trap at night and carried away the entire net; and Captain Ghenn added that he has "never seen the whale or net since."

The fishermen of the Faroe Islands have been very successful in their captures, by means of nets, of the "grind-whale" or blackfish (*G. melas*) at Vestmanhavn. This fishery is discussed in the next chapter.

It is altogether possible that nets may be used locally under favorable conditions to capture the smaller species of cetaceans, such as the white whale and blackfish, but for the larger members of the order they are without doubt impracticable.

PRUSSIC ACID.—Hydrocyanic acid has been used to destroy the life of the whale; but its deleterious effects soon abolished its use. In low latitudes the men at work in the blubber-room cut off the bottoms of their trousers and with bare feet and legs stow away the unctuous pieces of fat. Several men, who possibly had sores upon their hands or feet, were fatally poisoned by the blubber of a whale that had been killed with prussic acid. The news soon spread through the fleet, and the beginning and end of this method of capture occurred almost simultaneously.

As to the origin of the use of poison in the whale fishery there are many conflicting reports. The American whalemen unanimously attribute the inauguration of this enterprise to the French, from the fact that several of our ships fell in with French whalers that carried the so-called "prussic acid harpoon"; but so far as I can ascertain the harpoons were not generally used. Mr. F. C. Sanford, of Nantucket, Mass., tells me that poisoned harpoons were carried by the ship Susan Swain, which sailed from Nantucket November, 17, 1833; but Charles E. Allen, an "apothecary" in Nantucket, who was mate on the Susan on that voyage, says the crew never used them, as they were frightened by reports concerning the death of whalemen from handling poisoned blubber. Captain Allen also says that during a subsequent voyage on the northwest coast he shipped a Frenchman who reported that some of his countrymen killed a whale with a prussic-acid harpoon, and that when "cutting-in," the man who was working on the whale received a flesh wound and died from the effects of the poison. Mr. Samuel Tuck, eighty-three years of age, of Williamsburg,

N. Y., formerly agent of the Susan, says that a harpoon similar to the old double-barbed iron was made by a Nantucket blacksmith, with slots for bottles of acid, but it was not used at all during the voyage.

My correspondents, among whom are numbered some of the oldest whalemen, tell me that they are of the opinion that prussic acid has never been used in the American fleet. While collecting objects of interest connected with the whale fishery in the fall of 1882 for the London Fisheries Exposition, I obtained two harpoons intended to be used with prussic acid. They were presented by Mr. Joseph B. Macy, of Nantucket, and are now displayed in the fisheries section of the U. S. National Museum (Nos. 56,260 and 56,261).

It would appear that the method of destroying the whale by means of poison originated in Scotland, and that Dr. Robert Christison, of Edinburgh, was instrumental in promoting this novel enterprise. An exhaustive paper on the subject was read by him before the Royal Society of Edinburgh, in 1860.*

In a communication to Prof. Spencer F. Baird, U. S. Commissioner of Fish and Fisheries, Capt. William Adams, of the Scotch whaling fleet, gives the following account of a whale killed with prussic acid.

"During the winter of 1861 a large two-grooved rifle was made by Messrs. Dixon, of Edinburgh, from plans and instructions of Mr. James Milu, of 'Murie.' The weight of the rifle was 28 pounds. Shells were made for it and filled with one-half ounce concentrated prussic acid and a small charge of powder fired by a 10-second time-fuse. The prussic acid was made for me by Dr. Stevenson McAdam, of Edinburgh.

[Extract from Journal.]

"MAY 12, 1862. (Off the island of Disco.)

"10 a. m. Saw a whale and lowered away two boats.

"10.30 a. m. Saw several whales; called all hands and lowered five more boats.

"11 a. m. The mate, Scott, got fast with the gun harpoon; whale sounded and took four lines (480 fathoms).

"11.30 a. m. Lowered the S. quarter boat, Captain Nicoll being in tow with the large rifle.

"12 noon. Whale came up and a shell (prussic acid) was fired into her. She went under for four or five minutes, and on coming up another shell was fired into her. She then seemed quite helpless.

"Three gun harpoons were then fired into her as she lay on her side.

"At 12.30 p. m. she was quite dead.

"We had no difficulty with the men in regard to the poison, but we never got another chance to use it."

ELECTRIC WHALING APPARATUS.—In presenting an account of this apparatus it is not to be inferred that it has ever been brought into practical use, for as far as I can ascertain it has not; but it is interesting to know that modern science has not overlooked the needs of the whale fishery, and I mention it merely as one of the curiosities of the subject. In 1852 letters patents were granted by the United States Patent Office to two gentlemen living in Germany for an electric whaling apparatus. According to the specification this contrivance consisted of a magneto-electric rotation machine, a metallic wire attached to the harpoon, and a coppered whale-boat constructed in such a manner that the electric current might be reconducted from the whale when

* On the capture of whales by poison, by Robert Christison, M. D., Professor of Materia Medica in University of Edinburgh. Edin. New Phil. Jour., 69, new series, xii, 1860, pp. 72–80.

harpooned through the water to the machine. The boat was made 2 feet longer than usual to make room for the apparatus. The harpoon was of the ordinary pattern, but so constructed that the wooden pole might be easily detached with a small line. The harpoon was intended to be darted by hand, and when the pole was withdrawn the head and the conductor should remain in the whale; then the machine should be set in motion and the electric current circulated through the body of the whale. At each revolution of the machine handle it is claimed that the whale receives about eight tremendous shocks, or 960 strokes per minute—"so formidable a power that no living being can resist the same."

THE ORTHODOX AND CUSTOMARY METHODS OF CAPTURE.

"FASTENING ON TO WHALES."—In considering the various methods and appliances that have been employed from time to time in the capture of the whale, the primitive style, by means of the harpoon, line, and hand-lance, is of first importance. The next step was the introduction of the harpoon-gun, which finally gave way to the bomb-gun and suggested the system now universally employed of discharging explosives in the vital parts of the whale. But the initial step now taken in the capture is identical with that of the early days of whaling, for the harpoon is still relied upon to fasten the whale to the boat. The hand-lance, formerly the only instrument available in giving the death blow, has been almost entirely superseded by the bomb-lance, and its discontinuance is merely a question of time. An implement called the boat-spade was formerly used to disable a running right whale by severing the tendons which connect the body and the flukes; but, so far as its legitimate duty is concerned, it also has been virtually displaced by the explosive lance.

The practice of "fastening on to" whales is as old as the fishery. It was resorted to by the Biscayans, from whom both the Dutch and English borrowed their ideas, and has been adopted by all nations that have engaged in whaling. The Indians of Cape Flattery, the only representatives of their race south of Alaska who capture the whale, first fasten on to the animal, and then murder it with lances and other rude implements; and according to their traditions this method of capture has been handed down through countless ages. As early as 1613, Purchas says, in an account of "a hunting spectacle of the greatest chase which nature yieldeth," that the "harping iron principally" serves "to fasten him to the shallop;" after which "they strike him with lances made for that purpose, about 12 feet long." For over two hundred and fifty years this method of capture has passed from generation to generation, and is rigidly practiced at the present writing. Frederich Marten, in his account of a voyage to Spitzbergen in the ship "Jonas in the Whale" (*Jonas im Walfisch*), during the year 1671, says, in his quaint style, that they fastened the long-boat to the whale "that he might not run away," and then "launced" him until he was dead.

THE HARPOON.—The harpoon is of primary importance, for to this instrument the whalemen look for success and profit. The primitive or typical harpoon, forms of which are still preserved, is sagittate, and known to whalemen as the "two-fluked iron;" the next step was the harpoon, with one fixed barb, the "one-fluked iron," and the third, the instrument now in use, with a movable barb or toggle which acts upon the principle of the lily-iron of the sword-fishermen. The lily-iron, which was evidently suggested by the adjustable bone and ivory harpoon heads of the Eskimo tribes, was used on whaling vessels for striking porpoises when "sea-pies" were needed, and for other purposes, but it was not strong enough for whaling. Considerable complaint was lodged against the old harpoon from the fact that oftentimes it would "draw" and let the whale escape, and the urgent need of a new and better instrument became apparent daily. The "one-fluked" harpoon was introduced, being made with the diameter of the neck smaller than the shank, to

produce a weak place, which would bend without breaking when the whale started off harnessed to the boat; but this was also found unsatisfactory. Finally Lewis Temple, a colored man, of New Bedford, conceived the idea of the toggle-harpoon. He manufactured his first iron in 1848, and since that time it has been used by the American whalemen to the exclusion of all others.*

The shanks of the harpoons are forged by hand in blacksmith shops from the best and toughest Swedish iron and not of steel; the heads, though usually cast from annealed or malleable iron, are sometimes wrought. I have seen shanks of harpoons that have been twisted into the most questionable shapes by the actions of dying whales; some had complete circles or loops bent in them, and none of the instruments could be used until forged anew. When the whale is towing the boat the shanks of the harpoons, usually the portions known as the "necks," are sometimes reduced in diameter by tractile force. That the fibers of cold iron can be drawn out in this manner has been doubted by skeptics, but it does not seem improbable to persons who are familiar with the ductility of metals, or with the great strain brought to bear upon the harpoon when the boat is towed through a heavy sea, and more particularly when the harpoon is fastened under a rib of the whale. I have seen very interesting specimens of this character, and in the fall of 1882 I sent three "stretched" harpoons to the National Museum. Sometimes the harpoon breaks, and the portion which remains in the whale may long afterwards be cut out by the crew of the same or another vessel. Owing to the marks, subsequently referred to, the instrument may be easily identified. The wound becomes cicatrized, and perhaps after many years, by attrition, the projecting shank may be worn to a mere shred. A boat-steerer belonging to the Ansel Gibbs, of New Bedford, threw his harpoon into a bowhead whale in Hudson Bay, and several years afterwards the ship Cornelius Howland, also of New Bedford, captured the same whale in the Arctic regions on the western coast. The whale had traversed the great northwest passage, which is as yet unknown to man, and carried with it the harpoon, which was branded with the names of the Gibbs and of the blacksmith who made it.†

It is the popular impression that the harpoon is employed solely to kill the whale. This is also erroneous. It is used mainly to fasten the whale to the boat by means of the line in order that the animal may be killed with either the hand-lance or the explosive lance. I am aware that in many cases whales have been killed by the harpoon when it penetrated a vital spot, but these are the exceptions rather than the rule.

MARKED CRAFT.—The harpoons are marked with the initials of the names of the vessels and the boats to which they belong. Thus, the irons belonging to the mate's boat or bow-boat of the ship Susan should be stamped with a cold chisel, S, or S . . , B. B., and as long as such a harpoon remains in a whale no ship of any nation can legitimately claim the whale or its product. On some vessels, instead of using the initial of the boats, straight marks or a series of dots are made; thus, S on one side and | | | | or : : : : on the reverse has the same meaning as above noted.

Capt. W. H. Macy, author and whaleman, of Nantucket, in the "Log of the Arethusa," says that "marked craft claims the 'fish' so long as it is in the water, dead or alive." Also that if the captain of one ship is found in the act of cutting in a whale with the marked harpoon belonging to another, the claimant has a right to cut off the blubber even with the plankshear of the vessel and take what is below, but cannot claim anything that has been hoisted into the ship. This is the whale-

* To convey some idea of the magnitude of the harpoon trade, I should say that the books of Mr. James Durfee, the veteran harpoon-maker of New Bedford, show that from 1828 to 1868, inclusive, he made and sold 58,517 harpoons. Of this number 45,103 were the old-fashioned irons, including both the double and single barbed, and the remainder were the improved toggle-irons. We should also take into consideration that during this time there were about eight or ten harpoon-makers at work in New Bedford.

† Jireh Swift, New Bedford.

men's law, as determined by custom, and nothing better could be devised. In March, 1688, the universally recognized law of whalemen that "craft claims the whale" was placed on the colonial records of Massachusetts Bay, wherein, among other things, it is specified "6ly, that each company's harping Iron & lance be Distinckly marked on ye heads and soeketts with a public mark: to ye preyention of strife." *

THE HAND LANCE.—Next in importanee to the harpoon was the old hand-lance, which has been superseded by the bomb-lance. Its head is made of steel and its shank of the best wrought iron. The total length, including the handle, is about 12 feet. The lance itself is from 5½ to 6 feet long. It is used by the officer of the boat to kill the whale after it has been harpooned. Notwithstanding hand-lances are rarely employed at present, three of them are always included in the outfit of a whale-boat to be used in cases of necessity. Capt. William Martin, of Provincetown, tells me he always kills his sperm whales with the hand-lance, but uses the bomb-lance for right whales and humpbacks.

THE WHALE-LINE.—It is essential that the whale line or "main-warp" should be of the best quality of its kind, for should it "part" the whale would of course escape. It is loose laid, soft, pliable, and may be stretched until its diameter is greatly reduced before it breaks. Unlike cordage, it is free from tar, but during the process of manufacture the tow is sprinkled with whale oil as a preservative. It is made of the fibers of the "manila hemp" or wild plantain (*Musa textilis*), an endogenous plant, indigenous in the Philippine Isles, and the islands of the Indian Archipelago, and known as *Abaca* to the natives of the first-named group.

The whale-line is laid in Flemish coils in two tubs, 225 fathoms in the large tub and 75 fathoms in the small tub. The upper and lower ends of each line are exposed and provided with eye-splices in order that one end of the line may be made fast to the harpoon and the other end to the other line when fast to a whale. Each boat carries 300 fathoms of line, and if a whale by running or sounding a great distanee takes it all out another boat is signaled and assists in the capture. It is, however, unusual for a whale to take out over two thirds of the 300 fathoms belonging to a boat; but of course much depends upon the disposition of the whale and the skill of its captors.

One end of the whale-line is made fast to the "first iron," that is, the first harpoon darted at or into the whale, and the "second iron" is connected with the main line by a short warp attached by a running bow line. The harpooner, having darted the first iron, endeavors to dispose of the second in a similar manner as soon as possible; but if the whale gets beyond darting distance he "heaves" it overboard anyhow to prevent it from fouling with the main line. During the capture harpoon No. 2 is towed, and usually found near the head of the boat.

THE WHALING GUN.—The whaling-gun was primarily intended to impel harpoons, but as the weight of the line deflected the instruments from their true course of flight it became necessary that a missile should be so constructed as to be used with the gun for killing the whale instead of merely fastening to it. The gun-harpoon has therefore given way to the bomb-lance. We must give the English the credit for inventing the whaling-gun, that is, the heavy swivel-gun. The eminent whaleman and author, Scoresby, tells us that this gun was invented in 1731, but was little used, and also that in 1771 or 1772 it was again brought forward, having been improved so much that it was regarded as a new invention. The Society of Arts urged its introduction in the Greenland fishery, and offered rewards for whales killed with it. But the early English and Dutch, particularly the latter, apparently feared the gun more than they did the whales. American

* Hist. Amer. Whale Fishery, Alexander Starbuck; published in U. S. Fish Commission Report, part iv, p. 8, and Mass. Col. MSS., Treasury, iii, p. 80.

whalemen, however, have never regarded the swivel-gun with much favor, although it has occasionally been used by them on the California coast in devil-fishing, or elsewhere in humpbacking, finbacking, and right whaling, and sometimes in bowheading in the Okhotsk Sea, as well as in humpbacking on the southern coast of Africa, but principally on soundings. They preferred the light shoulder-guns, which oftentimes "fired aft" with more emphasis than they did forward. The consequence was that the gunner was kicked as far aft as 'midships, and it was found necessary then, even as it is now, to tie the gun to the boat with a laniard in order that it could be regained when it was "hoisted overboard." The recoil of the old shoulder-guns was immense. I have heard of two men who had their collar bones broken by a heavy gun.

The shoulder-guns which are now in such general use are of American invention and manufacture. The first were muzzle loading, and Provincetown still clings to this type, one of which, the Brand, they prefer. The New Bedford whalemen prefer the improved breech-loading guns. Of the latter there are two kinds now in use, the "Pierce & Eggers" and the "Cunningham & Cogan." The first named is made of gun metal throughout, and the second has the stock of cast iron and barrel of steel. Central-fire cartridges are used. The Eggers requires a Winchester cartridge No. 8, the bomb-lance being loaded separately, and the Cunningham has a bomb-lance and cartridge combined, made expressly for it, which are placed in the gun simultaneously. A rifle has been used, but it was found impracticable.

When fire-arms were introduced into this fishery there were, as might be expected in regard to any innovation, many arguments against them, but the necessities of the occasion demanded their use, and now the echo of the whaling-gun bounds over the billows in every clime.

The Brand bomb-gun is worthy of mention as being the first gun successfully used in the American whale fishery. There are three sizes, all of which are muzzle-loaders. The caliber, length, and weight are as follows: No. 1, 38 inches long; weight, 23 pounds; caliber, seven-eighths of an inch; No. 2, 36 inches long; weight, 19½ pounds; caliber, $1\frac{1}{16}$ inches. The length and weight of No. 3 have been lost among my notes, but its caliber is $1\frac{1}{4}$ inches. Some of the barrels are "blued" and others "browned." The ramrods are made of hickory, with brass thimbles and screws. Three drams of powder, sea shooting FFG, are recommended by the manufacturer as a charge for impelling a bomb-lance.

The Pierce & Eggers gun is one of the latest improved shoulder-guns, and the most popular and effective that has ever been introduced in the whale fishery. It may be used with either the Pierce or Brand explosive lance. It is also one of the most attractive whaling guns in appearance. It is made entirely of gun metal, with a skeleton stock and reinforced barrel. Charge, 2½ drams of powder. Its length is 36½ inches and its weight 24 pounds. It is manufactured by S. Eggers, New Bedford, Mass.

The Cunningham & Cogan gun is manufactured by Patrick Cunningham, under the direction of William Lewis, New Bedford, Mass. It is used principally by the crews of the steam barks in the Arctic regions in connection with the Cunningham & Cogan bomb-lance. Its total length is 33 inches and its weight 27 pounds. The stock is made of gray iron, skeleton; the stock and breech-piece are cast in one piece with a small rigid eye at the rear of the guard-plate for the laniard. The barrel is steel, with a bore of 1 inch, reinforced and screwed to the stock. The breech-block, containing the firing-pin, is hinged to the stock, and when closed is held by a snap-spring. The bomb-lance and cartridge combined is loaded at the breech.

At sea the mates usually have charge of the shoulder-guns and the boat-steerers of the darting-guns. On board ship these weapons are kept in the state rooms suspended over the bunks. In the whale-boat the shoulder-gun is carried at the starboard bow in a long box covered with a

piece of canvas, extending under the head sheets or perhaps simply under a flap of oiled canvas nailed to the boat. It is made fast to the forward "hoisting-strap,"* by means of a laniard to prevent its loss overboard, as its recoil is often so great as to prostrate the gunner. It is discharged from the bow by the officer, and is aimed and fired in the same manner as the ordinary shotgun or rifle.

THE DARTING-GUN.—It has been the custom of American whalemen for the past three decades to "fasten on to" the whale with the harpoon, and then, standing off at a safe distance, kill it with a bomb-lance. But the great bowhead, which yields excellent baleen and the next best oil to that of the spermaceti whale, has been the means of bringing about a change in the modern art of whaling. When fastened to in the Arctic regions—the home of this cetacean—with the ordinary harpoon, the great polar whale may dart under the ice, and if the crew do not care to follow it they must "cut line" and lose the whale and such material as it carries away. Capt. Eben Pierce and Mr. Patrick Cunningham, of New Bedford, have respectively perfected an instrument, known as the "darting-gun," expressly for this fishery. This weapon consists of a stockless gun-metal barrel (*a*) attached to an ordinary harpoon pole (B). A harpoon (C), with the whale-line attached, fits loosely in two brass projections or lugs (*d d*) on the gun. The apparatus is loaded with a cartridge or charge of powder and the bomb-lance (*b*) and darted at the whale. The harpoon entering the blubber brings a long wire rod (*g*), projecting over the muzzle of the gun, in contact with the whale. This rod is the trigger, and by impact the bomb lance is automatically thrown into the very soul of the cetacean, as the harpoon simultaneously fastens it to the boat, and if mysticetus is not killed he is thoroughly disgusted and willing to succumb. Were it not for this kind of gun, ice-whaling could not be successfully pursued.†

THE WHALING ROCKET.—The whaling rocket is of recent invention, and is intended to be projected from the decks of vessels. The "gun," so-called, is merely a rest from which the rocket is discharged; it is supported by an iron standard, and fired while resting on, and not against, the shoulder. The projectile is a large rocket, harpoon, and bomb-lance combined, weighing 18 or 20 pounds, and is pre-eminently the most powerful and destructive agent ever used for killing whales.‡

Mr. C. D. Voy, of California, in a letter to the Secretary of the Smithsonian Institution, cites an instance where a rocket at short range was fired entirely through the body of a whale and toggled itself on the side. He also says that during a series of experiments with the bombs on the beach one of them "carried a whale-line almost 60 fathoms, which shows what power they have, since a bomb and 20 fathoms of line weigh about 55 pounds."

THE BOMB-LANCE.—Robert Allen, of Norwich, Conn., invented the first explosive lance in America for killing whales. This occurred in 1846. The lance, a type of which is preserved in the National Museum, is long and slender, and the absence of guiding-wings rendered it uncertain in its effects. It was just as liable to strike the whale, as the whalemen express it, "broadside" as with the point; hence it failed in its mission. In 1852 C. C. Brand, also of Norwich, made improvements in the Allen lance, and was mainly instrumental in introducing the present form into the whaling fleet, thus inaugurating a new mode of capture, which in part revolutionized the process.

* An iron rod or strap, with a projecting eye at each end of the boat, by means of which the boats are hoisted and lowered to and from the vessel.

† When darted at a whale the gun is regained by means of a laniard attached to the shank of the socket.

‡ This weapon, like the darting-gun, serves two purposes; it both fastens on to the whale and kills or seriously wounds it. Both actions are simultaneous. The chain and toggle are released when the bomb is exploded to prevent the implement from withdrawing.

The system of manufacturing the modified forms is for the most part based upon the principles embodied in the Brand lance, differing, however, in the internal detonating mechanism.

The magazines, or shells, of the Brand lances are cast iron, annealed, cast with heads or points which have three cutting edges, and resemble in appearance an engraver's scraper. This lance is exploded by a time-fuse ignited by the detonation of a primer, to which fire is communicated by a firing-pin, the latter being operated upon by the discharge of the gun. The wings are of vulcanized rubber.

The shell or chamber of the Pierce lance is composed of seamless brass-tubing; the instrument has metal wings; the internal operative mechanism for exploding the lance is placed in or near the anterior end, and the explosion is caused by the concussion of the discharge of the gun, which ignites a time-fuse by means of a percussion cap.

The Cunningham & Cogan lance is composed of iron piping, to which is affixed (screwed) a malleable cast-iron point with three cutting edges. The instrument has rubber wings, and is exploded by a time-fuse ignited by a central-fire cartridge rigidly fixed to the lance and forming a part of it.

The above lances differ in their internal construction and arrangement; and, with the exception of the Brand No. 4, which is especially designed for Greener's swivel-gun, they may be used in connection with the shoulder-guns.

The Allen lance prevented the egress of water by the issue of flame in its rear caused by the burning of the fuse; the present lances are rendered impervious to water, either by tight screw-joints or by being hermetically sealed.

Pierce's and Cunningham's lances weigh, each, 1¼ pounds, and the Brand No. 2 (new model, for example) 2 pounds. These weights do not include the amount of powder required for the charges.

The retail price of the Brand lance is from $3 to $5 each; the sizes are determined by numbers varying from one to four, inclusive. The charge for the smallest size is 1 ounce and 5 drams of powder. The Cunningham lance is 17 inches long and sells at retail for $3. Two ounces of powder constitute a charge for the magazine or bomb, and 3 drams for a cartridge. The Pierce bomb is 19 inches long, and the charge 2 ounces and 4 drams of powder.

All of the bomb-lances are cylindro-conoidal in shape, and the mechanism for exploding the magazines is always concealed. The powder is fired by a fuse ignited by concussive force or by the flash of the gun when discharged. Explosive lances, called "darting-bombs," without wings are used in connection with the darting-gun. They are 14 or 16 inches long, and made of brass tubing or malleable cast-iron piping.

5. THE METHODS OF CAPTURE; ACCIDENTS.

RAISING WHALES.*—When cruising for whales, watches, consisting of the mates, boat-steerers, and foremast hands, are stationed at the lookouts, standing upon the cross-trees and supporting themselves by iron hoops and the rigging at the main top if rugged weather, and at the mainroyal or maintop-gallant if smooth weather. The men "stand their mast-heads from sun to sun," being relieved every two hours. In the southern fishery they stand usually on the horns, the projecting ends of the cross-trees, and sometimes on small planks which are placed across the projecting ends; but in the Arctic regions they stand in a "crow's-nest" made of canvas, painted so

* The whalemen are "quaint compounders of expressions," and as these expressions are singularly pertinent and remarkable for their terseness, I propose to employ them as head-lines for the different subjects in this part of my report. The idioms peculiar to whalemen are as legitimate perhaps as the provincial or national idioms, and justice could not be done the subject if they were omitted.

as to exclude the chilling blasts. In the latter fishery such a receptacle accommodates comfortably about three men—an officer, a boat-steerer, and a foremast hand; and when the captain desires to go aloft, the latter goes out in the rigging during the interview, or, if very cold and the consultation prolonged, he goes below. In this fishery the inconveniences of standing mast-head are vastly augmented by the extreme cold, and in the southern fishery by the rays of a tropical sun.

When whales are raised from the mast-head the species may be determined by their apparently sportive actions as well as by their spouts. In the latter case they are of course easily recognized, as the cachalot has one spiracle and the others two.*

The sperm whalemen sometimes cruise for months in succession without seeing whales, consequently there is great rejoicing, more especially if the vessel has been a long time from home with a "clean hold," or if there have been unusually long intervals "between catches," when an individual makes its "rising" within the range of vision, and by the vaporous column ejected from time to time indicates its whereabouts to the men on watch. The expressions employed by the men on the lookouts to notify the crew that whales are near have apparently changed with the times. Hector St. John, describing the methods of whaling adopted by the "first proprietors of Nantucket," says that, "as soon as they arrive in those latitudes where they expect to meet with whales, a man is sent up to the mast-head; if he sees one he immediately cries out 'Awaite Pawana!'† They all remain still and silent until he repeats 'Pawana' (a whale), when in less than six minutes the two boats are launched, filled with every implement necessary for the attack."

Capt. N. E. Atwood, of Provincetown, tells me that the cry used by some of the old Cape Cod whalemen from the mast-head to notify the crew was "Towno!" and Captain Davis‡ makes use of this cry in a sense signifying help. His statement is corroborated by the old whalemen of New Bedford, who tell me that it was the custom when they encountered a larger turtle on the Gallapagos Islands than they could manage, they invoke the assistance of the crew by shouting "Towno! Towno!" This term is also mentioned by Bennett, who, speaking of the English south seamen, says: "It was formerly the custom in this fishery to announce the spouting of a whale by the cry of 'Town, oh,' which, although not very clear in its derivation or meaning, is yet employed by some amongst the crew of a whale-ship, when seeking turtle, &c., on shore, to announce the view of a prize, and establish an individual claim to the discovery."§

Frederick Marten says, in his journal of a voyage to Spitzbergen in 1671, that when the Dutch whalemen saw whales, "or when they heard them blow or spout, they call in to the ship 'Fall! Fall!'

* The nostrils of the sperm whale are on the left side of the cranium, and coalesce in one passage, which communicates with an external fissure near the front and upper extremity of the head, which portion is known to whalemen as the "noddle end." Through this orifice the animal ejects the column of expired air from its lungs. The "spout" may at times, as the animal makes its rising, when the spiracle is submerged by the waves of a rough sea, be composed of or mingled with surface water, which is elevated by the column of breath as it escapes upward; otherwise the "spout" is merely a condensation of warm air from the lungs as it comes in contact with the colder air of the atmosphere.

The right whale has two "blow-holes" at the summit of the large protuberance on the back of the head, familiarly known as the "crown;" and the vaporous emissions, which are thrown up vertically, part at the top and fall on either side. The bifurcate appearance of the column has given origin to the name "forked spout," applied to this species by the Nantucket whalemen. It is all the more apparent as the whale approaches—provided you take time to investigate the matter—or recedes from you, in a direct line. The finback whale also has two spiracles; but as the columns unite near the base, it has, at a distance, the appearance of one spout. But to the experienced eye the spout of this whale can never be confused with that of the sperm whale; the former ascends at almost right angles with the horizon, and the latter is thrown forward at an angle of about 45 degrees, or, as the whalemen say, about a "four-point course."

† Which is probably a "Nattick" expression, signifying "Here is a whale."—(J. T. B.)

‡ Nimrod of the Sea, p. 104.

§ Whaling Voyage Around the Globe, 1840, vol. ii, p. 202.

then everybody must be ready to get into the long boat that he doth belong to." Scoresby says it was customary with the English fishermen when a whale was sighted to call out "A fish! A fish! or a fish mine!" and when it was harpooned a small flag or jack was displayed in the fast boat. When the men on watch on the ship perceived this signal, they immediately shouted "A fall! A fall!" and at the same time stamping on the deck to give the alarm to the sleeping crew below.*

The present well-known cry of "There she blows!" has long been employed by American whalemen, the feminine being used as the epicene gender of whales. The direction of the whale from the ship is then indicated by the men on duty. If the cetacean, instead of pursuing the even tenor of its way, should happen to be indulging in some of its queer antics, these are also reported.

LOWERING FOR WHALES.—The New Bedford captains rarely lower for whales, especially in the Arctic fishery, as they prefer to remain on board to look out for the ice, which momentarily threatens their vessels, and to direct the movements of the boats by means of signals, previously agreed upon, made usually with the light sails. The code of signals is entirely arbitrary, and varies, of course, on different ships, as it would not be policy for a master of one vessel to make known his orders to the commander of another.† Lowering the gaff-topsail or spanker on one vessel may, therefore, mean that whales are "astern," and that the officers of the boats should proceed in that direction to intercept them; but the same signal displayed by another vessel may have an

*At this alarm the crew jump from their beds, rush upon deck, with their clothes tied by a string in their hands, and crowd into their boats, with a temperature of zero. The crew, under such occasions, are shielded only by their drawers, stockings, and shirts, or other habiliments in which they sleep. They generally contrive to dress themselves, in part at least, as the boats are lowered down; but sometimes they push off in the state in which they rise from their beds, row away towards the fast boat, and have no opportunity to clothe themselves for a length of time afterwards. The alarm of a "Fall" has a singular effect on the feelings of a sleeping person, unaccustomed to the whale-fishing business. It has often been mistaken as a cry of distress. A landsman in a Hull ship, seeing the crew, on an occasion of a "fall," rush upon deck, with their clothes in their hands, when there was no appearance of danger, thought the men were all mad; but with another individual the effect was totally different. Alarmed with the extraordinary noise, and still more so, when he reached the deck, with the appearance of all the crew seated in the boats in their shirts, he imagined the ship was sinking. He therefore endeavored to get into a boat himself, but every one of them being fully manned he was always repulsed. After several fruitless endeavors to gain a place among his comrades he cried out, with feelings of evident alarm, "What shall I do? Will none of you take me in?"—*American Natural History. Godman. vol. iii, p.* 166. *Compiled from Arctic Regions, vol. ii.*

†CODE OF SIGNALS.—It is the custom of the captain of every first-class whale ship to employ a code of signals for the guidance of the boats' crews when lowered for whales. The signals vary on the different ships, or, in other words, there are as many codes as there are ships. In many cases they are entirely arbitrary, as it is only intended that they should be understood by the crews belonging to the vessel that uses them; but whatever code may be agreed upon, the more simple and comprehensive it is the better, as complicated signals are apt to mislead or bewilder the officers. It is the prerogative of the master of the vessel to determine what signals shall be employed, and after the code has been perfected he explains its significance to the boat-headers. Some masters employ the ship's sails, while others use balls or flags, or a combination of all may be utilized. There are published accounts of the signals employed by the English as well as American whaling vessels. Capt. G. B. Borden, of New Bedford, who at present is engaged in whaling, has furnished the following system for this report: "A very common code consists of the red, white, and blue colors—one flag each of these colors, and a fourth of the three combined. These four flags represent the four boats, the starboard, port, waist, and bow boats. These are the same kind of flags used in the boats, and when so used they are called waifs (duplicates). The four flags also represent the four important bearings from the ship. Red for starboard quarter (corresponding to the positions of boats on the cranes); white for port quarter; blue for waist or beam; and red, white, and blue for bow. By using the flags separately and by combining them the boats can be directed very easily in any direction. Every vessel uses a flag called the whaling signal. It is an attention signal. It may be of any color, and when set at either fore or main mast head it indicates that the whales are up. At mizzen peak it calls the boats on board. If the whales are not seen by the boats when the attention flag is set, their bearings are pointed out by the code thus: If on starboard beam the red and blue—red first, or blue under red. For port beam white and blue, and so on through a combination of colors and a series of positions of flags.

"By the use of the flags or waifs in the boats they can be identified when fast to a whale or need assistance, and by their use on board a master can call any particular boat to assist another, and can also direct its movements to a desired point. By the use of the four flags separately and combined at different mast-heads an excellent code may be established; but often in calm weather, or when the boats are a long way from the ship, the signals or flags cannot be distinguished. It then becomes necessary to adopt other means of signaling. The light sails answer this purpose

entirely different meaning. The master arranges the system of signals and explains its significance to the boat-headers. Some of the Provincetown masters lower with the boats, especially when an "ugly" whale or a large school is attacked, and some prefer to take an active part in the capture. On large vessels it is to the interest of all concerned that the commander should remain on board; for when he lowers, the office of "ship keeper" devolves usually upon the cooper, and, as might be expected, the officers, when detached from the vessel, prefer to rely upon the judgment of the commander. The master can also take upon himself more responsibility than the cooper, or any other subordinate would dare or care to assume. Great skill and experience is required at times in directing the movements of the boats, and such tactics may be compared, on a smaller scale it is true, to handling a body of men in attacking a wily enemy. The captain, by staying aloft with the marine glass, has better opportunities than the men in the boats for ascertaining the positions of the whales and for observing their movements; and he can telegraph his orders by means of sails or flags to the boat-headers, and direct the movements of the vessel *viva voce* of the men below.

The men at the first alarm come swarming up the companion-way of the forecastle. In the extreme southern fishery they divest themselves of superfluous articles of clothing and scatter them indiscriminately about the deck; rolling up their trousers and girding their loins with their leather belts, taking a double reef until supper time, they hold themselves in readiness to go over the side of the vessel at the word of command. There is a certain order, or systematic action, observed on all first-class whaling vessels, however imperfectly disciplined some of the boats' crews may be. The captain indicates the boats he wishes to attack the whales; the boat-header and the boat-steerer take their proper positions in the boat—the former at the stern and the latter at the head—while suspended from the davits. At the proper moment the davit-tackles are run out by men on deck, and the boats drop with a lively splash. The sprightly oarsmen meantime leap the ship's rail, and swinging themselves down the side of the vessel, partly assisted by the chains or channels, and jump into the boats just about the time the latter strike the water. Although it may be said there is a general scramble, there is not the least confusion; every person and thing has the proper place assigned to it in a whale-boat.

Going on to a Whale.—When squarely in the water the sail may be set, or the men spring lively to their oars. If they approach a whale during a calm, oars are thrown aside and the boat propelled with paddles. As soon as the boat leaves the ship the order is to line the oars. It is important that this should be attended to before the whale is harpooned or a capsized boat may be the result. The whale-line is passed forward and arranged in such a manner* that it may be taken out by the whale without fouling.

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very well. We will suppose a vessel to be under top-gallant sails (the royals are seldom, if ever, used on a cruising-ground), and nearly or quite calm; the boats down after whales which may come up ahead of the ship, a long distance from and not in sight of the boats; the flying-jib being hauled down, signals for ahead, and the boats then proceed in this direction. If the whales are going quickly, the flying-jib should be run up and down rapidly for the boats to go faster. Gaff-topsail or spanker down, whales astern. Should the whales come up on the weather bow, say four points, the weather clew of foretop-gallant sail goes up; on weather-beam, maintop-gallant sail; weather quarter, say four points, mizzentop-gallant sail, or if the vessel is a bark, the gaff-topsail, in connection with weather clew of main-top-gallant sail. Either of the gallant-sails lowered on the cap is a signal for the boats to heave to—gone far enough; and so on, by working the light sails, separately and conjointly, a very comprehensive code may be established.

"In right whaling a pointer in connection with the whaling-signal is often used. The pointer is a large basket or frame of wood covered with canvas and painted black, placed at the end of a 12-foot pole, used at mast-head and pointed in the direction of the whale. This does not answer the requirements of sperm whaling. The sperm whales are very timid, and we cannot approach near enough with the ship to make the pointer understood without danger of galleying them.

"I have also seen large balls (canvas-covered baskets painted black) worked on the fore and aft stays for signals, but can give but little information regarding them."

* The top end of the line in the large tub is led forward, and about 3 or 4 fathoms coiled in the box of the boat. This is a box-warp. The bight of the line is carried aft and thrown over the loggerhead. The line runs fore and aft

The officer, or boat-header, is at this time in the stern sheets manipulating the steering oar, or, as the term implies, he "heads the boat," or lays the harpooner on the whale. He has standing room only, being the only one for whom a thwart has not been provided. His duties are, among others, to so shape the course of the boat as to get within "darting distance" without "gallying" the whale. As the sail oftentimes obstructs the view of the officer, preventing him from seeing the whale, he must rely upon the harpooner for instructions to steer the boat.

The boat-steerer is at the head of the boat attending to his duties as oarsman. When the proper moment arrives he springs to his feet, sometimes at the word of command from the boat-header, and, with his harpoon well in hand, darts it into the whale. When the animal has been fastened to "good and solid" the harpooner and officer immediately change places. The former attends to steering the boat, while the latter proceeds to kill the whale with the hand-lance, if such an instrument is used. If the whale is to be towed to the vessel, the header and harpooner again shift ends, the former taking the steering oar; but when the ship goes to the whale, they remain in the positions they occupied when the lancing was done, and the header passes the tow-line to the ship. In traversing the distance between the ship and the whale, the boats may move in single file or *en échelon*, with a total disregard, however, to the order of these evolutions, since it is not intended that such tactics should be employed. As may naturally be inferred, there is, even among the boat's crews that belong to the same ship, sharp competition in getting fast to whales. Many whales are lost in this way. This is called by the New Bedford whalemen "whaling for victory," or "victorious whaling," and is merely the result of the desire of certain officers to kill whales themselves or prevent others from doing so. This utter disregard, which some of the boat-headers seem to have had in olden times, for the success of the voyage may be attributed to that desire on the part of many men, in all stations of life, to be the leading spirits in certain exploits or movements, without regard to their own ability or the consequences. As an illustration of this kind of whaling, I shall merely say that when the three port boats are lowered, they usually proceed systematically and cautiously to the windward of the whales, with favorable chances of success; but when the starboard boat is ordered down, if its officer, a "victorious whaleman," instead of following the same course taken by the other three and coming in behind, takes a shorter course for the whales, he invariably gallies them. The result will be, in a majority of cases, that none of the boats will get fast. This practice, though universally condemned, is oftentimes resorted to, and can only be broken up by the strictest discipline. As Capt. W. H. Seabury remarked, in conversation with the writer on this subject, "the first duty that an officer of a whale-boat should be taught is that he is on a voyage for oil and not for whales."

Notwithstanding there is, more or less, a spirit of rivalry among the boat's crews, and a sharp competition among the captains of the vessels, it is oftentimes imperative as a mutual protective policy that harmonious action should be paramount to all others. When down for whales the boats belonging to the same vessel are obliged to assist one another. Sometimes two or more crews belonging to different vessels unite in the capture, and if successful an equitable division of the oil is afterwards made. This is called "mating." Two vessels may be gamming* when whales are raised, and in order to render the capture certain, and for the purpose of working together harmoniously and effectively, the vessels generally mate. "If there has been no previous

of the boat over the oars. This is done after the oarsmen have taken their seats. The extreme end of the line is first carried through the chocks, then brought inboard and bent into the eye-splice of the rope strap of the first harpoon.

*Exchanging visits, getting the latest news, or probably letters from home, and otherwise extending the courtesies befitting the occasion when two whalers meet on the broad ocean and "speak" each other.

agreement to meet the exigency, a flag is hoisted at the peak of the captain's ship [upon which they are gamming], which familiar sign, especially on sperm-whale ground, is readily understood, and when the boats are lowered for the chase, the visiting captain takes charge of the mate's boat of the ship he is on board, and the executive officer visiting heads the captain's boat."

When two boats belonging to different ships which are not mated approach the same whale the officer who desires to enter into a copartnership with the other sets a waif in his boat. This signal is readily understood, and if answered by the officer of the other boat it signifies that the terms of agreement are ratified, and the whale if captured shall be divided equally between the vessels.

Two vessels belonging to different nations also sometimes mate. The American and English vessels cruising on the same ground at times, perceiving that it would be to their interest to jointly capture a whale, enter into friendly relations and divide the proceeds.

In dismissing this subject I should perhaps say that usually the same spirit of acquisition, and the same competition and sharp dealing that characterizes men on land, is also characteristic of whalemen afloat. He who can get a whale without exceeding those bounds which hedge us in all branches of life's industries, usually accomplishes his ends with but little compunction of conscience as to the means; otherwise, under ordinary circumstances, he would at times fare badly during a cruise.

The swiftest boats, or those lowered under the most favorable circumstances, do not always plant the first iron or kill the greatest number of whales. It may be that a boat's crew consists of an expert officer and harpooner, but the oarsmen, or the majority of them, may be green. Under these conditions, more especially if they must rely upon the oars as a motive power, the boat may be behind the others in reaching a school; but from the experience of the boat-steerer and officer, they may strike and kill more whales than when the crew is composed entirely of veteran whalemen, who may so manage their boat as to be the first to attack the school; yet their harpooner may either be gallied or miss his chances, and probably not strike as many whales as the slow boat. As a rule, however, the fastest boats kill the most whales. The boats from one ship may attack a lone whale, which, peaking its flukes, may reappear on the surface closer to one boat than the other; or they may strike a pod of whales, and the several boats may attack as many whales, and the results will very materially depend upon the actions of the cetaceans and the skill and good fortune of the harpooners.

Having overtaken or intercepted a herd of whales, the manner of "going on to them," which signifies the act of approaching and harpooning them, is so varied as to preclude a system of rules. The elements of success, however, in performing this feat are introduced in the stereotyped rule of the whalemen, "Never gally your whale." Attention to the practice of the most skillful whalemen, joined with his own experience, must be the guides of the officer who directs the movements of his boat. Much depends upon circumstances, the kind of whale attacked, and many other considerations, which, arising on the spur of the moment, must be taken in hand and carried out by the officer as opportunities are offered. The training and courage of the crew is also a question of no little importance; for, with some green hands, the first impulse, when the boat-steerer is about to dart the iron, is to jump from the boat to the water. Some whalemen prefer to sail over a right whale, striking it about midships, and throwing the toggle-iron when they are "wood and blackskin," that is, when the boat and whale are in contact, or nearly so, at which moment the cetacean immediately "settles," with a marvelous rapidity, thus affording an opportunity for the boat to sail over without injury to itself or crew. Some whalemen also approach the right whale 'quartering," on the starboard side, to give the boat-steerer a right-handed dart; this latter is

always a desirable point to be gained; for, on the contrary, the harpooner will have a left-handed thrust over the second iron, which, even with a left handed man, would be an awkward movement. An officer of a boat never follows the wake of a right whale, for the moment the boat strikes the "suds"* it is maintained that the whale is immediately made acquainted with the fact through some unknown agency, and will be gallied, without fail, and soon widen the distance between itself and the crew.

So far as I can glean reliable facts from intelligent whalemen, I am of the opinion that the majority of whales do not willfully or maliciously attack the boats, and that most of the accidents now on record are due chiefly to the violent convulsions of the whales in their eagerness to make their escape rather than to their ferocity or pugnacity. A whale may be quietly and peaceably making its passage, it may be asleep, or it may be feeding or perhaps cruising over its ground, when suddenly it is arrested by a harpoon buried several feet in its flesh. There may be times, when thus suddenly aroused and smarting under or angered by their wounds, if a sperm whale, it has rushed headlong upon the boat and demolished it instantaneously. Usually the whale is terrified beyond measure by this unexpected thrust, and its first impulse is to get out of the way immediately by burying itself in the depths of the ocean, or to escape by running. The moment a whale is struck a violent thrashing of the flukes ensues, and they are just as apt to cut down a boat as not, should it be in the way, and, of course, the work of destruction would be as complete as if the whale had premeditated the attack. Several whales of this species, however, have not only attacked the small boats but have gone "head on" to vessels and disabled them, and Capt. Isaiah West tells me he has had them to chase him "like a dog" in the whale-boat. The remarkable loss of the Essex will ever be fresh in the memory of the whalemen of all nations, as evincing the terrible anger and revenge of the mighty cachalot.

While in New Bedford I met Capt. Martin Malloy, who was the master of the bark Osceola 3d when she was attacked by an angry sperm whale after it had demolished three boats. Captain Malloy tells me that this occurred to the west-northwest of Cape Verde Islands, latitude, 190 degrees north, longitude 28 degrees, December 16, 1866. A large bull sperm whale was raised; the waist boat and the starboard boat struck it and were "stove." The mate picked up the crews of the two "cracked" boats and took them to the ship. The whale in the mean time continued to fight the portions of the boat and the boat gear, angrily seizing pieces of wood and other articles and breaking them to pieces with his jaws. Captain Malloy did not think it prudent to attack the whale in the small boats, and went on it with the ship. When within 300 feet of the whale it turned on one side and made for the ship, with its mouth wide open, as is the habit of the species in making an attack. The whale struck the vessel on the bluff of the port bow, knocking off the the cut-water. The ship trembled from stem to stern, and so great was the concussion that many articles on board, such as crockery and glassware and other small utensils, were dislodged from the places where they are usually kept. As the whale crossed the bow two hand-lances and a bomb-lance were thrown into it. The vessel made for the whale the second time, but it kept off. All this time the two tow-lines and a portion of one of the stove boats were fastened to the whale, the lines being entwined about its body. Captain Malloy, with a picked crew, finally approached the whale and killed it after a desperate fight of twelve hours. The whale stowed down 115 barrels

* Another peculiarity of the whale is the "glip." When the sperm whale is alarmed or on the alert against pursuit, on going down for a run beneath the surface it emits a portion of oil, or its equivalent, which, for a considerable period of time, causes a smooth, bright surface on the water. This is termed the glip or wake. The mystery of the glip is in a real or supposed communication between this smooth spot and the whale occasioning it. Should the boat-header incautiously pull his boat into this glip, or cross the line between the retreating whale and his glip, the effect will be to gallic the animal.—Capt. WILLIAM M. DAVIS, Nimrod of the Sea, p. 181. This is maintained and substantiated by whalemen generally.—(J. T. B.)

of oil. The jaw measured in a straight line from extreme forward end to socket 19 feet and 2 inches, and the flukes 16 feet 4 inches from point to point. Captain Malloy also tells me that when cut in, the bones of the head of the whale were fractured from the concussion of the severe blow, which evidently disabled the animal and probably saved the ship.

It sometimes occurs that the boats are lowered and the crew eagerly engage in the chase, but without success. The whales may perhaps disappear altogether from view, or it may be necessary to "cut line"* and abandon a whale at the approach of night after a long and fierce struggle. The chase may be postponed on account of fog or rough weather, or a harpoon may "draw" and the animal escapes for that time at least. Trouble may also arise from entanglement of the line (foul-line) as it runs from the boat; the whale may be extremely vicious or "ugly," or it may escape by running under ice. Again, the whale may be lost by what is known as "opposition whaling," when the crews of the small boats belonging to the same vessel infringe upon the rights of others in going on to a whale, to which we have already referred.

GETTING FAST.—The "fast boat," in the whaleman's dictionary, signifies the boat actually engaged in the capture, fast to the whale by means of the harpoon and line. A loose boat, on the other hand, is, as the term implies, one that has not succeeded in striking a whale. The duty of a loose boat, if near by and not certain of a capture, is to keep within hailing distance of the fast boat. Still there is no rule laid down for such a procedure. Two boats may fasten to the same whale, unless it sounds. If one boat is fast and the whale goes below, the second boat usually lays by. It is sometimes the custom, when a vessel carries four boats, for three of them to get fast to as many whales as possible, and for the fourth to "play loose boat." When a whale takes out all of the 300 fathoms of line carried in one boat, it would escape if assistance were not rendered on the spot. The "fast boat" is therefore made "loose," and the loose boat fast. The latter comes to the rescue either by call or signal, provided it has not been taken in tow by the fast boat, which is sometimes done. When it is necessary for the loose boat to assist, the officer in charge casts one end of his line to the officer of the fast boat. The latter bends the line to his own with a rolling hitch over the head of the boat. When the line of the fast boat is almost out—about 1 "fake" or so remaining in the tub—the officer tightens his hitch and lets it go. Often the hitch slips to the end of the line where it is brought up by the eye-splice, and the line of the fast boat is thus attached to the line of the loose boat while the whale is running. This process may be repeated as long as more line is wanted by the addition of more boats. A fast boat may also become loose by accident, the iron may draw or break, the line may part, or, on account of ice, or in very rough weather, or at the approach of night, it may be necessary to "cut line."

The actions of whales, when attacked, vary with both the species and the individuals. Superficial wounds annoy them and internal ones destroy them. Suffering from the blow of the harpoon, they endeavor to escape the hand that inflicts it, or to rid themselves of the instrument that irritates and tortures the flesh. To accomplish their ends they can resort only to the most violent physical exertions and contortions. At such a time, and subsequently, as the boat approaches to afford the officer an opportunity to use the hand-lance, the imminent danger of one's life is oftentimes unparalleled; but the danger diminishes when the lance penetrates the sensitive lungs or convoluted intestines, for the unhappy creature then weakens, and becomes quiet under the soothing influence of departing life.

As a means of defense, the right whale depends solely upon its flukes, which measure from 12 to 15, and sometimes 20 feet, in expansion, and in depth 5 or 6 feet, and weigh several tons.

* When the whale is about to take the end of the line the drag is bent on, forward of the chocks with a rolling hitch, with the expectation that when the trouble is over the whale may be found.

This immense creature uses its caudal fin with remarkable dexterity, and often with the most frightful results. The northwest coast whale, or the Pacific right whale (*Balæna japonica*), is the most dangerous of the bone-bearing whales to encounter. When attacked, or surrounded by obnoxious objects, it performs an evolution with its flukes commonly called sweeping, that is, swinging them from side to side, and indeed, when greatly incensed, it "sweeps from eye to eye," churning the water into mountains of foam, and demolishing everything in range. Although the whalemen anticipate this defensive and offensive maneuver, they oftentimes permit their passionate ardor in the capture to exceed the bounds of prudence, and as a penalty sometimes lose the whale, boat, apparatus of capture, and even their own lives.

The sperm whale, on the other hand, is, as the whalemen express it, "dangerous at both ends." Although it does not sweep with its flukes, as the right whale does, it gives them up and down motions, bringing the broad surface with tremendous force and startling effect upon the water; yet the caudal member should not be disregarded. If disposed to show fight, it relies mainly upon its long, slender, treacherous lower jaw, studded with glistening teeth, and to this dangerous habit, sometimes called "jawing back," may be attributed the death of many whalemen and the demolition of many boats. Owing to the position of its eyes, it commands a wide oblique vision, and consequently guards against premeditated attacks on both sides, but while it may congratulate itself upon so wise a provision on the part of nature, it seems oblivious to the fact that for the same reason—the peculiar position of its eyes—it cannot perceive an object immediately in front or behind. To this oversight of nature, the sperm whale may attribute its defeat and destruction, and the sperm whaleman his success and profit. The favorite method of capture is to "take it head and head," or to "go on the flukes." In either case, it is better to keep the "hump," a functionless adipose dorsal fin, and the spout in a line of vision; for in so doing the boat cannot deviate far enough from its course to "get on the eye" of the whale. Going on head and head is therefore considered a better plan and is always carried out when practicable. As the boat and whale are moving in opposite directions, they come together more rapidly than when the crews follow the flukes. A few moments are of the utmost importance to a man about to strike a whale. Though large, this animal is exceedingly quick in its movements when alarmed. Suddenly the whale may change its position from a horizontal to almost a perpendicular one, and disappear beneath the surface; it may "settle" away like a corresponding mass of lead, disappearing rapidly from view, or with a dexterous movement of the flukes it may strike and demolish the boat. Many sperm whales are lost when the boat "goes on their heads," because the harpooner darts the iron prematurely, and striking the impenetrable headskin, known as "white horse," bends his harpoon. This happens, however, usually when an inexperienced or "gallied" boat-steerer throws the iron and loses his whale because he did not wait for the orders of his officer. An expert harpooner, on the other hand, need not be told when to dart, as he "chooses his chance" and buries his harpoon abaft the head as the boat is laid off. In following the flukes, the rule is, of course, first to overtake the whale. Having accomplished this, the boat is laid off, say to the starboard, to give the harpooner a right-handed dart, and ranged alongside the whale. When far enough forward, and about 1 or 2 fathoms, or possibly 3 or 4, from the whale, and moving in a line parallel with it, the boat-steerer has an excellent opportunity for darting the harpoon into the back, or "bilge," and the chances of "drawing" will be lessened if the iron gets fast to one of the costal bones. It was the old custom with some of the whalemen to carry a small air-tight oil cask in the boat. When they perceived that a sperm whale, usually an old patriarch, was disposed to show fight, the cask was thrown overboard, and the ferocious animal immediately proceeded to attack it. From its buoyancy and the facility with which it revolved on its axis in the water, the cask became

at once an object of interest and annoyance to the whale, which was too much engaged with this little nuisance to notice the boat as it stealthily approached. Some sperm whales, when mortally wounded, more especially after eating heartily, are seized with a violent vomiting, and eject from their capacious stomachs immense "slabs" of the *Octopus*, upon which this species largely feeds.

If the whale is swimming "top-water," the harpooner has a better target to dart at; but if swimming under the "rim of the water," or about to sound, he must make the best use of his time and opportunities and exercise his discretion. Again, the whale may be "scooping" or feeding—a more horrible sight has never been witnessed ashore or afloat than a large right whale with contracted upper lips, exposing the long layers of baleen, taking in his food—and while thus engaged at times pays little attention to surrounding objects, and may be struck with comparatively little trouble. And yet again, the whale when approached may "turn flukes" and sound; but the men know by experience about the location where it may make its "rising," which it is compelled to do for inhalation. It may reappear suddenly under the boat and smash or upset it, or it may come up within a short distance from the men, in which case the boat is layed on and the boat-steerer strikes him "wood and blackskin." Or, as is the case very often in right whaling, the boat may sail over the whale broadside, striking it about 'midships at the very time the harpoon is thrown. As before remarked, the right whale has the power to "settle" like a lump of lead when an offensive object comes in contact with it, and the boat sails over without injury. Whales may also be approached "quartering," the harpoon being thrown as the boat crosses the angle of the flukes. All these conditions more or less influence the distance the harpoon is thrown, which is commonly known as "darting distance." In many cases some of the "long-dart men" have thrown their harpoons effectively as far as 4 or 5 fathoms. There is one case on record in which a remarkable dart is mentioned. Two boats belonging to different ships, American and English, were chasing the same whale, when one harpooner threw his iron over the crew of the other boat and "fastened on to" his whale. The distance the harpoon may be darted, though varying, as a rule, from close contiguity to 16 or 18 feet, depends mainly upon the actions of the whales and the most favorable opportunities offered by them for burying the iron deep enough to take effect without "drawing" when the tension is brought to bear upon the line by the actions of the cetaceans as they either sound or run. The boat-steerer "chooses his chances," and, by the way, if he "misses his chances" several times, that is, fails to strike two or three whales in succession, under favorable conditions, the captain deprives him of his office, and he may or may not have another "chance" on that ship. This is what may be termed "hard luck;" but the success of the voyage depends in a great measure upon the skill and ability of the boat-steerers.

Stopping a running right whale with the boat-spade is at once the most dangerous and thrilling feat ever executed in the varied career of the whaleman; but this method of capture has been superseded by the bomb-lance. The old whalemen never tire of telling us, as their eyes sparkle with the fire of youthful daring, how they "fought under the flukes of the whale." A whale when about to "sound," that is, to descend into the water, must first get a purchase with its broad, flat tail and then throw it high in the air, in order to dive head first; the officer of the boat, taking advantage of this evolution, known as "turning flukes," would thrust the sharp-edged spade into the "small," in which are inclosed the tendons that connect the body and the flukes, and having severed some of them, the tail became useless, like the disabled screw of a propeller; progressive motion was arrested, and the whale became a comparatively easy prey to its captors. Some of the whalemen were very skillful in this feat, even when the whale was swimming, or "running," on the water, and it required powerful arms and courageous hearts to crown their efforts with success. There is one case on record that has come under my observation, where an

officer actually unjointed the flukes by a tremendous and well-directed blow of the spade. The whale was in a favorable position, the uplifted flukes producing a tension, and the caudal fin, though still connected, "hung to one side."* Spading flukes is one of the lost arts of the fishery, and may never again be revived, but will live with the whalemen from generation to generation. We should naturally think that it would be far preferable to stand off at a safe distance and kill the huge floundering cetacean with an explosive lance projected from a gun, rather than to approach it while it is lashing the water in its terrible agony, and kill it in close encounter with the hand-lance. Not so with the broad-chested, white-headed whalemen of the old school, who regard the modern gun as a travesty upon their forefathers; yet they always acknowledge that if it were not for the bomb-guns few whales could be taken at present in any ocean.

When the whale has been harpooned, the first order given is "Stern all!" to clear the boat from the whale, and the next is "Wet line!" to prevent the friction from the outrunning line. The officer and boat-steerer quickly "shift ends," the latter taking down the sail as he goes aft.

As soon as the whale is struck with the harpoon it will endeavor to escape either by sounding or by running, or, as Marten says, "it runs away with the long boat as swift as the wind." If the whale sounds, the crew lay by awaiting its reappearance upon the surface for respiration, and as fast as the slack-line is retrieved it is laid in loose coils on the after platform. Although the line is not coiled as carefully the second time as it was in the first place, considerable care must be taken, for should the whale again take it out it should run as freely as before.

When the whale returns to the surface from its soundings it usually comes up with a bound, and it is at such a time that accidents should be avoided. To warn the boat's crew of approaching danger the whale-line is sometimes marked with a bit of colored cloth or flannel, which, as the line is hauled in, signifies look out for whale when it appears above the water. If the whale runs, the boat, of course, is taken in tow, and the excitement of the chase is prolonged until the animal is tired out, or stopped by means of the boat-spade or bomb-lance.

RATE OF SPEED.—As to the running speed of a whale when first harpooned, I can only say that it has not been accurately determined. Few of the whalemen can be induced to give an opinion on a subject upon which they all widely differ, and those who give an opinion are not willing to be held responsible for it. Bennett† says of the sperm whale that when first pierced by the harpoon it will tow the attached boat at the rate of more than 15 miles an hour; but this velocity of motion is the effect of extreme excitement and does not continue long. Under ordinary circumstances of alarm, as when conscious of being pursued by enemies, its speed averages about 8 or 10 miles an hour. Scoresby says that the Greenland whale swims with a velocity, at the greatest, "of 8 or 9 miles an hour."

Capt. William M. Davis publishes a statement, which I transcribe herewith, condensed from a series of questions submitted to some of the New Bedford captains. He says:

"The running speed of the sperm and right whales, when gallied, is supposed to be from 10 to 12 miles an hour. When struck he will frequently go 20 to 25 miles per hour for a short time, when he will generally stop or 'bring to,' and give the 'boat-header' a chance to kill him. Sperm whales have been known to run out 300 fathoms of line in four minutes, and sometimes to run out 600 fathoms in sounding."‡

Twenty or twenty-five miles per hour is rather a high estimate of the speed of a whale. When a whale first feels the prick of the harpoon it starts off with an almost astonishing velocity, and it may then run at the rate of 25 miles per hour, but most assuredly it could not actually make that distance in the time named.

* This is vouched for by several whalemen of Edgartown.

† BENNETT: Whaling Voyage Round the Globe, vol. 2, p. 172.

‡ Nimrod of the Sea, p. 398.

Very little attention also seems to have been given to the rate of speed when the whale sounds. Captain Scoresby, however, notices the latter as follows: "When fish have been struck by myself, I have on different occasions estimated their rate of descent. For the first 300 fathoms, the average velocity was usually after the rate of 10 miles per hour. In one instance the third line of 120 fathoms was run out in sixty-one seconds; that is, at the rate of $8\frac{1}{6}$ English miles, or $7\frac{1}{8}$ nautical miles, per hour."*

DIFFICULTIES OF CAPTURE.—At times one fast boat may kill a whale, and again, if the animal shows fight, two or three boats, and sometimes more, may be required. In one instance a vigorous whale took in tow from four to six boats, and ran out 1,600 fathoms (9,600 feet) of line. All endeavors to haul up and lance it proved abortive. The loose boats were moored to those that were fast, the whale all the time towing them steadily on. This occurred, writes Cheever, on May 28, 1817.†

Bennett, speaking of the remarkable endurance of a sperm whale during its capture, says:

"It occurred to Capt. T. Stavers, of the Tusean, to lose a large whale under circumstances that exemplified the power of the cachalot in carrying off incumbrances of this kind. The whale in question, at the time he escaped from the boat, had attached to his body seven harpoons, three entire boats' lines, (or 1,320 yards of cordage), a line-tub, and numerous drogues; and, with all these powerfully resisting bodies impeding his progress, ultimately escaped by superior speed. Two days after the same whale was encountered, and killed with difficulty, by the ship John Palmer, which, at a subsequent meeting in port, restored to the Tuscan her harpoons and lines found on the dead whale."‡

It is worthy of remark that as soon as a sperm whale is harpooned the news is telegraphed through some invisible agency to others of the same species, though at a great distance; a general stampede ensues, and with noses in the air they all rush to windward.§

The right whale of the northwest coast is extremely shy as well as dangerous, and from repeated attacks is approached with difficulty. This whale practices a *ruse de guerre* by hollowing its back, causing the blubber to become loose, or "slack," as it is termed, and preventing the harpoons from entering. Many a boat-steerer has been dismayed by this maneuver; and although the harpoon may have been thrown with all the force that could be summoned, the impetus was inadequate to penetrate the relaxed blubber and flesh.

As to the capture of the California gray whale, I am indebted to Scammon's account, which has been paraphrased from his "Marine Mammalia." This species is known to the whalemen as the devil fish, on account of the great danger attending its capture; the pursuit is called devil fishing, and the whaleman who engages in the capture a devil fisherman. It is one of the most dangerous whales to encounter. The fishery for the most part has been conducted in the shallow inland waters or lagoons on the California coast which this species frequents from November to May. The cows enter the lagoons to bring forth their young, and the bulls generally remain on the outside. The several ways of capturing these whales is known as "lagoon whaling," "kelp whaling," "whaling among the breakers," and "whaling out at sea," the first named being accompanied with the greatest danger. When struck at sea, an opportunity may be had for keeping

* *Op. cit.*, Vol. 2, p. 544. † The Whale and his Captors, p. 211. ‡ BENNETT: *Op. cit.*, pp. 207, 208.

§ Bennett, in writing on this subject, says: "It is a confirmed fact, and one often noticed with suprise by southern whales, that upon a cachalot being struck from a boat others many miles distant from the spot will almost instantaneously express by their actions an apparent consciousness of what has occurred, or at least of some untoward event, and either make off in alarm or come down to the assistance of their injured companion. But, without attributing to the cachalot an extraordinary acuteness of sight or hearing, or any more mysterious sensibility, we may, perhaps, find that the violent agitation of the sea produced by the plunges of the harpooned whale, and the more rapid and distinct conveyance of sound in water than in air, are sufficient to account for the above phenomenon."

the boat clear of the whale; but in the swift tide of the shallow and turbid waters in the narrow passages of the lagoons, the dangers are greatly augmented by the terrible lashings of the ponderous flukes, and scarcely a day passes in this fishery but there is a general upsetting and staving of boats, and occasionally the loss of a limb, severe cuts, and bruises. These whales have been attacked and escaped so repeatedly that they have become remarkably shy and wary, and the greatest strategy must be practiced by the whalemen to insure a capture. Some of them assume positions which leads their captors to believe that they are dead, or at least tractable; but upon the approach of the boat within shooting distance they are on the move again, and out of sight in a moment. When an officer of a boat discovers a whale he sets a waif in his boat and gives chase; the boats belonging to another vessel will not interfere, but go in pursuit of other whales.*

Many whales float along the rim of the water, their backs a little above the surface, while others swim "top water."

Accidents during the capture of the whale may be attributed primarily to the energetic actions of the huge cetaceans to get out of the way of their pursuers or hide themselves from them; secondarily, to carelessness or inexperience of the men, and to the vain desire of some officers of the boats to be the first to strike the whale, or to strike more whales than any one else—a practice known to the old New Bedford whalemen as "whaling for victory," which every commander should condemn; to unavoidable accidents which may occur with the utmost care, and, finally, to the disposition of "ugly" whales to attack and destroy the boats. Not that all whales are vicious or pugnacious—some are; but when these immense creatures endeavor to hide themselves in the depths below, they must get a "purchase" with their horizontal flukes to "round out" in order that they may go down head first, and when these enormous caudal attachments crash through a frail cedar boat containing six men, lives and limbs are in danger. It makes no difference whether the whale strikes a boat intentionally or accidentally, the effect is substantially and emphatically the same.

The capture of the whale, full of perils at all times, has been shorn of some of its dangers by the introduction of guns and bomb-lances. At least, it would seem so. Still, the record of accidents shows that the mishaps of the old style of fishing and those of the new are about evenly balanced. The dangers incident to "hamstringing" a whale with the boat-spade and killing it with the hand-lance may be offset by accidents resulting from the use of fire-arms.

MANNER OF USING SHOULDER-GUNS.—The distance from the whale at which it is customary to discharge the shoulder-gun depends upon the skill of the gunner and the position and actions of the "fish." The officer prefers to get as close to the whale as possible without gallying† it; not that the gun will not shoot accurately at a greater distance, but because the whale swims so low as to cause the bomb-lance to traverse a considerable distance through water. Capt. William M. Barnes tells me that in killing bowhead whales, the shoulder-gun should be fired at from 20 to 50 feet from the "fish," sometimes a greater distance; and also that a bomb fired at a distance of 100 feet would in most cases prove ineffectual. As a matter of choice the whalemen prefer to be as near the whale as 18 feet in order that the bomb may penetrate that part of the animal called the "life" (lungs), which is usually submerged; but there are instances on record where whales have been almost instantly killed with bomb-lances at a distance of 30 feet. Captain Scammon says‡ that the Brand gun does good execution within a range of 25 yards, and Messrs. Wright, Bowne & Co.,

* Marine Mammalia and American Whale Fishery, p. 25.

† This word "gallied" is in constant use among whalemen in the sense of frightened or confused. It is perhaps a corruption of the obsolete verb *gallow*, to be found in old writers. Thus Shakspeare has, in King Lear, "The wrathful skies gallow the deep wanderers of the dark."—W. H. MACY There She Blows, p. 72.

‡ Marine Mammalia and American Whale Fishery, p. 226.

of San Francisco, tell me that they use the Cunningham & Cogan shoulder-gun in killing bowhead whales, and that the bomb-lance may be fired effectively from 60 to 90 feet. The Pierce & Eggers gun is sighted for 20 yards, and will shoot accurately at that range, but I am told it is also effective at 40 yards.*

MATERNAL AFFECTION OF WHALES.—The implement known as the "drug," or "drag," is often used successfully during the capture. It may be fastened to a wounded adult by means of a harpoon, called a "drug-iron," to retard the progressive motion of the animal in order that it may more easily be killed; or it may be used advantageously when a school is attacked, by fastening it to a calf whale to attract the mother or other sympathizing cows. Such a process is called "drugging a whale." The harpooner never throws his "drug-iron" into the calf with the intention of killing it, for if the little "sucker" dies the females forsake it. If alive and struggling energetically in the water, the dam swims about it and endeavors to assist it in making its escape. It is very generally conceded that the same maternal devotion for the young that characterizes both the higher and lower orders of land animals is also shared by the marine mammalia, and the whalemen, taking advantage of this, oftentimes make captures that could not otherwise be effected. Paul Dudley says: "The care of their young is very remarkable; they not only carry them on their tails, and snekling them, but often rising with them for the benefit of the air; and however they are chased or wounded, yet as long as they have sense and perceive life in their young, they will never leave them, nor will they then strike with their tail, and if, in their running, the young one loses his hold and drops off the dam comes about, and passing underneath, takes it on again. And therefore care is taken by those who kill these mate fish (as they are called) only to fasten the calf, but not to kill her, till they have first secured the cow. For so soon as ever the calf is dead the cow perceives it, and grows so violent that there is no managing her."†

Captain Manby gives an interesting account‡ of the maternal affection shown by cow whales. He says:

"Nothing can surpass the tender attachment and maternal attention which a female whale will sometimes manifest if her young one be harpooned; she joins it at the surface whenever it has occasion to rise for respiration, encourages it to swim off, assists its flight by taking it under her fin, and seldom deserts it while life remains. She is then dangerous to approach, but affords frequent opportunities for attack. She loses all regard for her own safety in anxiety for the preservation of her young; dashes through the midst of her enemies; despises the dangers that threaten her; and even voluntarily remains with her offspring after various attacks on herself from the harpoons of the fishers. An extraordinary instance of this is related by Captain Scoresby: 'In June, 1811, one of my harpooners struck a sucker, with the hope of its leading to the capture of the mother. Presently she arose close to the fast boat, and, seizing the young one, dragged out of the boat about 100 fathoms of line with remarkable force and velocity; again she arose to the surface, darted furiously to and fro, frequently stopped short and suddenly changed her direction, and gave every possible indication of extreme agony. For a length of time she continued to act thus, although closely pursued by the boats; and, inspired with courage and resolution for the welfare of her offspring, seemed regardless of the dangers which surrounded herself. At length one of the boats approached so near that a harpoon was thrown at her; it

* With a load of 2¾ drams of powder the Pierce & Eggers gun discharged a Pierce bomb-lance three times into a solid pine block 11 inches square at a distance of 20 yards. Twice the lance penetrated the block 9 inches and once 9½ inches.—FRANK E. BROWN, New Bedford, Mass.

† Philos. Trans., vol. xxxiii, 1726, p. 261. Paul Dudley is in error when he says whales carry their young as he has mentioned.—J. T. B.

‡ Voyage to Greenland, 1822, pp. 33, 34.

struck, but did not attach itself; a second was thrown; this also failed; but a third was more effectual, and yet she did not attempt to escape, but allowed three other boats to approach, so that in a few minutes three more harpoons were fastened, and in the space of an hour afterwards she was killed.'"*

Captain Scammon,† referring to the manner of capturing the California gray whale, says it is rare that a dam will forsake her young; when first struck she momentarily forgets the calf in her endeavor to escape, but instantly she recovers her self-possession, will suddenly "bring to" and "sweep" around in search, and when the boat approaches her she sometimes demolishes it.

FINNING OUT.—The "flurry" is the whaleman's name for the dying actions of the cetacean, and "finning out" is the death. As the old style of killing the whale with the hand-lance was not only more dangerous but more exciting, I shall briefly refer to the manner in which it was accomplished. The whale being well harnessed to the boat by means of the tow-line, which is fastened to the flesh-embedded harpoon, it may either "turn flukes" and "sound," or, bellowing at times like a bull—with a great volume of voice, however—it may "run," as it is termed, taking the boat in tow at a rate, it has been estimated, all the way from 15 to 25 miles an hour, when it first starts off, but settling down to about 8 or 10 knots per hour when it gets warmed up to its work. This is the old "Nantucket sleigh ride." The whale having tired itself by running, the boat is hauled up by the line and the affrighted whale, startled anew by the close proximity of so strange a load, rushes through the surging and fast receding waters. The officer "gets a set" with his hand-lance and plunges about 5 or 6 feet of cold steel into the lungs of the victim, and persevering without ceasing in the up and down motions, familiarly known as "churning," as the boat persistently clings to the whale, until the "spout" of the unfortunate cetacean is tinged with the crimson of its own life-blood dyeing the waters in the vicinity; the muscles of the strong arms now relax upon the lance; the boat is laid off, and the dying whale swims round and round in an unbroken circle. This is the "flurry." Death is now merely a question of time. In intense agony the huge cetacean follows its circumscribed course, laboriously plowing its way through the bloody water, until the throes of death are about to convulse its enormous frame. The blood ejected through the spiracles now becomes as "thick as tar." It is not only believed by whalemen, but it is usually the case, that the whale during its dying moments so times its encircling path as to place the head to the sun; it makes a heavy lurch; the sea is lashed into a maelstrom of angry, bloody water, and the ponderous whale rolls heavily on its side, or partly on its back, with its dorsal fin projecting above the water. This is "finning out."

To use a paradoxical expression, some dead whales are not always dead. It may be in a comatose state but averse to vivisection; but as the men again approach it and cut holes through the lips to make the line fast, when the whale is to be towed to the vessel, a demolished boat or loss of life and limbs may be the result. Hence the more cautious whalemen "prick his eye," by inserting about a foot or so of the hand-lance into the eye-ball, and if the whale does not flinch it is supposed to be dead. A dead whale may be towed more easily head first, and it is also

* But Bennett, on the other hand, says (Whaling Voyage Round the Globe, 1840, p. 180): "I believe that we have seen the female purchase her own safety by the desertion of her young. On several occasions our boats destroyed a suckling calf, in the midst of a school, without sufficient interference on the part of the mother to lead to her being identified by the harpooner. In one instance, the boats, while pursuing a school, killed a calf with a single lance wound; the body of the little whale remained floating on the water, but none of the adults discontinued their flight. On another occasion we noticed a herd of females make off with great rapidity, and leave a small calf swimming in an anxious, bewildered manner in the vicinity of the ship; it continued thus deserted for some time, but was ultimately rejoined by the mother, when they both set off to overtake the main body of fugitives."

† Marine Mammalia and History of the American Whale Fishery.

worthy of mention that a dead whale, when cast adrift, will beat to windward, the natural motions of the flukes having a tendency to propel the body.

SUNK WHALES.—Since the whale is very nearly of the same specific gravity as the water of the ocean,* some individuals sink when dead, and others float heavily as if water-logged, the line of flotation being considerably above the axis of the body. Hence it is difficult to locate a freshly-killed whale. Subsequently, as it commences to decompose, the animal becomes more buoyant. When several whales are killed, therefore, the "floaters" are conspicuously marked by attaching a small flag, previously referred to as the boat waif, the blackfish poke, or perhaps an implement termed a "waif-drug." When the waif is used, a hole is mortised in the blubber with a boat-spade, and the pole, which has several notches at the lower end to retain its hold, is planted therein. A whale is said to be "waifed" when this flag is hoisted over it; it then becomes the property of the ship whose agents were instrumental in its death, and in case it floats off during the capture of other whales, its whereabouts may be ascertained by means of the flag, either from the boats or from the mast-head of the vessel.

When the "pokes" are used, the officer gives the order to "Blow up! Blow up!" and a man with sound lungs grasps one of these membranous pouches and inflates it until it has the external appearance of an "overgrown hypertrophied dropsical spider." It is then attached to the whale, and being of a white color may be readily seen at quite a distance from the ship.

The "waif-drug," or "flag-drogue," may be used to impede the flight of a wounded whale and to waif a dead whale as well. This kind of drug consists merely of a flag rigidly fastened by its pole to a small piece of plank; the latter is loaded with lead to retain the flag in an elevated position. It is fastened to the whale with a harpoon and line.

It is not unusual for the right whale to sink when killed; the sperm whale sometimes sinks, but the humpback and finback almost always go to the bottom.

Bowhead whales sink oftener than right whales, but it is seldom they descend so far below the surface that they cannot be hauled up by one or two boats' crews. They are generally captured in shoal water, where the carcasses may be anchored or buoyed, and usually rise a day or two afterwards, while whales that sink in very deep water may never come to the surface. Some whales float when first killed, but shortly afterwards commence to sink gradually until they descend so far that the boats have to cut their lines.

In consequence of their great tendency for sinking, the capture of humpbacks and finbacks, in order to be accomplished successfully, must be conducted on soundings. The humpbackers go prepared for this contingency. Some of them use the large harpoons, previously described,

* Scoresby says that the whale being very nearly of the same specific gravity as sea water the weight may be calculated with considerable precision. The body of the whale may be divided into three segments, forming tolerably regular geometric solids. First, the head, a parabolic conoid, which, in the sucking whale, is 4 feet in diameter and 5½ feet in height; its solid content about 34½ cubic feet. Secondly, the middle segment, extending from the head to the thickest part of the body; this is a frustum of a cone, in the sucking whale, 3 feet in length and 4 to 5 feet in diameter, producing a solid content of 48 cubic feet. Thirdly, the posterior segment, extending from the greatest circumference to the tail; this segment is a paraboloid, or parabolic conoid, with its smaller end truncated. Its length in the sucking whale is 8 feet, its diameters 1 and 5 feet, and its solid content 81½ cubic feet; and to these products may be added about 10 cubic feet, the estimated bulk of the fins and tail, which make an amount of 174 cubic feet; this sum divided by 35, the number of cubic feet of sea water in the Greenland ocean in a ton weight, gives the weight of the animal 5 tons within a cubic foot.

One of the largest mysticete, of 60 feet in length, the head 20 feet in length by 12 feet in diameter, the middle section 6 feet by 13 diameter, the third section 26 feet in length by 12 and 2 feet diameter, will appear (if calculated the same way, with an allowance of 5 tons for the fins and tail) to be of the prodigious weight of 114 tons! But as the last section is somewhat more slender than the body to which it is referred, this calculation may be a little in excess. The largest animals of this species may, however, I conceive, be safely stated at 100 tons in weight, and an ordinary full-grown animal at 70 tons!—SCORESBY: Journal of a Voyage to the Northern Whale Fishery, pp. 155, 156.

to raise sunk whales to the surface. When a wounded whale is about to "turn up," the humpback-iron, with a stout line attached, is thrown into the so-called "neck"—properly speaking, the whale has no neck, since there is no constriction at the junction of the head and body—or into the region about the spout holes, where the blubber is unusually tough. The whale remains at the bottom for several days, and becoming somewhat buoyant by the gases generated by incipient decomposition, it is very materially aided in making its reappearance upon the surface by the men who haul upon the large lines attached to the harpoon. Weights are also used to drive the large harpoon into the blubber of a sunk whale. For this purpose the pole of an ordinary cutting-spade is "rigged" to a humpback-iron. Two iron hoops nailed to the pole, one near the butt and the other about 6 feet from the other extremity, act as guides in directing the instrument in its descent. A piece of pig-iron, weighing about 30 pounds, to overcome the density of the water, is lashed to the forward end of the pole with spun yarn. A line by which the whale is to be hauled up is made fast to the harpoon. The whale-line, which was used in the capture, is rove through the iron hoops on the second harpoon and hauled taut in a perpendicular position. The large harpoon with weight attached is held as nearly as possible over the whale and dropped from the boat. Accelerated by the iron weight, and guided by the whale-line and hoops, the barbed head penetrates the blubber of the whale. This operation, however, may have to be repeated before the iron enters.

An apparatus for raising sunk whales to the surface of the water was patented by Thomas W. Roys, of New York, June 3, 1862, but I have no account of its use. This was termed by the inventor a "whale-raiser," and consisted of a harpoon-like instrument about 10 feet long and weighing about 200 pounds. It had two movable wings or toggles at the forward end, which closed when entering the flesh and expanded when the line was drawn upon. This instrument when released from its position in the whale-boat, was intended to fall by its own gravity, being guided by the harpoon-line upon which it traveled, and bury its point into the whale. By means of a cod-line attached to the "raiser," before its release from the boat, a hawser may be made fast under water and attached to the ship's windlass which applies the power for floating the whale. I have not heard of any occasions upon which this device has been applied.

Captain Scammon* mentions another method of raising whales. He says: "We have known many whales to be recovered when sunk in from 40 to 60 fathoms of water. The *modus operandi* in hauling these decomposing subjects to the surface is: If the water is rough, the line is taken into the bow-chocks of the boat, then uniting two crews in the after part of one boat they either haul on the line by hand or with a tackle until the boat's bow is nearly submerged, or the whale is lifted; or, if in a smooth bay, two boats are sometimes used, by laying a spar across both, and taking the line between them over the spar, which serves as a sort of windlass purchase. If the dead animal has been long down, in a considerable depth, care is taken to avoid its coming up under the boat; for as the carcass nears the surface its velocity is so much accelerated that in some instances the animal rises with a bound which equals its sprightliest actions before life became extinct."

Towing-in.—The labors of the men, however, do not end with the death of the whale. The dead inert mass must be conveyed to the ship in order that the commercial products may be secured. Let us now return to our capture as it lies partly on its side.

Some whalemen tow the whales to the vessel "flukes first," while others tow it "head first"; but the majority of them claim that the whale may be towed with greater facility in its natural position, the action of the flukes driving it forward. If the ship is near by, the boat that first

* Marine Mammalia and American Whale Fishery, p. 46.

struck the whale conveys one end of the tow-line to her, and the whale is hauled alongside. In transporting a sperm whale to the vessel a hole is made through the tough covering of the head at or near the spout-hole, through the nib end, or the lower forward corner of the junk. A "short-warp," a piece of whale-line about 5 fathoms long, is rove through the hole, doubled and knotted. About 200 feet of the line used in the capture is cut off, rove through the strap, and doubled. In towing the right whale the lips are triced together over the scalp with a warp; the whale is then rolled over and the warp "parbuckled". The fins are "sewed up" with a rope which is rove through holes made in the thin parts and lashed under the belly; a hole is cut through the chin, and the tow-rope rove through. Several boats take their positions in tandem line, the tow-ropes are properly adjusted, and the men, with merry boat song, commence the laborious and monotonous task of towing the whale to the vessel. If the ship is to windward of the whale she runs directly for it; if she is too far to leeward and the weather is calm or nearly so, the boat, or boats as the case may be, tow the whale in the direction of the ship. The rate of speed under these circumstances, which varies perhaps from 1 to 3 miles per hour, depends upon the number of boats in tow and the velocity of the wind. The ship in the mean time works toward the whale. As she approaches it, if the wind is strong, sail is shortened, the head-yards are squared in so as to throw the sails upon them aback, and the ship's headway is stopped as much as possible. The whale is hauled alongside and fastened.

ACCIDENTS.—The life of a whaleman is full of danger at all times. Aside from the perils incident to the career of all seafaring men, he is exposed to the dangers incident to his calling. When "cutting-in" in lower latitudes he has the sharks to contend with as well as the sharp-edged cutting spades to avoid. In boiling out, a foaming or bursting pot may envelope the ship in flames, or in a heavy gale the immense casks upon the deck may break from their lashings. When down for whales, he is exposed to many perils which neither a landsman nor a sailor in the merchant marine service know of. The captures are attended, in many cases, with the most frightful calamities in the way of loss of life or limbs. Lives are jeopardized by such risks as a "foul line" or perhaps, in some cases, though seldom, the logger-head may be wrenched from its position;* by the premature explosion of lances in gun barrels; by the heavy recoil of the immense shoulder-guns, which has knocked the men down, or "kicked" them pretty well aft in the boat, and perhaps breaking a collar-bone, or the boat may be broken into many pieces or capsized by the whale. Few accidents, however, now occur from the guns and lances. When the guns were first used they were charged with powder from cans, horns, or flasks, and instead of following the printed instructions furnished by the inventors or manufacturers, the men would often charge the guns too heavily, and in many cases neglected to keep the barrels clean. Under such circumstances, together with the weight and unwieldiness of the weapons, many accidents ensued. At present the improved guns, aside from being lighter and perfected otherwise, are provided with cartridges, and it is seldom an accident is reported, except in those extreme cases when such a thing is brought about in an unaccountable or unavoidable manner, or possibly the result of carelessness. The bomb-lances, owing also to their present state of perfection, seldom if ever explode before entering the whale.

The dangers more to be feared by whalemen when down for whales are such accidents as foul line, stove boat, or lost at sea. A foul line, as it leaps like a thing of life from its coils in the tub, is the most treacherous; smoking hot by a brisk confrication with the wood-work, it travels the full length of the boat, and if it catches the arm or leg of one of the crew, as it sometimes does,

* This has occurred, and in one instance very severely injured one of the oarsmen, inflicting a severe wound on his head.

the unfortunate man would be carried out before any assistance could be rendered him; or by fouling in the chocks the danger of being towed under the water is imminent. We have many published accounts of instances where men have been snatched from the boats so suddenly that the survivors were not aware of their sudden removal. Cheever mentions instances where two boats were carried down and the entire crews lost. One was lost on "False Banks," and another, belonging to the whaling bark Janet, of Westport, with the captain, who was acting as a boat-header, and the crew of five men, were all carried down and drowned by the boat-line getting foul while fast to a whale. It is seldom, however, that a whole boat's crew is lost in this manner.

It is not my intention to reduplicate the long list of accidents that has been made up by the various writers in whaling literature, but I shall refer to several mishaps that have occurred to whalemen with whom I am more or less acquainted.

Capt. Amos C. Baker, the present keeper of Clark's Point Light, near New Bedford, was badly used up by a right whale, and from him I obtained the following account of his accident and subsequent sufferings. He says: "When I was third mate of bark Awashonks, of New Bedford, we were cruising for right whales on the coast of Patagonia. On October 13, 1864, we raised two about noon; the first, by the way, we had seen since we left Port St. Catharine's, Brazil. We got dinner and lowered three boats—the mate's, the second mate's, and the third mate's. The whales were together, coming toward the bark and boats, and we took them head and head. The second mate got slightly fast to one by the lip. Both whales sounded, and shortly afterwards broke water together, the fast one fighting hard and sending the white water almost mast-head high. I tried to strike the loose whale, but he would settle every time that I got within two dart's of him. Meantime Mr. Norton, the mate, having struck the fast whale, he and the second mate sterned off to wait for the whale to get quiet. I got tired of trying for the loose whale, and went into the suds and struck the fast one; but I came very near getting cracked. The whales sounded at a short distance; when the loose one broke water he was comparatively quiet. I asked Mr. Norton if I should cut line and strike the loose one again. His answer was, 'I don't like to say either way.' However, I cut my line and chased the loose whale a short distance, but finally gave it up and came back to the fast whale, which was fighting hard, and sending the white water in all directions. I pulled in ahead and took it quartering on the head, and Tom, my harpooner, sent two more irons into him. Tom and I shifted ends; I set my lance down in his life twice—and the next thing I remember I was lying on one-half of the boat. I felt no pain at first, but could not move. It so happened that the part of the boat I was on did not roll over with me; had it done so, I should have been drowned. But it was not to be so. I was in the most trying and dangerous situation. The part of the wreck I was on was foul in the line. I tried to cut the line, but I could not move, and every time the whale kicked, he would 'yank' me and the wreck of the boat right up to his flukes. I expected that he would crush me every moment. I then noticed the after-oarsman hanging on the steering-oar, which was attached to the part of the boat I was on. I implored him to cut the line. He crawled up and cut us from the whale. I next saw the whale spout thick blood. About this time the mate's boat ran alongside of me. He was still fast. I told him I was badly hurt and could not move. He replied, 'Mr. Fisher'—the fourth mate, who had come down in the starboard boat—'will pick you up. He is right here.' I saw Mr. Fisher with the rest of my crew, excepting the one who was with me. The bow-oarsman was badly cut and bruised. When they took hold of me to lift me into the boat I began to realize how badly I was hurt. I thought that they would kill me. Of course they handled me as gently as they could; but it seemed to me that they were very rough. The ship was about 2 miles off, and every stroke the oarsmen made seemed like taking my life. We reached the ship at last, and Captain Wing said,

'Put a rope around him under his arms, and haul him up.' I was worked up to that pitch that it seemed to me I did not care much which way I went, up or down; but I said if you take me up at all I want to be hoisted in the boat. Captain Wing then saw how badly I was hurt. I was carried below to my berth, my clothes were cut off, and the lower part of my leg bound up in splints. Meanwhile the whale had 'turned up' and the men left me to take it alongside. Mrs. Wing, the captain's wife, was very kind to me, and did all she could to make me comfortable. I sent the steward for the captain, and told him my leg was broken above the knee, and he said at first 'No;' but I told him it surely was, because I could feel it. He then concluded that it was, and bound up the upper portion of my leg with splints, and kept the bandages wet with rum and salt water. The blood was washed from my head and beard. My head was cut badly and my chin split open. All my wounds were dressed, and, taking it altogether, I thought I was about used up. My bunk was very dismal, and after lying there for two days Mr. Norton gave me his room; I found it much lighter and better ventilated than my berth. The cooper made a box for the lower part of my leg, and for eighty days I lay upon my back. Old Tom, my boat-steerer, a Cape Verde Portuguese, came to see me often. During his first visit he said, 'You killed that whale, Mr. Baker; that whale most killed you.' Tom is still alive, and was afterwards promoted to second mate, as high as he could get. Mr. Fisher, the fourth mate, took my boat's crew while I was sick and killed a right whale. Tom gave the whale two irons to the hitches, and three of the crew jumped overboard just before he darted his first iron; they must have been frightened. We did not make land for seven months after my leg was broken, when we touched at St. Catharine's. I was then walking on crutches, and some of the officers frequently told me that I would never kill another whale. During our homeward passage, on June 30, 1865, latitude 10° 30′ north, longitude 39° west, we raised two schools of sperm whales. Captain Wing did not want me to lower, but I insisted upon it. The mate and myself went for one school and the second and fourth mate for the other. A whale came up just right for me to strike him, and I went for him, keeping the hump and spout-hole in range. I was still on crutches. We were right over his flukes when Tom darted the iron, and the boat was cut in two about 'midships, and all of us were sent up into the air. I have often wondered how I got clear without breaking my leg again; but it did not happen to strike anything. The boat was stove so badly we did not think she was worth picking up. On my next voyage I went out as second mate of bark Stafford, and my boat-steerer got his line riding while the first whale I struck was sounding, and down went the boat. This made three times in succession that I got a good soaking, and I began to think I was a Jonah; but I had better luck afterwards. When I was before the mast, in the John Dawson, we struck a large sperm whale off Madagascar; he smashed up three boats, and even 'shooked' some of the line-tubs. One man was badly hurt."

In 1879 I met Capt. J. T. Dunham, who was at that time keeper of the light house on the extreme tip of Cape Cod. He lost a leg by a foul line and was carried under water a considerable distance. I am indebted to Mr. R. W. Swift, of Provincetown, who has kindly forwarded Mr. Dunham's account of the accident. When he was boat-steerer on the schooner Clara L. Sparks, of Provincetown, he struck a whale near the island of Bequia, West Indies. As soon as the whale felt the iron he struck the boat with his flukes, stove it, and half filled it with water. Mr. Dunham was precipitated into the water and one of his legs was entangled with the line. The whale sounded so suddenly that Captain Sparks, who headed the boat, did not notice Dunham's disappearance, but afterwards missing him concluded that he must have been caught in the line, and taken overboard. The crew pulled ahead with the hope that the whale would stop sounding before the line came taut. The whale, on the other hand, continued his downward motions and the line straightened out. In a few moments Mr. Dunham came to the surface more dead than

alive. The crew pulled up to him, and the captain hauled him into the boat. Until he got into the boat Mr. Dunham did not know that one of his feet was gone. It appears that his right foot was foul in the line when the whale started off, the half turn rapidly revolving around his ankle, cut its way through the flesh to the bone, and when the line straightened out the bone snapped off. Captain Sparks set a signal for the mate to come to his assistance. Dunham was transferred to the vessel and all sail made for Bequia. Arriving at Bequia, a doctor advised Captain Sparks to take Mr. Dunham to St. Vincent, where he would have the proper care and attention. Captain Dnuham, after this experience, sailed as master of several vessels.

In 1881 an article was published in the newspapers to the effect that Capt. James R. Huntting, of Bridgehampton, Long Island, had the presence of mind, resolution, and bodily strength to double up, reach forward, and with a sheath knife cut the line beyond his foot, and come alive to the surface, when the whale was sounding at the rate of 20 miles an hour. In the first place, this may be considered an almost impossible rate of sounding speed for a whale; in the second place, Captain Huntting, in a letter to the writer, dated October 2, 1881, denies the statement. He says:

"I know of no instance of a man cutting himself clear of line with the whale descending at the rate of 20 miles an hour, neither do I believe it ever has or will be done. In my own case, I was taken out by foul line and carried some distance under water, but the whale rose to the surface and stopped his headway, and I was then able to cut myself clear. Had the whale continued to sound, I could not have done it. My own case occurred July, 1846, in the Japan Sea. I was on ship Portland, of Sag Harbor, Capt. J. R. Corwin, and acting as mate at the time. I will give you an instance of a man who was caught in a foul line by the upsetting of a boat, and carried almost instantly 50 rods under water. He was picked up with his foot and hand gone, torn off by the line. I amputated the limb above the ankle, and took out the crushed bones of the hand, and the man lived at least ten years after, and may be alive at this day. He was alive the last time I was in New Bedford. This occurred in April, 1853, on the coast of Chili, when I was master of ship Jefferson, of Sag Harbor. How this man could have lived under water so long is a most unaccountable thing. I could not have believed it had I not seen it with my own eyes."

Captain Cottle, who was once master of the Eugenia, of New Bedford, when second mate of the Champion, of Edgartown, was, in 1849 or 1850, taken out of his boat by a foul line. He cut the line while under water, and was almost dead when he was rescued.

Captain Baker tells me that one of his bow-oarsmen, Mr. Tinkham, got a turn around his ankle when the line was running out, but disengaged it as he was going over the head of the boat. He was badly hurt, but recovered, and has since made two whaling voyages as master.

During my investigations of the whale fishery, and more particularly while on my tour of collecting objects for the U. S. National Museum, I have from time to time met with discarded implements, or parts of implements, which brought me face to face with the dark side of the whaleman's life. In the fall of 1882 the schooner Admiral Blake, Captain Hathaway, of Marion, came into the port of New Bedford with a disabled boat, which was a silent witness of a remarkable tragedy enacted upon the high seas. It appears that on July 13, 1882, a whale was struck with a darting-gun, but the harpoon did not enter the blubber sufficiently deep to discharge the bomb-lance. As the first officer of the schooner, who thought the gun had been regularly discharged, was putting it away under the thwarts, it went off; the bomb passed through the body of James Alcom, killing him instantly, and then struck Charles Smith, the after-oarsman, in the back, and appeared on the other side above the right hip.

It is not often the case that a whale-boat, when down for whales, is unable to make the ship; yet there are far too many accidents of this nature on record. Separated from the ship, suffering from exposure, and emaciated by the ravages of hunger and thirst, the unfortunate crew are doomed to wander upon the face of the trackless ocean until rescued by a passing ship or relieved by death. While we write, the news of the loss of Captain Sparks, with a boat's crew, of the schooner Edward Lee, of Provincetown, Mass., comes to us; and while pondering over the mysterious ways of Providence, the safe arrival of the party is announced at Pensacola, Fla., almost simultaneously with the arrival of the schooner at Provincetown. Having been tossed upon the ocean for eleven days, they were picked up and brought to an American port by a German bark. A letter was immediately addressed to Captain Sparks, with the request that he would forward a detailed account of his wanderings and sufferings. The captain, after refitting his vessel, has again sailed on a whaling voyage, but before leaving port he kindly made the following statement to Mr. R. W. Swift, of Provincetown, for publication in this report:

"We raised a school of sperm whales at 12.30 p. m. May 14, 1881, in latitude 17° 50′ north and longitude 46° 50′. My mate and myself lowered and gave chase. The mate selected a 40-barrel whale and fastened to him; I continued to chase the school, but could not get within darting distance. Finding that I was getting too far from the vessel, I gave up the chase at 4 o'clock. At 5 o'clock I made the vessel, which was heading directly for me, and an hour afterwards her hull was plainly visible. Night coming on, we steered the boat by compass in the direction the vessel was last seen; but not seeing her lights, we hove to at 8 o'clock, and lay by until morning. At daylight we found nothing in sight; but we steered in a northerly course until 1 o'clock p. m., at which time I changed the course to southwest in hopes of finding the vessel. During the second night I again hove to. In the morning, under sail, we steered in a westerly course until noon, when our course was changed to the northwest until night. During all this time I had not seen a sail. I was then forced to believe that we were lost in mid-ocean, fully 1,000 miles from land. We were dressed in our shirts and trousers only—not a single coat or jacket—and every one of us were barefooted. When we left the vessel the beaker was full of water, but every drop was consumed before we gave up the chase for whales. I decided to head the boat for the West India group, with the hope that if we were not rescued by some passing vessel we might be able to reach some or one of the Windward Islands. On the sixth day of our wanderings May 20, we saw a school of sperm whales, and although every man in the boat was greatly reduced from exposure and his long fast, I thought it best to make an attempt at least to capture a whale to furnish us food. I placed myself in the head of the boat, holding the iron as well as I could, and selected a whale to strike; the momentum of the boat forced the harpoon into the whale, which fortunately was not an ugly one, and he was finally killed. While dying, however, he struck the boat so hard as to injure it and it sprung a leak. I cut 15 pounds of flesh from the whale, which we ate raw. This lasted us two days, and we again suffered the pangs of hunger. Rain-showers could be seen passing on each side of the boat, but very little fell on us. During the eleven days of our exposure I judged that about 2 gallons of water were caught in the boat; but being mixed with salt water we could not quench our thirst. Sometimes during the night the mist would wet our shirts and we greedily sucked them; sometimes we were compelled to drink salt water, but this had a very bad effect upon us. One night a flying-fish jumped into the boat; I divided it into sixteen pieces, all of which was greedily devoured by the half-starving men. We continued on our course for the land without seeing a single sail. On May 25, the eleventh day of our separation from the Edward Lee—all of us were prostrated from the want of food and water; one of the men was lying helpless in the bottom of the boat—we sighted a sail which proved to be

a German bark two days out from Guadaloupe, bound to Gibralter, loaded with sugar. I informed the captain of our situation, but he gave us no invitation to go on board. We had sailed 750 miles in an open boat without food, and his treatment seemed rather hard. I begged of him to give us food and water. He made no reply, but in about ten minutes his cook brought each one of us a drop of water and one sea biscuit. I then requested accommodations for myself and men aboard his ship, but he sternly refused. He told me to go aboard of another vessel which had just hove in sight. I told the captain that he might shoot me and my men and throw us overboard, but we would not willingly leave his ship and run the risk of not being seen by the other vessel, which was quite a distance off. Finally the bark was hove to, and a signal set, which was noticed by the other vessel. Shortly after this the captain insisted that I should leave with my men and pull for the other vessel, and promised to lay by until he was sure the second vessel saw us. With this promise we were helped into the boat, and as soon as our line was cast off the yards of the bark was squared and she was off. I did not learn her name, as I had neither time nor opportunity to do so. I only wish I had. The second vessel was about 2 miles away, and proved to be the German bark A. Klochman, Capt. Henry Abel, of Memie, who kindly took us on board. The fare on board this vessel, consisting as it did only of water and hard-tack, was hardly suitable for men in our condition; but we rejoiced in the hope of temporary relief and in the prospect of getting to land. We remained on board the Klochman twenty-two days, and finally landed at Pensacola, Fla., where we were kindly treated and cared for by the Masons and Odd Fellows, who provided us with the means to return to our friends. While in Pensacola I telegraphed to my agent at Provincetown for instructions, and received word that the Edward Lee had arrived home the day before. I sold my boat and deposited the money with Mr. Young, a notary public, Captain Abel having made a demand on me for $65 for bringing us into port. I had already given him $40 worth of whale-line before we landed, and I supposed that would satisfy him for what he had done for us. We had the coarsest of fare while on his vessel. Twice in the twenty-two days the captain gave me white bread, and the balance of the time I had the same as the foremast hands, which was, as I have before stated, merely water and hard-tack.

6. THE METHODS OF SAVING THE COMMERCIAL PRODUCTS OF THE WHALE.*

CUTTING-IN AND TRYING-OUT.

CUTTING-IN THE WHALE.—The process known to the English as "flensing," to the Americans as "cutting-in," and to the old Nantucketers as "flinching" the whale is the act of removing its oleaginous blanket and transferring it to the vessel; and the process of "trying-out" is the reduction of the blubber to oil.

When the ship-keeper perceives that a capture has been made, he makes sail, if possible, and endeavors to shorten the distance between the vessel and the boats. Meantime every preparation is made to save the blubber. The cutting-spades and boarding-knives are brought on deck, the officers' stages† are "slung" over the side of the vessel, the heavy cutting-tackles are sent aloft, and the bulwarks removed in the waist of the ship to make a gangway. The whale is brought alongside the vessel and fastened with its flukes forward to the starboard side with a

*The methods employed in "cutting in" the whale; the oil making; preparation of whalebone; ambergris, &c., will be more fully discussed in the section of this report on Preparation of Fishery Products.

†The cutting stage is a kind of platform suspended over the side of a ship by ropes, for the officers to stand upon while cutting-in a whale. Of the earliest form there are two kinds; they are known as the "forward cutting stage" and the "after cutting stage," from the fact that they are placed respectively forward and abaft the gangway. They are made of spruce plank about 12 inches wide and vary in length on different ships. Some vessels have discarded this kind altogether, while others still retain them, in addition to longer ones, known as "outrigger stages." The "outrigger" is from 18 to 22 feet long, 20 feet being about the average length, and 15 to

chain, which is passed around the "small,"* rove through a port-hole in the bulwarks, and made fast to the bowsprit or a small upright post in the deck, called a "bitt." The whale being thus secured, the order is to "Supper the watch!" or "Dinner the watch!" and immediately after the meal the process of "cutting-in" begins. It is necessary that the blubber should be removed as soon as possible, since it may "blast" on the whale, or in all probability rough weather may set in and delay the work, or it may be desirable to lower the boats for other whales. The men and officers take their proper positions. The first and second officers go into the forward and after cutting stages respectively. The captain, assisted by his first mate, usually decapitates the whale; the second mate "scarfs," or cuts the body blubber; the third mate has charge of the waist of the vessel and of boarding the blubber, in which duties he is assisted by the fourth officer, or perhaps the latter may be with the foremast hands at the windlass; one of the harpooners stands ready to go down upon the whale, (that is, if a sperm whale), to manipulate the blubber hook when necessary, and another harpooner has charge of stowing away the blubber between decks. On the quarter-deck the cooper, assisted usually by one of the laziest men on the ship to turn the grindstone, is kept busy sharpening the spades, which are dulled from time to time by striking harpoons in the whale or the bones in cutting off the head. No one is allowed to "cut on the whale" except an officer; it would be a presumption on the part of a foremast hand, at such a time, to go into a cutting stage.

The head of the whale is first cut off, and the process of removing the blubber from the body begins. The manner of decapitating and dissecting the head of a right whale differs somewhat from the method of decapitating a sperm whale. Removing the body blubber, however, has practically no distinguishing features that need to be explained here. In cutting-in a right whale the first officer, with a long-handled spade, makes a "scarf" around the eye and fin (from H to E and I, as shown in the accompanying illustration, Fig. 1). A chain is adjusted about the fin (B) and one of the cutting-tackles is attached to the ring (C); the men heave at the windlass and literally tear off both the fin and blubber, the former being skillfully unjointed by the officer before the huge cetacean rolls in the water. As the whale revolves upon its axis, a motion imparted by the cutting-falls which are manipulated by the men at the windlass, the officer continues to cut the blubber as indicated by the spiral lines † in the diagram, and the helical strip of blubber is pee'ed in a continuous piece the entire length of the whale, from the fins to the flukes. As it is hoisted on board it is subdivided into smaller sections, about 14 feet long and 6 feet wide, called "blanket-pieces." The subdivisions are made by the officer who stands in the waist of the vessel, with a long ensiform implement called the boarding-knife, the process being called "boarding the blubber." He severs the immense strip of fat whenever one of the cutting-tackles "comes two blocks": the other tackle is made fast to the blubber before the officer severs it, and when the first tackle lowers the blanket-piece the second tackle "comes two blocks," and another piece is cut off. This alternating process continues until the blubber has been disposed of.

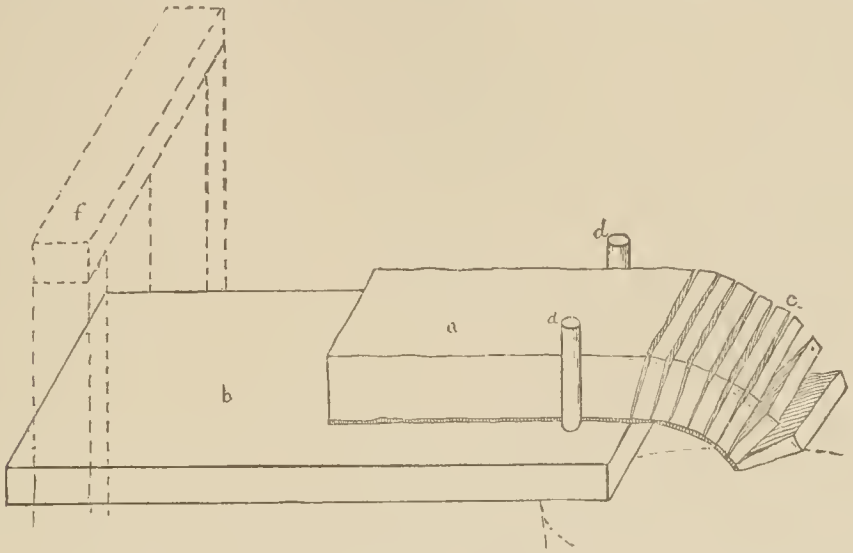
The blanket pieces are lowered through the main hatch into the blubber-room, where they are subsequently reduced to smaller sections or "horse-pieces." The pieces of flesh and muscles or "lean"—the whaleman's name for the flesh of the whale—which adhere to the inside of the blub-

18 inches wide. The boards or "arms"—some call them "legs"—that brace the stage from the vessel, are from 7 to 10 feet long; some of them are bolted rigidly to the stage, while others are adjustable. This kind of stage is suspended over the vessel by two or three tackles from the mast-head or from davits. For convenience and safety of the cutters, when at work, a long pole or rope, usually the latter, is lashed to iron stanchions from 3 to 3½ feet high, forming a secure railing and support for the officers, the whale, of course, being between the stage and the ship. When not in use the "arms" are folded, and the stage is turned up alongside the ship and lashed securely.

* The slender portion of the body of the whale, at its junction with the flukes.

† The officer does not make a smooth cut as shown in the lines in the diagram. The actual incisions in the blubber of the whale form zigzag lines, gashes made by the perpendicular thrusts of the keen-edged spades.

ber, are removed by the blubber-room gang with sharp knives to prevent the discoloration of oil when boiled. This process is called "leaning." When ready to boil the blubber the "horse-pieces" (*a*) are pitched upon deck with forks and minced either with hand-knives or machinery.* The slices (*c*) are about half an inch thick, almost as long as the blubber is thick, and resemble

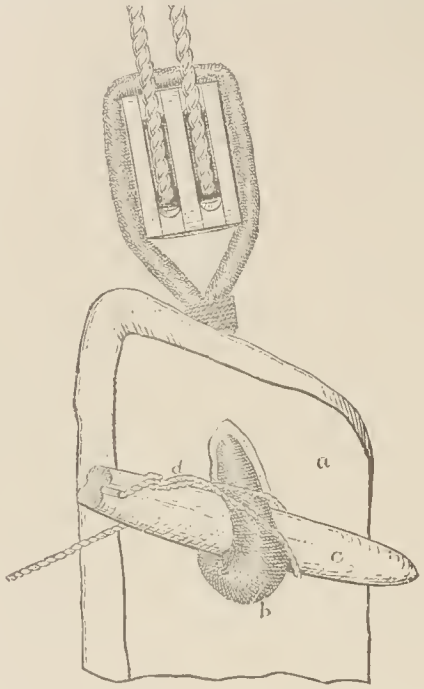


MINCED BLUBBER ON MINCING HORSE.

great pieces of fat pork. The pieces are called "books" or "bibles," from a fancied resemblance to the leaves of a book. In this condition the blubber is pitched into the try-pots and the oil extracted. The residuum, termed "scrap," is used in boiling out the "catch," the fires being first started with wood. Meantime the flukes of the whale are cut off, and at times hoisted on deck and the blubber saved. The carcass is cut adrift, and, surrounded by a school of ravenous sharks and a troup of greedy, garrulous birds, floats away and usually sinks. The head, which had in the first place been detached from the trunk and moored by chains to the vessel, should next be cared for. If the capture is an unusually large sperm whale, the head may be divided into two sections, the "case" and the "junk," and hoisted in separately. Previous to this, however, the lower jaw with the teeth is wrenched from its socket and hoisted in. If a small sperm whale, the entire head may be hoisted in and dissected on deck. The "head matter" or spermaceti is removed and placed in casks or other receptacles of a similar nature, and the worthless remains are pushed through the gangway into the sea. If a right whale, the upper part of the head, containing the whalebone, is hoisted on deck, and the baleen cut out with spades, cleaned, dried, and bundled for the market. The two lower lips are hoisted in separately and the blubber cut up and boiled. The body oil and head oil of the sperm whale are kept in separate casks and marked "H." and "Sp. O." The oil from all parts of the right whale is barreled indiscriminately, since there is no difference in the quality. As fast as the oil is cooked it is bailed from the try-pots into a large copper tank called the cooler, whence it is transferred to large casks, lashed to long rails on both sides of the vessel, and kept on deck until cool enough to stow away below. It is then run down into the casks in the hold of the vessel through a flexible pipe. The casks are "chocked off" or braced from each other and from the ship by pieces of wood called "beds," and remain *in statu quo* unless the hold is broken out to ship the oil by another vessel or when broken out in port.

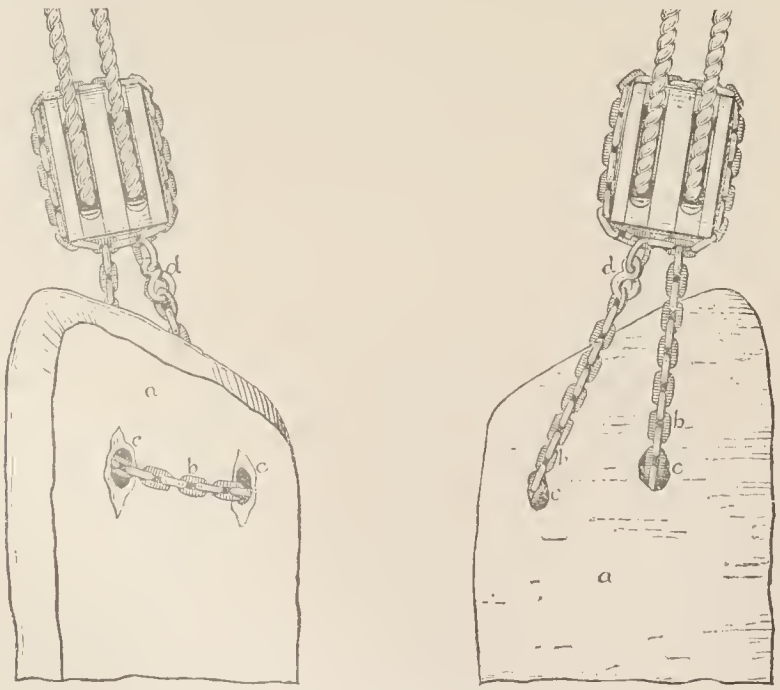
* The mincing-horse used in hand-mincing is simply a piece of two-inch plank (*b*) about three feet long and a foot wide, with several pegs (*d*) in the sides to keep the horse-pieces in place. One end slips with a cleat under the main rail (*f*) and the other end rests on the mincing tub. As fast as the blubber is minced it falls into the tub.

The lower block of the cutting-tackle is usually strapped with rope. In boarding, the blubber hook is detached, and the strap, with a grommet, (*b*) is passed through a hole cut in the blubber (*a*) and toggled (*c*) on the opposite side, as shown in the accompanying illustration.



HEAD OF BLANKET PIECE HOISTED BY ROPE-STRAPPED BLOCK.

An improvement, however, has been made, although it is not so regarded by some whalemen, by strapping the lower block with chain. Strapped in this manner, the obviously awkward rope attachment is dispensed with, and the chain tail (*b*) may be rove through holes (*cc*) in the blubber (*a*), as shown in the accompanying cut, and moused into the sister hooks (*d*) thus:



HEAD OF BLANKET-PIECE HOISTED BY CHAIN-STRAPPED BLOCK.

The above illustrations represent the under or "fat" side of the blubber with chain attached, and also the reverse or "blackskin" side.

The head of the right whale and bowhead may be hoisted by means of the rope-strapped blocks and fid, or by the chain-strapped blocks, the same as shown above for hoisting the blubber.

A word in regard to some of the implements used in manipulating a dead whale and removing its blubber.* The falls are made of manila hemp, composed of four strands, and measure in circumference 5¼ inches. The lower block is 18 by 12 by 10 inches, the upper blocks 18 by 12 by 6 inches and the guy-block 13 by 9 by 6 inches. The guy rope is 4¾ inches in circumference. The blubber hooks vary in weight from 75 to 150 pounds each, depending upon the size of the vessel. The cutting-tackles, when in position for active use, are suspended by pendants lashed to the main-mast-head above the eyes of the rigging. The pendants are large cables (*a*, Fig. 4), of a size that would be required perhaps to anchor a 300-ton ship. They are usually about 12 feet long; the variation in length, however, is governed by the size of the vessel. They are connected with the cutting-tackles by means of two immense iron shackles (Fig. 2, *a a*) 16 inches long 9 inches wide in the clear and from 1½ to 1¾ inches in diameter.

The implements with which the incisions are made in the blubber are called cutting-spades. The blades are made of Norway iron, faced with steel, and the poles, are of spruce. The total length varies from 12 to 20 feet. With these apparently awkward implements all of the cutting is done upon the whale. The narrow ones are used to cut through the blubber to the flesh and the wide ones to sever the muscles or pieces of flesh that persist in binding the fat to the body of the whale. The former process is called "scarfing," and the latter "leaning up." The half-round spade is used to mortice holes in the blubber in order that the cutting-tackle may be attached, as previously described.

Duties of crew.—In cutting-in a whale the same discipline is enforced on board ship that was observed in the boat when engaged in the capture. Next to making the home passage with a full ship, the disrobing of a whale of its oleaginous covering constitutes one of the most joyous occasions. When a whale is "raised," the exultations of the whalemen cannot be called genuine, for the capture may not be made; but when the prize is made fast to the ship, the most sanguine anticipations, barring wind and weather, may be realized. A violent storm may part the fluke-chain, or it may become necessary for the safety of the vessel to cast the whale adrift.

The captain has general supervision of all work, and may sometimes participate actively in cutting the whale. He may prefer, especially when the animal is to be decapitated, to accompany his first officer on the stage, and assisted by him, perform this operation, which is regarded a delicate and important one by whalemen; but he usually goes on deck when the head has been severed from the body and assumes general charge of matters there, leaving the details of the cutting to his first officer. Aside from the general work of cutting, which claims his close attention, he has the ship to care for, more particularly if surrounded by ice in the Arctic fishery.

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* *Index to illustrations of cutting falls.*

Fig. 1. Lower block strapped with rope (*a a a*) and blubber hook (*g*) shackled into the grommet (*d*). The rope beckets (*c c c*) are used for convenience in handling the block, and the back lashing (*b*) by the officer in directing the point of the hook into a hole in the blubber.

Fig. 2. Upper blocks (*b b*), guy block (*c*), pendant shackles (*a a*), and links.

Fig. 3. Lower block (*b*) strapped with chain (*d*) and sister hooks (*c*) into which the tail may be coupled by means of the link (2).

Fig. 4. Perspective view of the cutting-tackle, showing the position it assumes when suspended from the mast-head. It should be guyed out by means of the guy-block and rope (*c*), and the end of the cutting-falls (*e*) should lead to the windlass.

Fig. 5. An implement called the small blubber hook used to manipulate blubber on the vessel.

He may also, perhaps, visit the mast-head when whales are in sight, to ascertain if there is a prospect for lowering the boats for another capture. It may also happen that two or more boats are down for whales, in which case he performs the duties of the first and second officers on the stage. When cutting-in a sperm whale on a Provincetown vessel, if the mate is not skillful, the captain, assisted by the first and second mate and boat-steerers, severs the head from the body. On the New Bedford vessels, if the captain does not make his appearance on the stage, his first officer has sole charge and direction of cutting off the head. After the captain leaves the stage the mate remains and "leans" the blubber from the carcass until the last piece has been hoisted in. The second officer's post of duty confines him to the forward end of the outrigger stage, where he is engaged in "searfing"* and "leaning up"; he also cuts off the flukes, and remains upon the stage till the last piece of blubber and the flukes, if a sperm whale, are hoisted in. The third mate has charge of the waist and the general directions of boarding the blubber; he uses the boarding-knife in cutting holes in the blanket-pieces for attaching the cutting-tackle; subdivides the blanket pieces into sections and sees that they are properly lowered in the main hatch. Although not actively engaged in cutting the whale, he occupies an important position, and upon him, in a great measure, depends the length of time consumed in this operation, with the exception, of course, of wind and weather. It is also his duty to see that the hatchway is kept clear, and that all implements necessary for carrying on the work are at hand and in their proper places. Some captains, especially in the olden days of whaling, after decapitating the whale took charge of the boarding; but they seldom do this now. Sometimes on the steam barks in the Arctic regions the third and fifth mates work in the waist, or the captain may, when "pushed," take charge of the boarding, and send the fifth mate between decks to stow away the blubber. The fourth mate on some vessels assists the third officer in the waist. If he is a person of good executive ability the latter is perhaps the best place for him. On some vessels it would be better, under certain conditions, for him to be at the mast-head on the lookout for whales, but this is not usually the case. In sperm whaling he may be in the waist with the third officer, when not on the stage cutting on the head; but, as before stated, he usually retires to the deck when the whale is decapitated. Three of the boat-steerers work in the waist of the ship, assisting the third officer, and the fourth takes it "overboard", and also has charge of stowing the blubber between decks. The captain's boat-steerer takes all the "overboards" on the first whale captured, and the others in the order of their rank on each whale subsequently taken, their duties being to insert the blubber hook in the hole made in the blubber, to reeve the head-needle, and to perform any other duty that may, under the circumstances, be required of them which could not be accomplished by the officers from the stages. The carpenter, or cooper, usually the latter, sharpens the spades and knives at the grindstone on the quarter-deck, assisted by one of the crew, who turns the crank. As the spades are frequently dulled by striking bones, especially while cutting on the head, there is very little cessation in this work. A common grindstone, with an elliptical wooden tub, full of fresh water to prevent iron rust, is always carried on the ship for this and similar purposes. The cook and steward are engaged in their regular duties, but may, at times, especially when hoisting in the heaviest parts of the whale, be called forward to the windlass. The majority of the crew heave at the windlass. One man is sometimes placed on the lookout for whales—though usually when cutting-in and boiling out, mast heads are not kept—and two sharp, active, and wide-awake foremast hands are selected to "tend the falls,"

* The term *scarf*, usually pronounced *scaff*, has rather an elastic definition. A boat-builder *scarfs* two pieces of timber when he joins them permanently together; a whaleman, on the other hand, when he *scarfs* the blubber, separates it entirely by incisions made with the spade.

one man to each tackle, called "falls tenders." Two men in each watch belong to the "blubber-room gang," employed in stowing away the blubber. One man, on a sperm whaler, is stationed on the main or mizzen chains or in the starboard boat with a scoop net, to "skim slicks" while the head of the whale is being severed from the body, that is, to save the small pieces of blubber and "loose" oil which float upon the water. On some ships, however, the man whose duty it is to assist the cooper has charge of the scoop-net, or is "captain of the scoop-net," and in this case, when his services are required, especially when cutting about the roots of the "ease," whence the spermaceti flows, the cry of "Scoop-net! Scoop-net!!" calls him from his ignominious post at the grindstone to the more exalted position of "skimming slicks," the contents of the net being placed in a wooden receptacle on deck, called a scrap-tub, and afterwards boiled out.*

TIME CONSUMED IN CUTTING IN.—The time consumed in the process of "cutting-in" depends upon the age of the whale, the condition of the weather, the kind of apparatus and accessories, and the skill and ability of the cutters. Under favorable conditions a small or medium sized whale might be disposed of in five or six hours, and a large one, a "one hundred barreler," perhaps in twelve hours; but in a rough sea the crew may be four or five days in cutting-in a whale which, in smooth weather, should be cared for in six or eight hours. Three days is about the average time for boiling out the blubber of a large sperm whale; but this also depends upon the weather, fatness of the cetacean, and size of the pots. Formerly, if a one-hundred-barrel whale were captured, cut-in, boiled out, and stowed down in a week, it was regarded fair work; but with the modern appliances the same work should, under favorable circumstances, be accomplished in less time. The blubber of right whales may be boiled out with greater facility than that of sperm whales. Less skill and time is required to cut a right or bowhead whale than a sperm whale; three or four hours

* During the process of cutting, as the crew heave away at the windlass they are urged to their work by the inspiration of song, peculiar to them. The order from the captain is to "heave away and chanty up," the word "chanty" meaning to sing, the songs being known as "shanty songs."

Touching this point I reproduce here the following extract from a letter from Capt. William M. Barnes:

"When a whale ship is so fortunate as to find whales, time becomes of importance, and as a ship when in the act of cutting is in a great degree motionless, whalemen are anxious to finish the work and to get under sail again. Often a storm is seen approaching, or the ice is close at hand to leeward, or night and darkness are near. Experience has shown that the men work more cheerfully at the windlass when their quite tiresome and monotonous labor is enlivened with a good song, and masters of whalers congratulate themselves if they find among their crew one who can lead off at the windlass with a rousing song. The men forget their fatigue; they quit grumbling, and with merry laughter join in a rattling chorus, while creaking falls and clanking pawls, and the frequent shout of 'Board, Oh!' tell them that the work is fast being accomplished. It will be a happy change when the tireless, uncomplaining power of steam is used in the 'cutting-in.' The work will be done more quickly, and the men will be available for other uses. I wish I could give you a few of the songs the 'shanty men' sing, but as a great part of the singing is extempore, and only suited to the occasion, one does not remember it unless himself a singer. Many popular tunes are brought into requisition, being often changed by the singers. The words seldom amount to much, unless the singer chances to be witty, when he may make happy allusions to passing events. The tunes are exhilarating and selected on this account. Among the songs, I may mention here, 'John Brown's body,' 'Dixie,' 'Marching through Georgia,' 'Old Dan Tucker,' with many variations, to which could be added many others. I think an Arctic whaleman would prefer a lively chorus at his windlass to the operas of the best masters. I can recollect when on my first voyage when the work was lagging the captain would hail the cook, with 'Doctor, where are you? Come! Wake 'em up there!' And the old darky would roll along forward, and opening a capacious mouth start a song and the work at the same time. His songs were few in number, but they were not injured by repetition. I remember a line or two:

Cook.—A dandy ship and a dandy crew,
All.—Hi ho, my dandy, Oh!
Cook.—A dandy mate and skipper, too,
All.—Hi ho, my dandy, Oh!
(Repeat with variations.)

Cook.—Oh, what shall I do for my dandy crew?
All.—Hi ho, my dandy, Oh!
Cook.—I'll give them wine and brandy, too,
All.—Hi ho, my dandy, Oh!"

being the average, under auspicious circumstances, for cutting one of the first-named species, whose yield would be about 100 barrels. Capt. G. B. Borden tells me he once picked up a bowhead whale, whose death was caused by "killers," which he took alongside, cut-in, and boiled out in twenty-one hours, making 140 barrels of oil.

SWEEPING AND FLUKING A WHALE.—When a whale has been towed alongside the vessel the fluke-chain is made fast to the "small." The preliminary steps for adjusting this chain are termed "sweeping the whale," and the act of adjusting it is known as "fluking the whale." The following is an account of the processes as well as a description of the implements employed:

The buoy-line, or as it is also called the "bob and line," or the "lead and buoy," consists of a piece of tow-line—usually about 7 or 8 fathoms in length—a buoy and lead. The buoy, bent on to one end of the line, is made of pine wood, which is often painted white in order that it may be more readily distinguished, as it is frequently necessary to use it at night. A small hand-lead, or "shot," about 6 pounds in weight, is also bent on to the line, about 1½ or 2 fathoms from the buoy. When the whale has been hauled alongside, the ship is so laid as to forge ahead a little and at the same to bring the cetacean along with it, flukes forward. The lead is now dropped overboard between the ship and the whale on the side of the "small" near the flukes. The lead, of course, takes the buoy under water. The line is then pulled up, which raises the lead, and the buoy, released, floats on the surface. If the buoy should come up on the opposite side of the "small" it is hooked up with the line-hook, or with a hook that may be improvised from a broken harpoon shank attached to a pole, and taken on board. If, on the other hand, the buoy should appear on the surface of the water on the same side of the "small" on which it descended, the lead will have to be dropped again and again, and the operation repeated, as is often the case, until the maneuver is successfully accomplished. Having passed a small line around the "small," the fluke-chain may be bent on and hauled around in a similar manner. One end of the fluke-chain is hauled up to the plank-sheer in the gangway and rove through a ring or shackle at the other end. The bowline is singled and the ring slacked to the "small."* The chain is stoppered in the waist, one end being led forward through a hawse-hole† or chain-pipe. On the bluff of the bulwarks, on the starboard side, a rope is made fast to the chain on which all hands haul, bringing the end of the chain forward. When the whale is far enough forward to be conveniently cut, the chain having been hauled up short, about 1½ fathoms, it is made fast to the bow-sprit or a bit made for the purpose, and the whale is said to be "fluked." If a fluke-rope is used it may have an eye-splice in one end; or, if not, a clinch may be made and slipped down to its place. The whale thus secured lies with its flukes to the bow of the ship and on top of the water, and the fluke-chain may be veered out as occasion may require during the operation of cutting-in. The after part of the whale's head, as it now lies, is nearly abreast the after part of the main rigging, provided the ship is about 110 feet long, and is made fast by a good stout rope to a bit or a ring in the deck. The whale is now made fast and everything is ready for cutting it in.

Recently some enterprising whaleman has improvised an instrument, termed a "fluker," from an old hand-lance, simply by cutting off the head and converting the shank into a large round-bend hook. A small lanyard with a buoy at one end is "stopped" to the point, and the instrument is thrust under water between the whale and vessel. When low enough in the water the point is turned outboard, the instrument is hauled up under the "small," and the buoy with a line to which the fluke-chain is attached appears on the other side. The buoy is detached, removed with the line-

* See diagram of cutting-in a bowhead or polar whale, A.

† Many vessels have two hawse-pipes, several feet apart, to be used when two whales have been killed, and sometimes two chains are taken through one hawse-pipe.

hook, and the fluke-chain adjusted as before mentioned. This is a much better and quicker method than when the buoy and line is used, and although this instrument, which is also known as the "Joe Crook," is not familiar to the majority of whalemen, its importance will be very readily appreciated by them.

Large ropes were formerly used for fastening the whale to a vessel, but I believe very few of them, if any, are to be found now. Sometimes a large rope may be used when a vessel is towing a whale or in veering out a whale in heavy weather when it would be impossible for her to lay by it. This rope is made of manilla, usually manufactured for the purpose, and varies in size from 7 to 11 inches in circumference. It is slack laid and about the same kind as those carried by the large steamers on Long Island Sound, for instance, and is sometimes studded to prevent chafing.

BOILING AND STOWING THE OIL.

DUTIES OF CREW.—During the process of boiling out the oil (described in the section on PREPARATION OF FISHERY PRODUCTS), which includes the preparation of the blubber before cooking, the master has general supervision of the work, but the mate attends to all business that requires active superintendence. Both the officers and men, with the exception of the cooper, stand their regular watches before the try-works day and night. On some vessels the first officer is exempt from such a duty. It is expected that the officers should only superintend the boiling of the oil, but oftentimes they perform as much manual labor as the petty officers.

The boat-steerers stand their watches before the works, and if they find time they also rig their boats for another capture.

The men perform the menial duties of the ship. Two in each watch are kept at work in the blubber-room preparing the blubber for the mincer. This is the blubber-room gang; it is headed by a man in each watch, who is regularly appointed to fill this position during the voyage; his assistant, however, is not regularly appointed, the selection being made from any of the foremast hands composing that watch. If the machine is used for mincing, three or four men may be needed: one to "feed," one to "hook off," or remove the blubber, one to trim the thick pieces of fat, and probably one or two to keep the apparatus in motion. But when the mincing is done by hand, the services of one man in each watch only are required for slicing the fat.

The other men of the watch carry horse-pieces from the main hatch to the mincer, tipper up decks, remove scraps, bail out oil, stand their mast-heads, serve their tricks at the wheel, or lend a hand wherever and whenever needed.

The cooper is seldom on duty at night, that is, if he is industrious and prepares a sufficient number of casks during the day to last the watch over night. It is also his duty, during the day, to grind the blubber-knives, or to bail the oil from the cooling tanks.

The Arctic ships have watch and watch (six hours each) when boiling. In sperm whaling, on some ships the watches are set, for instance, from 7 a. m. until 11.30 a. m. This gives the forenoon watch below half an hour for dinner; the other watch goes below at 12 m. and is called at 4 p. m. One watch gets supper at 6, and the other at 6.30. At 7 p. m. the watch is set for the night, dividing the time until 7 in the morning. In the morning the watch below is called at 6.30, in order that the men may get breakfast in time to be on deck at 7.

The duties of the crew during the operation of running down the oil into the casks in the hold of the vessel from the receptacles in which it cools on deck vary somewhat, both on the different vessels and in the sperm and Arctic fisheries. The sperm whalemen have more sea-room and more time at their disposal when stowing down than the Arctic whalemen. It is also important that they should exercise unusual care in this process, without involving the question of time, for

the oil usually remains in the holds of their vessels much longer than is the custom in the Arctic fleet. In sperm whaling, as a rule, the captain directs all work, measures the hold, and gives orders for the casks, which, in his opinion, should be coopered for riders, forelaying to run the casks of the proper size in order that they may be ready for coopering. The first officer generally has charge of all work on deck; at times, however, he may superintend the work in the hold, in which case the second mate remains on deck. One of the officers or boat-steerers also tends the hose-cock when filling the casks. The cooper has all he can do in coopering such casks as fast as they are called for. As the Arctic whalemen are usually beset by ice, which momentarily threatens their ship, and on account of the presence of ice they are unable to get as much sea room as the sperm whalemen, they are in consequence compelled to store away their oil as speedily as possible, and at times under great difficulties. The master usually devotes his attention to stowing down, but at times he may shift the greater part of the responsibility on his officers, and will himself look after the ship, spending perhaps the greater portion of his time at the mast-head, "conning" his vessel and looking for whales. The first officer has charge of the deck, running down the oil, inspecting the cooperage, sending the casks below as fast as they are needed, and pushing the work with the utmost speed and vigor. This custom, however, often varies, for sometimes the first officer may stow the hold and the second mate may remain on deck. Since the oil cools rapidly in the Arctic regions, the crews under favorable circumstances are enabled to clear their decks much sooner after boiling out than in the southern fishery. Stowing down, boiling out, and the performance of other necessary work required in working the ship, may be carried on simultaneously; one man may be called upon to perform the duties which, in the regular order of things, properly belong to another, but the master, under all circumstances, feeling his responsibility, always satisfies himself that the oil casks are properly stowed away. If the mates in the Provincetown fleet are efficient and trustworthy, the captain devotes very little attention to the process of stowing down, other than to designate such casks as should be filled. The mate has charge of the deck; it is his duty to see that the casks are well swabbed out and free from water; that the oil is sufficiently cool; that no dregs have been transferred from the cooler, and that the work in all details is properly attended to. The second mate usually has entire charge of the hold. One boat-steerer bails the oil from the cooler, and one cuts off the oil as fast as the separate casks are filled.

MAKING-OFF; SCRUBBING.

MAKING-OFF.—Paring and barreling blubber, termed making-off, was, and is now, conducted by the Dutch, English, and Scotch whalemen. Commander Scoresby* and Laing† give a full account of the process. *Making-off* blubber was carried on at leisure hours when the crew were not engaged in the pursuit of whales. The blubber in this condition was transported to the English and Scotch ports and the oil extracted on shore, by which time the blubber was more or less rancid, and it is not much of a wonder after all that the odor should be offensive when the cargo was broken out in port, or when the oil was extracted.

The process of making-off is not practiced among the American whalemen. At the inception of the American whale fishery (as before referred to) it was the custom, in shore whaling, to bring the blubber home and extract the oil, but as the voyages were short, the blubber was comparatively in a good and healthy condition. In the Arctic regions, however, it is now customary with some ships, when they find whales abundant, not to delay matters by boiling out, but they stow away the blubber 'tween decks (where, in this cold climate, it will hold its own for a long time), and, when full, put out for Plover Bay and boil out at anchor. In Hudson Bay it is said by some

*Arctic Regions, vol. ii.

†Voyage to Spitzbergen, pp. 133, 134.

whalemen that when a whale is taken among the ice and cannot be towed to the vessel, small tackles are carried in the boats to the whale, and where they are enabled to get sufficient purchase to roll the animal they take off the blubber, cut it into horse-pieces and drag it to the ship on sleds. In sperm whaling, however, no delay can be suffered in extracting the oil, which is attended to as soon as possible, or the blubber will blast, and when put into the pots will, as it is termed, run together, forming a consistency of, and almost as sticky, as glue, and in this condition the oil becomes black and unsalable. In the English sperm fishery, in 1820, the oil was reduced from the blubber shortly after it was taken on board, in the try-works, with which the ships engaged in this fishery were always provided. There were two coppers (kettles) in the try-works, placed side by side, near the fore-hatch. These, with their furnaces, did not differ from those now in use on American ships. They were made of brick-work, occupied a space of 5 or 6 feet in length by 8 or 9 in breadth (fore and aft, and athwart ship), and 4 or 5 feet in height. There was also a cistern for the water.*

SCRUBBING.—When cruising in low latitudes during warm weather many of the sperm whalemen deposit their blubber on deck, instead of stowing it away in the blubber-room. In this case the decks are infrequently washed when running the works; they are, however, "lippered up" regularly while boiling, for the sake of cleanliness and economy as well, it being desirable to save the oil which exudes copiously from the blubber. Except when whaling or boiling out, or when something of an extraordinary nature occurs to prevent it, the deck of the sperm whaler is scrubbed daily, Sundays excepted. Many of the southern right whalemen, instead of washing their decks, clean them by means of the ordinary scraper, a small triangular instrument with sharp edges and wooden handle, familiar to all seafaring men. There is always more or less fog on right-whale grounds, accompanied by a fine mist, called by some whalemen a fog-storm, since the water drips freely from the mast-heads, yards, ropes, and rigging, and rather gives the impression that the ship is in a state of profuse perspiration. During these light rains, the water being obtained from the cisterns of the clouds without manual labor, the decks are usually swept with brooms several times a day. After leaving the whaling grounds for the home port all right whalemen have a general scrubbing; many of them commence at the lower mast-heads and wash down, using lye and sand in abundance. On all whaling vessels the decks are well scrubbed after each fare has been boiled out and stowed away. A liberal supply of salt water is thrown on, and the scrubbing in the southern fishery is usually done with cocoanut brooms; the bulwarks are washed with lye made from the ashes of scraps, or perhaps with salt water and sand. Scrubbing the decks of a well-soaked blubber hunter in the lower latitudes is an ungrateful task, except in so far as the superficial filth is carried away, for the powerful rays of a tropical sun draws the oil from the planks and renders the condition of the deck almost as bad as before. In lippering up decks a man takes an oil scoop in one hand and the lipper† in the other, with which he brushes the refuse fluid into the receptacles and transfers it to the tubs.

Holy-stones, so extensively employed in the Navy, are seldom if ever used by whalemen. The latter rely solely upon their scrub-brooms and the calcined ashes of scraps for removing sperm oil, and upon the scraper for removing right-whale oil. Sperm oil in its natural condition when fresh may be washed off with comparative ease, but after being cooked it is removed with difficulty. Right-whale oil, on the other hand, has a tendency to glue up or gum up the decks—whence

* Godman.

† A lipper is a piece of thin blubber of an oblong shape, with incisions in one end for the men to grasp. The lippers best adapted to this purpose are cut from the posterior edge of the corner of the flukes, and sometimes pieces of the head skin are used. Sometimes a piece of leather may be used. Different vessels employ different utensils of this kind. A large metal ladle used for scooping up the oil from the deck is also called the lipper.

the name "right-whale glue" often given this kind of oil—consequently considerable labor and strong lye is required to wash it off. Humpback oil has the same effect, and should be treated in the same manner.

Some whalemen contend that it is bad luck to wash off the blackskin which has accumulated on the main-mast during the process of boarding the blubber, and indeed some of the old sperm whalemen will not permit it to be removed until the season is over. They will tell you that the presence of blackskin on the mast cannot possibly influence their catch of whales; that whales will be scarce or plentiful as the case may be, but they show that there is a discrepancy between their words and their actions by declining to remove the substance until a full ship is reported, or until the season is up. They contend that a mast patched with pieces of whale skin does not look so bad after all; on the contrary, their presence should be hailed as an emblem of industry and activity, and overwhelming proof that all hands have been hard at work. This is one of the whaleman's superstitions, to the influence of which he usually yields with becoming modesty and gracefulness.

7. THE HOMEWARD PASSAGE AND ARRIVAL.

Making the home passage.—Should the ship be in the Pacific or in the Indian Ocean, very little, if anything, is done towards fitting the vessel for the home passage until "square away for home," and then it generally occupies nearly all of the passage, usually about three months, to get everything in ship-shape. The vessel now, it may be said, for the time being, loses her identity as a whaling craft, and becomes a carrier, and the captain is anxious to go into port with a clean and "smart-looking" vessel. The first thing to be attended to is the rigging, which is "set up" wherever needed. The seizings are "squared" on the lower rigging; the rigging is "capped," "rattled down" (which expression signifies that it is "rattled up"), and finally "tarred." By this time, if the ship has "good luck," she may be in the Atlantic Ocean, probably well up to the "line," and, having been thoroughly washed, the crew, after cleaning the iron-work, get ready to "paint ship," including the outside (bulwarks), inside, and spars. This is usually done while running through the northeast trades. The mast-heads are manned during this time, unless the ship has her holds "chocked off," in which case it would not be necessary to keep the men on the look-out. As the ship nears the Gulf Stream it was formerly customary to "overboard try-works." When she strikes soundings all of the gear is taken out of the boats; the craft bundled up and stowed down overhead, care being taken to keep the gear of each boat separate. The boat sails are unbent, and, with the drags, short-warps, lantern-kegs, boat-knives, hatchets, compasses, rowlocks, and other smaller articles belonging to the boat are stowed away in a large cask and marked "boat-gear." The cutting-pendants in the mean time have been taken from the mast-heads. The craft is bundled up with canvas around the points. The boat-masts, paddles, and rudders are stowed on the afterhouse. The oars are usually left in the boats. The blubber-hooks, the cutting-falls, the blubber-tubs, &c., are stowed in the fore-hold.

A ship cruising in the Atlantic Ocean usually commences to fit up ship about a month before starting for home, tarring, rattling, and capping the rigging, but she waits until making her passage before she commences to paint. The spars, yards, and masts are painted while the sails are set, the crew taking advantage of a good "spell of weather" for the purpose. It often happens, however, as the whalemen express it, they "get caught," and are compelled to shorten sail before the paint has dried, which, as can be readily imagined, produces a very bad state of affairs.

The crews are always willing workers at such times, more especially if they have a good fare. "Getting home," an old whaleman tells me, "if a man has a home, from one of these voyages is the only real pleasant thing about the whole trip. The days of arrival have been the happiest I have ever seen."*

WETTING THE HOLD.—During the voyage it is important that the oil casks be kept wet in order that the hoops may fit tightly and remain intact to prevent leakage of oil. To this end the hose is brought to the hatches about three times a week and a copious supply of water is run down into the hold and deluges the casks. Sometimes in low latitudes the hatches are removed and water thrown down. The casks are also wet as soon as the hold has been stowed.

THE ARRIVAL HOME.—The return of a vessel is a signal for an animated scene upon the streets and docks of New Bedford. Perhaps a revenue cutter or some coasting vessel may sight the returning whaler off Block Island and convey the news directly or indirectly to New Bedford, or the vessel may bear down upon Clark's Point, particularly at night, before any one at her home port is aware of her proximity to the coast. The custom-house officials, who are always on the *qui vive* for arrivals, usually ascend the cupola of the building when an arrival is reported, and with marine glasses endeavor to recognize an old acquaintance in the vessel, whose identity can be established by certain peculiarities, which, to trained and familiar eyes, characterize every ship. The name of the vessel being known, her agent, or owners, immediately hire a tug and steam out to meet her, to hasten her arrival to the dock whence she sailed. Meantime the "sharks"—an immense school of them—which now consist of outfitters, boarding masters, and cartmen, are among the most

* The following sailors' chanty for heaving at windlass has been forwarded by Capt. Amos C. Baker, Clark's Point Light, Massachusetts:

I thought I heard our captain say:
Good by, fare you well; good by, fare you well;
That to-morrow is our sailing day:
Hurrah, my boys, we're homeward bound.

We're homeward bound to New Bedford Town;
Good by, fare you well; good by, fare you well;
When we get there we will walk around;
Hurrah, my boys, we're homeward bound.

Heave away, my boys, heave away:
Good by, fare you well; good by, fare you well;
To-morrow is our sailing day;
Hurrah, my boys, we're homeward bound.

And now our ship is full, my boys;
Good by, fare you well; good by, fare you well;
We'll think of home and all its joys;
Hurrah, my boys, we're homeward bound.

With a flowing sheet we're homeward bound;
Good by, fare you well; good by, fare you well;
When we get there we can stand around;
Hurrah, my boys, we're homeward bound.

Its when you see those New Bedford girls:
Good by, fare you well: good by, fare you well;
With their bright blue eyes and flowing curls;
Hurrah, my boys, we're homeward bound.

When we are paid off, we'll have a good time;
Good by, fare you well; good by, fare you well;
The sparking of girls and the drinking of wine;
Hurrah, my boys, we're homeward bound.

We'll spend our money free when we're on shore:
Good by, fare you well; good by, fare you well;
And when its all gone we'll to sea for more;
Hurrah, my boys, we're homeward bound.

active and energetic. They are usually aware of the approach of the vessel before any one else knows of it; they can tell her name with greater ease and at a greater distance than any one else, and they always have the "smartest" and best-sailing sloop or schooner in the harbor. During the fall of 1882 I watched these maneuvers with a peculiar interest, and being myself a participant in the exciting scene in search of news and "curios" I was sometimes thrown rather too intimately in contact with them. It was to their interest financially to board every incoming whaler; it was to my interest as an investigator to be also among the first. Oftentimes I accompanied Capt. James V. Cox, the custom-house official, and again one of the reporters of the New Bedford papers, and sometimes I engaged a small boat with a Portuguese as a motive power. All of the boarding is done between Clark's Point and the dock. When the "sharks" stipulate for a vessel, they agree to pay a certain amount *pro rata*, and watching their opportunity their little vessel shoots rapidly alongside the swiftly incoming whaler, as the noisy little tug hurries it along; and without stopping, but upon the point of osculation, the "sharks" spring from the deck of their little craft to that of the whaler, and the boat that landed them, circling gracefully around like a bird upon the wing, makes a complete detour of the returning vessel, and shoots alongside her warf. The whalemen, many of whom are strangers to us and our customs, are idle spectators of the busy bustle of numerous little boats about them, their vessel being under snug sail and in care of the tug. The old hands know what to expect, but they cannot avoid it; and the new ones know not what to expect and have something to learn. All of them have packed their chests and tied their superfluous clothing in bags made of cotton duck, and both chests and bags are securely fastened with frequent turns of pieces of lance warp or whale-line. The men, leaning upon the bulwarks or main rail, gaze listlessly upon the little boats darting hither and thither; but the scene changes when the "sharks" swoop down upon them. One "shark" fastens upon a whaleman, another upon his chest of clothing, and a third upon his bundle; some exact promises for trade and others for board. The boarding-house keeper having induced a whaleman to sojourn at his house, marks its number and name of street upon the chest with a piece of chalk. Now the cartman comes in for his profit, which is 25 cents for every chest or bundle he conveys to the hotel, the sum being paid on the delivery of goods by the boarding-house keeper and afterwards collected from the boarder, for be it remembered that the whaleman under all circumstances foots the bills. The head cartman, therefore, who may be engaged by the "sharks," or a part of them, takes under his charge every package marked by the boarding-house keeper for whom he is working, all agreements having been previously made. A lively scuffle sometimes ensues; the "sharks" may show their teeth and snap at one another; sometimes there is a rough-and-tumble fight or a bitter war of words when plying their vocation, and even afterwards, for the defeated "sharks" generally evince their displeasure by abusing the more fortunate ones. At times a school of garrulous "sharks" may surround a pilgrim who has no knowledge of English nor of the manner of conducting matters upon the arrival of a whaler in an American port, but, amazed and confused by the surrounding incidents, in answer to perhaps a dozen calls upon him at once, not knowing what to say, he may nod assent to all, which the nearest "shark" takes in affirmative, and while "shark" No. 1 is searching for the chest, "shark" No. 2 may also approach the unfortunate and also receive a pantomimic answer signifying an unconditional surrender. Consequently, when number one returns with a writ of *habeas corpus* in the shape of a clothes chest, number two enters a *nolle prosequi* with a clothes bag, and the result will be a lively passage at arms. But to the victor does not always belong the spoils, for a third "shark" steps in, while the other two are fighting, and carries off the boarder and his baggage. During these exciting times I usually pre-empted a convenient spot where I could see and hear, and, as soon as the battle of the "sharks" was over, and sundry piles of baggage and plunder lay about the field, I interviewed the crew for news and "curios".

THE WHALEMAN'S SHARE OR LAY.

THE LAYS.—As the financial matters of a whaling vessel are conducted on the mutual co-operative system, none of the men receive wages, but are paid a certain proportion of the earnings of the vessel, drawing in the mean time such supplies as they need, which are charged to them and deducted from their profits at the end of the voyage when settlements are made. This system originated with the Dutch, in the early part of the seventeenth century, when they reorganized the Greenland fishery, in the interest of economy and efficiency, and it has ever been the basis upon which the settlements for whaling voyages have been adjusted in this country. The owners of the vessel provide all the necessary outfit of apparatus and food supplies and bear all the expenses of preparing the vessel for the voyage and of discharging the cargo on arrival home or for its transshipment from foreign ports. The shares, universally termed "lays," are the proportionate parts of the value of the cargo. "Short lays" are the perquisites of the officers, being graded according to rank, and are the most profitable; the "long lays" are received by the crew. The lays vary somewhat with the times, as well as at the different ports, and they also depend upon the disposition of the owners or agents of the vessels, and upon the abundance or scarcity of whalemen when the crew is shipped. The experience of a veteran whaling captain of New Bedford illustrates the system of lays, as well as the grades of promotion peculiar to whaling vessels. He says: "When I was a cabin boy in the old ship Messenger, a four-boater, I had the $\frac{1}{215}$ lay; the next voyage, before the mast, in the bark John Dawson, a three-boater, I had the $\frac{1}{165}$ lay; the next voyage, as boat-steerer in the same bark, I had the $\frac{1}{65}$; the next voyage, as third mate of the Awashonks, a four-boater, I had the $\frac{1}{68}$ lay; the next voyage, as second mate of the Stafford, a three-boater, I had the $\frac{1}{28}$ lay; the next voyage, as mate of bark Atlantic, a four-boater, I had the $\frac{1}{23}$ lay; the next voyage, as master of the A. R. Tucker, a three-boater, I had the $\frac{1}{16}$ lay, and the last voyage, in the same vessel, I had the $\frac{1}{14}$ lay. The captain sometimes receives as high as the 8th, 10th, and 12th lay, depending upon his experience, especial fitness for certain branches of the fishery, and the terms he can make with agents, and sometimes he gets a bonus besides."

The crews of San Francisco receive the following lays: Captain, $\frac{1}{12}$; mate, $\frac{1}{20}$; second mate, $\frac{1}{30}$; third mate, $\frac{1}{45}$; fourth mate, $\frac{1}{55}$; fifth mate and boat-steerer, $\frac{1}{65}$; boat-steerers, $\frac{1}{80}$; cooper, $\frac{1}{50}$; cook, $\frac{1}{120}$; steward, $\frac{1}{100}$; blacksmith, $\frac{1}{160}$; foremast hands (whalemen), $\frac{1}{165}$; and foremast (green), $\frac{1}{180}$.

Until within five or six years the agents charged the crew $12 to $15 each for loading the vessel and discharging the cargo, the work being done by outside labor. At the present time, however, the agents pay all expenses of getting the vessel ready for sea and of discharging cargo on her return.

While the oil is on the ship it is at the risk of the crew, but when it leaves the ship the owners of the vessel insure it for the benefit of the crew. Sometimes it is insured by the officers of the ship who are often large owners.

When a vessel is returning home with an amount of freight in addition to the regular cargo the crew may receive wages besides their lay or share in the voyage.

The following are the most common lays received by the New Bedford sperm whalemen:

The green hands in a four-boater get from the 180th to the 190th; in a three-boater from the 170th to the 180th. Those who have made a voyage would get in a four-boater about from the 160th to the 195th. The seamen get from 140th to 160th.

The cooper in a four-boater, if he has made one or more voyages and is a capable ship-keeper, would get about the 50th or the 55th lay, but if green, about the 75th. In a two-boater a competent cooper would get about the 45th lay and a green one about the 60th.

The steward in a four-boater would get from the 100th to the 150th, and in a three-boater the 30th.

The cook would receive about the same lay as the seamen, and, in addition, a certain percentage of the "slush."*

The boat-steerer or harpooner in a four-boater gets from the 75th to the 90th lay. If he is a "crack" man, and has "struck everything and never missed his chance," he would receive the 75th, if green about the 80th or 90th. In a three-boater a skillful harpooner would get about the 65th lay, and one less skillful the 75th.

The fourth mate gets about the 60th or 65th lay.

The third mate in a four-boater gets from the 45th to the 60th lay; in a three-boater, from the 38th to the 45th.

The second mate in a four-boater gets from the 30th to the 40th; in a three-boater, from the 28th to the 35th.

The mate in a four-boater gets from the 20th to the 25th; in a three-boater, from the 18th to the 23d.

The master gets in a four-boater from the 12th to the 17th and in a three-boater from the 10th to the 16th.

The men sailing from Provincetown receive shorter lays than the New Bedford whalemen. The vessels of the former port are of a smaller class, and instead of making extended cruises to distant points in the Pacific Ocean and the Arctic regions, make short voyages in the Atlantic, and consequently their outfits are not so expensive as those of the ships and barks of New Bedford, and the owners can afford to offer greater inducements to the crews.† Capt. N. E. Atwood, of Provincetown, kindly furnishes the accompanying data concerning the lays at this port.

The following is a sample of the lays paid by the owners to the officers and crews sailing from Provincetown in 1880:

Schooner Carrie W. Clark, 116.34 tons, three boats.			Schooner Clara L. Sparks, 95.76 tons, two boats.			Schooner Antarctic, 100.66 tons, two boats.		
No. of men.	Rank.	Lay.	No. of men.	Rank.	Lay.	No. of men.	Rank.	Lay.
1	Captain	10th.	1	Captain	10th.	1	Captain	10th.
1	Mate	16th.	1	Mate	12th.	1	Mate	12th.
1	Second mate	21st.	1	Boat-steerer	20th.	2	Boat-steerers	22d.
1	Boat-steerer	45th.	1	do	22d.	1	Ship-keeper	35th.
2	do	43d.	1	Ship-keeper	33d.	1	Steward	45th.
1	Ship-keeper	55th.	1	Steward	60th.	1	Cook	80th.
1	Steward	41st.	1	Cook	90th.	1	Seaman	100th.
1	Cook	80th.	1	Seaman	75th.	8	Green hands	140th.
2	Seamen	140th.	2	Seamen	90th.	1	Green hand	160th.
1	Seaman	125th.	1	Seaman	100th.	17		
11	Green hands	160th.	4	Green hands	120th.			
23			15					

* Various kinds of grease saved during the voyage in the galley. A sperm whaler will bring home perhaps four or five barrels of "slush," which are sold to soap manufacturers.

† The Provincetown vessels do not, however, bring in such large and valuable cargoes, but their trips are more frequent.

The profits of the whalemen have for many years been very uncertain. Many months may be spent in an unsuccessful cruise over many quarters of the ocean, and the vessel return home without a barrel of oil. Again, a voyage of short duration may result in very great success, and the officers and crew receive suitable recompense for their dangerous toil.

Among the most successful voyages may be mentioned that of the ship Envoy, which sailed in 1848. In a 55 days' cruise in the North Pacific this vessel secured 2,800 barrels of whale oil and 40,000 pounds of bone. This oil and bone was transshipped home, and a second cruise made, when 2,500 barrels of oil and 35,000 pounds of bone were secured. Including some oil purchased at a nominal price from a wrecked vessel, the profits of this voyage were about $138,000. The ship Corinthian sailed in 1862 from a four years' cruise, having secured a cargo valued at $275,000. In more recent years some profitable voyages have been made. The bark Alaska arrived at New Bedford in 1880, having taken 3,255 barrels of sperm-oil, the largest quantity ever secured on a single voyage. In 1878 the bark Adeline Gibbs made the remarkable find of 132¾ pounds of ambergris, which sold for $23,231.25.

As an example of the "hard luck" sometimes experienced by whalemen, Capt. Gurdon L. Allyn, a veteran sealer and whaler, who had made several successful voyages, tells me that he sailed from New London on the bark Tempest May 21, 1857, bound for Spitzbergen, with hopes of a successful voyage such as Scoresby and other early whalers used to make. On July 28 the Spitzbergen mountains were sighted, but no whales had been seen. "We crossed to East Greenland and after a month's unsuccessful cruising made sail for the Azores, which we reached September 8 without having seen a whale. Here we learned, much to our disgust, that the sperm whalers had been very successful. We cruised over the usual grounds, but the season being late we found none. We continued south, bound for the Indian Ocean, and on December 31 caught our first whale near the Crozette group." Captain Allyn continued his cruise from the Indian Ocean into the Southern Pacific, and thence to the North Pacific and Okhotsk Sea, but had little success. After three years' almost total loss of time the little oil secured was transshipped at Honolulu and the vessel turned over to another captain, but only after Captain Allyn, who was owner of the vessel, had suffered a loss of $7,000 by the voyage.

PART XVI.

THE BLACKFISH AND PORPOISE FISHERIES.

By A. HOWARD CLARK.

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1.—THE BLACKFISH FISHERY.

HISTORY AND METHODS OF THE FISHERY.

The fishery in New England.—Enormous schools of blackfish (*Globiocephalus melas*) occur everywhere in the Northwestern Atlantic, and indeed, if identical, as is supposed by many, with the European species, throughout the North Atlantic. They often strand on the sandy beaches of Cape Cod, and when a school of them approaches the shore they may be driven in upon the beach with the greatest ease. In the year 1874 it is estimated that three thousand blackfish were stranded on the sandy shores of Cape Cod, and smaller schools have frequently been driven ashore at that cape and other places in New England, so that the entire number secured during the past twenty years will reach several thousand. As there is very little expense connected with their capture, the proceeds obtained from their sale is almost clear gain to the captors. Another species of blackfish (*G. Scammonii*) abounds in the Pacific, but is not a special object of pursuit.

The excitement which is created in the fishing towns of Cape Cod when a school of blackfish appears off the shore is illustrated by a story told by a correspondent of the Worcester Spy: "There are many amusing stories told about the appearance of blackfish. On one occasion when services were being held in the village church here, the minister being engaged in his sermon, some one in the street cried out, 'Blackfish!' Many in the congregation heard it, and a rush made for the door, when the minister cried out, 'Stop!' Some turned about, expecting to be reproved, but the minister in his excitement only said, 'Now all take a fair start,' and joined the crowd himself; and when pursuing the fish shouted out, 'Hallelujah! hallelujah!' He got his share, which amounted to $25. At another time one man who had failed to put in an appearance until the fish were driven in claimed his share, as he had not heard the alarm as soon as the others. A town meeting had to be called to settle the matter, and though it was a unanimous vote that his share was forfeited, yet he pleaded his case so eloquently that 'half a share' was voted him."

Capt. N. E. Atwood, of Provincetown, says that when he was a boy he used to hear his grandfather talk about blackfish running ashore. His father, born in 1784, knew nothing about them, but when he, born in 1817, came to be a man grown, they began to come back into the bay.

This was doubtless in 1829 when, we are told, a school, about forty in number, was taken at Provincetown, being the first for many years. Sometimes there have been three or four years when they have not appeared, then for twelve or thirteen years they are abundant.

"In August, 1875," says Mr. G. Brown Goode, "news was received at the headquarters of the U. S. Fish Commission at Wood's Holl that a school of blackfish had been driven ashore at Dennis. A party was dispatched by the first train, with instructions to bring home some of the largest, to be molded in plaster of paris for the fishery collection then in preparation for the International Exhibition in Philadelphia, in 1876. They reached Yarmouth Station, and took wagons across the cape to Dennis, where an assemblage of great carcasses was found on the shore, while their owners, to the number of forty or fifty men and boys, comprising all who had been in the boats which drove them ashore, were standing about on the beach or sheltered in the lee of a row of fish-houses, the day being damp and drizzly. The blackfish varied in length from 6 to 20 feet, many of them being cows with sucking calves. A gash in the breast of one of the cows allowed a stream of rich, white milk, 2 or 3 gallons at least, to gush out. One of the pregnant females, not exceeding 12 feet in length, was dissected, and specimens of young blackfish of various sizes obtained from it, the largest at least 6 feet long. These unborn calves were bluish instead of black in color on the back, and grayish-white beneath. In every instance they were marked by a spiral line of lighter color, which wound about the body five or six times, and which were supposed to have been caused by the pressure of the placental envelope. The old males were the largest, and could be distinguished by the prominent hump between and over the eyes. The school numbered one hundred and nineteen, and were sold that evening to Provincetown oil-makers at the rate of $11 each. The Fish Commission party had previously bought three, for which they paid $14 each, making in all $1,318, or perhaps $25 or $30 to each captor. All business negotiations were conducted by a committee of seven men, selected from the oldest and most reliable of the company. In the settlement a boy draws half a share, a man or a boat a full share. The blackfish are usually sold at auction, and if there are several buyers they usually bid off the bodies by deputy and then have a second auction, at which only those bid who wish to try out the blubber. We could not handle the largest and were obliged to be content with some about 14 feet long, which we had transported on wood-wagons to Yarmouth, and conveyed to Wood's Holl by special train, getting in after midnight. Dissecting and modeling were vigorously pursued for the next week, and many trophies of this day's work decorate the walls of the U. S. National Museum."

The following account of the manner in which blackfish are driven ashore and killed is from the pen of a veteran fisherman of Provincetown:

"They make their appearance about the shores of Cape Cod and Barnstable Bay from early in the summer till early in the winter, and when it becomes known that a school of blackfish is in the bay the boats are manned and proceed at once to get in their rear, and as the fish are on the surface of the water the most of the time, it is easy to tell how to manage to keep them between the boats and the shore. And while in this position the men in the boats will make all the noise with their oars they can, and that will cause them to go in the opposite direction from the boats and toward the shore; and when the fish find that they are in shoal water, by seeing the sandy bottom, they become alarmed and go with all their might till they run fast aground on the sand. The boats then row in their midst, the men, with lance in hand, jump out their boats in the water and butcher them as a butcher would a hog, and it becomes one of the most exciting occasions that it is possible to imagine, for the water flies in every direction and the blood flows freely until death puts an end to the great tragedy.

"When the water ebbs and leaves them dry upon the beach, then their blubber is taken off, cut in slices and the oil fried out, about 30 gallons of oil, upon an average, being obtained from each fish, besides about 6 quarts of extra oil from the melon. The melons are taken from the top of the head, reaching from the spout-hole to the end of the nose and from the top of the head down to the upper jaw, and when taken off in one piece they represent a half water-melon, weighing about 25 pounds, and when the knife is put into the center of this melon the oil runs more freely than the water does from a very nice water-melon; hence the name melon oil."

As may be inferred from what has already been written, blackfish oil is of considerable value, and a school of these cetaceans is no small windfall to one of the cape villages. The oil is rated as common whale oil, and for a few years has sold at from 30 to 50 cents a gallon. Cape Cod has two oil factories, established chiefly for the purpose of trying out blackfish blubber.

The head oil or melon oil, as also oil from the jaws, is refined in small quantities for the use of watch and instrument makers, and is sold under the name of porpoise-jaw oil. A history of its manufacture is given below in the discussion of the Porpoise fishery.

CAPTURE BY WHALERS.—Blackfish are not usually an object of pursuit by whalemen, but when the larger prey is scarce their time is sometimes occupied in taking these animals.

In addition to the shore fishery for blackfish, Provincetown for many years sent three or four vessels of its whaling fleet to the east of the Grand Banks of Newfoundland in search of blackfish. They were equipped like the sperm whalers and employed the same methods of oil manufacture. It was by one of these vessels, the Edwin and Rienzi, that the Hatteras sperm-whale cruising ground was discovered in 1837. Captain Henry Clay, of New Bedford, tells me that the blackfish captured at sea average larger than those that are beached. The average yield of oil is about 40 gallons, but he has seen individuals that yielded 150 gallons, and has heard of some that stowed down over five barrels each. Few whalemen take the trouble to separate the head and body oil. The method of capture practiced by the Provincetown whalers was as follows: As soon as a school was sighted, two boats' crews were lowered, and chased the fish as they would a school of whales. The boat-steerer fastened on to one or perhaps two at a time. The second fish he fastened to with the second iron. Number two would flounce about without drawing the harpoon. The boat-header killed either one he could reach first. Instead of towing the dead fish to the vessel, air-tight kegs or "pokes" were made fast to them so that the ship-keeper could pick them up, and the boats cut the lines and followed the school. When the water is bloody the fish apparently make no exertion to escape, and oftentimes a dozen or fifteen would be killed at a lowering. In removing the blubber, cutting-gear similar to that used for cutting in whales, but lighter, was employed. If the fish were small a strap was put round the flukes and they were hoisted in to be cut up on deck; but the large ones were decapitated in the water. The head was hoisted in, and the blubber cut lengthwise of the fish, and a circle round the body near the "small"; a long shanked hook attached to the cutting tackle was inserted in the blubber, and as the men heaved at the windlass the carcass revolved in the water, and the blubber, in one piece with the fins attached, was peeled off with one revolution. The blubber was also removed from the "small." The head was dissected on deck; first the melon was removed, then the throat, next the under jaw, and lastly the "head-skin," which is the whaleman's term for the blubber on top of the head. The sides and back of the neck are mainly "white-horse."

The method of capture by the Pacific whalemen is thus described by Scammon: "When a ship's boat is lowered for blackfish, the chase begins as for other whales, although many masters have their boats all ready and run just ahead of or into a 'school' with the ship before lowering, by which means the animals are so frightened or 'gallied,' that they 'bring to,' or move slowly in

all directions, giving the boats, which are instantly lowered, a good chance to 'get fast.' The harpoon frequently kills the fish; if not, a few darts with the hand-lance dispatch it. As soon as it is dead the prize almost invariably sinks, and if the ship is close at hand, it is towed to the vessel at once; but if a considerable distance away, it is either made fast to the 'loggerhead' at the stern of the boat, or a buoy is tied to it and left, to be afterwards recovered, the boats still continuing the chase. In this way quite a number are captured from one school."*

The following list of arrivals, though incomplete, will give an idea of the quantity of black-fish oil, in addition to their regular cargoes, brought home by some of the whaling vessels:

Name of vessel.	Home port.	Date of arrival.	Quantity of oil.
			Barrels.
Factor	Nantucket	Sept. 12, 1832	9
Joshua Brown	Provincetown	Nov. 22, 1845	6
Troy	Bristol, R. I.	Condemned	3
Peru	Nantucket	Dec. 27, 1850	60
March	Yarmouth	Aug. 4, 1850	30
Gov. Hopkins	Dartmouth	May 28, 1851	14
James Loper	Nantucket	May 10, 1851	40
Leonidas	Westport	Sept. 20, 1851	30
Mary	Nantucket	Nov. 17, 1851	30
Napoleon	do	May 16, 1851	13
Rambler	do	July 28, 1851	8
Sea Shell	Provincetown	Aug. 15, 1851	20
Catawba	Nantucket	June 17, 1852	29
Harvest	do	Mar. 20, 1852	50
Peruvian	do	Aug. 10, 1852	70
Hamilton	do	May 20, 1853	25
Do	do	June 25, 1853	34
Do	do	July 29, 1853	4
Walter K	Provincetown	June 27, 1853	15
Hamilton	Nantucket	July 26, 1854	130
John and Edward	New Bedford	July 24, 1854	10
William P. Dolliver	Nantucket	June 26, 1854	97
Nautilus	New Bedford	Apr. 24, 1855	6
Nonpariel	San Francisco	Oct. 14, 1855	150
Peru	Nantucket	May 31, 1855	200
Do	do	May 7, 1863	12
Cetacean	Provincetown	Aug. 29, 1866	8
Mattapoisett	Westport	Aug. 5, 1866	30
Stella	New Bedford	Lost	6
C. H. Cook	Provincetown	Aug. 10, 1867	15
Hecla	New Bedford	May 29, 1867	11
Abby Bradford	Nantucket	Aug. 31, 1868	8
Oak	do	Sept. 20, 1869	15
Eunice H. Adams	do	June 14, 1870	10
Irving	New Bedford	May 13, 1870	2
President, 2d	do	Sept. 20, 1874	10

HISTORICAL NOTES AND STATISTICS OF THE BLACKFISH FISHERY OF CAPE COD.—The following items, gathered from various sources, show the importance of the blackfish fishery during the past one hundred and fifty years:

1741.

In May, 1741, we are told a Spanish privateer, under Don Francisco Lewis, captured and carried away a whaling sloop from Barnstable. The season was unfavorable for whaling on the capes, but late in the summer and the early fall of 1741 the inhabitants were cheered by the advent of great numbers of blackfish and porpoises. By the end of October they had killed one

* SCAMMON: Marine Mammalia, p. 87.

hundred and fifty porpoises and over one thousand blackfish, yielding them about 1,500 barrels of oil, for the most of which they found immediate sale. "This unexpected success so late in the year put new life into some who had spent all the former season of the year in toil and labor to little or no purpose."*

1744.

In 1744, it is narrated by the Boston News Letter, a Nantucket Indian struck a blackfish, was caught by a foul line, carried down, and drowned. This and the preceding are the first instances of the use of the name which I have met with.

1753.

In 1753 is was voted, "for the time to come, if any person shall take a boy under ten years old to drive blackfish or porpoises, he or they shall have nothing allowed for the boy; and that when any blackfish or porpoise shall be driven ashore and killed by any number of boats of the inhabitants of this town, if one man or more shall insist on having the fish divided to each boat, it shall be done."

1770.

In 1770, it is said by Pratt in his History of Wellfleet, all the oysters in Wellfleet Bay died. "What caused this destruction is not certainly known, but it is supposed that, as, at this time, a large number of blackfish died and came on shore, where their carcasses remained, producing a very filthy condition of the water, it caused this mortality."

Another historian of Wellfleet, in the last century, remarks: "It would be curious indeed to a countryman, who lives at a distance from the sea, to be acquainted with the method of killing blackfish. Their size is from 4 to 5 tons weight, when full grown. When they come within our harbors boats surround them. They are as easily driven to the shore as cattle or sheep are driven on the land. The tide leaves them and they are easily killed. They are a fish of the whale kind, and will average a barrel of oil each. I have seen nearly four hundred at one time lying dead on the shore. It is not, however, very often of late that these fish come into our harbor."†

1828.

The Barnstable Journal of November 7, 1828, records that "Last week a shoal consisting of fifteen of these fish were surrounded by boats and driven on shore at Truro. The day following seventeen more were taken in like manner at the same place. A number have been take at Orleans."

"A quantity of oil from the grampus lately caught at Harpswell, Me., has been sold at Bath, at $18 per barrel."‡

1834.

"The blackfish driven ashore at Sandy Neck, Barnstable, by several fish boats were stripped of their blubber, which was taken on board of the vessels to which the boats belonged on Friday last and carried to Provincetown for the purpose of trying it out. We learn from one of the men engaged in the business that there were about one hundred and forty driven on shore, of which one hundred and eight only were saved, the undertow of the next tide taking the others off again unexpectedly. It was thought that the blubber saved was sufficient to make 150 barrels, which is worth from $10 to $15 per barrel."§

* Starbuck, Hist. American Whale Fishing, p. 33.

† Levi Whitman in Coll. Mass. Hist. Soc., 1794, iii, first ser., pp. 119–121.

‡ Gloucester Telegraph, November 8, 1828.

§ Barnstable Patriot, August 26, 1834.

1837.

"A small party of fishermen from Squam captured a school of thirty-six blackfish measuring from 12 to 20 feet in length. They were seen near shore, and the fishermen surrounded them in their wherries and drove them ashore, where they killed them with knives, pitchforks, &c. The oil worth $300 to $400."*

1843.

"July 20 about one hundred blackfish entered this harbor. Captain Baxter, keeper of light, discovered them. They were driven into shoal water by the splashing of the oars. Death blows were inflicted with all sorts of implements from a bowie knife to a rake handle, including rusty bayonets, blades of scythes, &c. Seventy-five barrels of oil were obtained. Some of the fish were from 20 to 25 feet long and 15 feet in circumference. If one of the school is lanced so as to bring blood the whole school will follow the track of the wounded fish, hence the first wounded must be driven toward the shore in order to capture the school."†

1850–1852.

"About one hundred and fifty blackfish were captured on Truro beach on Friday week, and one hundred and eighty at Eastham on Monday."‡

"Saturday night a school of blackfish was driven ashore at North Eastham, and twenty-eight were captured."§

1853.

"The Nantucket Inquirer and Mirror of the 4th August gives an account of the capture of blackfish on the 30th ultimo. They took ninety-one in all—the entire school. They attacked these fish in water up to their waists. They are from 10 to 20 feet in length and average half a ton each. The yield will be 150 barrels."

1855.

"On Saturday evening, 31st March, some gentlemen at Little Beach captured a blackfish 18 feet in length. The blubber produced 2 barrels of oil."‖

"Ninety blackfish, the product of which was valued at $1,500, were driven ashore at Wellfleet on Cape Cod, in June, 1855, by a number of boats and vessels that happened to be in the neighborhood. It is unusual for this species to be driven ashore before August, and their appearance so early would indicate their great abundance. Another school was sighted in Provincetown harbor in the same month but the people would not attack them on Sunday."¶

"BLACKFISH.—On Sunday week a large school of very large blackfish were driven ashore at East Brewster and various other points in Orleans and Eastham, where they were nearly all captured. Another school came ashore Monday and were discovered by some fishermen near Wellfleet. The whole number taken was about two hundred and thirty. They were very large, and their oil is valued at $4,000 or $5,000."**

"BLACKFISH.—As the Orleans packet was on her way to Boston Monday she encountered a school of blackfish in the bay and drove them on shore, where they were nearly all captured. They were about fifty in number, and were not probably worth less than $1,000. * * * Fishermen say that they always come in large numbers when mackerel are plenty in the bay, as they subsist on the same food as mackerel. Once in the bay and they are pretty sure to be captured, as they keep close into the shore, in shoal water, and have not the sagacity to find their way out again.

* Gloucester Telegraph, October 14, 1837.
† Barnstable Patriot, July 26, 1843.
‡ Gloucester Telegraph, September 11, 1850.
§ Barnstable Patriot, August 24, 1852.
‖ Lewis & Newhall's History of Lynn, p. 443.
¶ Yarmouth Register.
** Barnstable Patriot, July 10, 1885.

"They are very frequently found in the flats and marshes, where they have been left by the receding tide, and it is customary for the finder to mark them by cutting his initials on their flesh until it is convenient; others, to make the matter doubly sure, drive down stakes and fasten them thereby. The keeper of Billingsgate light-house in Eastham a few mornings since found the shore for a long distance strewed with these fish, that had been frightened ashore during the night by being pursued by some fishing vessels during the day. He proceeded to mark them, according to custom, jumped in his boat and went over to Provincetown, where he sold out his right for $1,000, and his purchasers made a good bargain at that.

"On Friday last Capt. Joseph Hamblin, of Yarmouth, with two or three other gentlemen, drove between seventy or eighty blackfish into our harbor. After pursuing them for a considerable distance they finally drove them ashore, and succeeded in killing seventy-one of their number, and they are now engaged in trying out the oil. This school will yield some $1,500 worth of oil."*

"On the 2d instant about sixty blackfish were captured in Truro on the bay side. They were worth $1,000."†

1859.

"BLACKFISH—LARGE HAUL.—On Saturday last four boats belonging to Brewster, Eastham, and Orleans succeeded in driving ashore at Brewster a large school of blackfish, and, with the aid of people on shore, they were slaughtered by spears, lances, scythes, and whatever came to hand. Nearly seven hundred were captured, the proceeds from which must be something near $7,000, divided among about twenty persons."‡

1865.

Capt. Jonathan Cook, of Provincetown, says: "In November, 1865, I bought seven hundred and sixty-eight blackfish at Wellfleet, at $12 apiece, and paid $9,216 for them."

"BLACKFISH.—A school of blackfish was discovered off Provincetown on Monday night week by some fishing boats, which were immediately put on the chase, and the whole school, numbering two hundred and thirty four, were driven on the beach at Brewster the next day. The fish as they lay on the beach were worth some $10,000. About two hundred men and boats were employed in capturing them, and the shares were quickly sold at some $50 each, making a good day's work. The beach was visited by hundreds of people to behold such a quantity of fish. This is probably the greatest catch of blackfish ever made in these parts."§

1870.

"A young blackfish, 8 feet long and weighing about 200 pounds, was captured at Ipswich on Friday by some fishermen."‖

"The enterprising town of Wellfleet is in luck this year. Its inhabitants have been blessed with a rich harvest in the mackerel fisheries the past season, and last week the packet schooner Nellie Baker, when a short distance from that port on her passage to Boston, fell in with a large school of blackfish, and with the assistance of about twenty boats and seventy-five men from Billingsgate Point, succeeded in capturing seven hundred and forty-one of them. Some of the fish measured over 25 feet in length, and that reliable individual, the 'oldest inhabitant,' averred that there has been nothing like it since he can remember. It is estimated that these fish will yield fully 700 barrels of oil, and they have been purchased by Wellfleet and Provincetown parties at $12 apiece, as they lie on the beach, thus realizing the sum of nearly $9,000."¶

* Barnstable Patriot, July 17, 1855.
† *Ibid.*, August 14, 1855.
‡ *Ibid.*, August 16, 1859.
§ *Ibid.*, November 7, 1865.
‖ Gloucester Telegraph, December 7, 1870.
¶ *Ibid.*, December 3, 1870.

"THE BLACKFISH AT WELLFLEET.—Mr. Cook, of Provincetown, who purchased the blackfish captured by Wellfleet fishermen a few days since, is in this city to-day and states that probably 1,000 barrels of oil will be obtained from the lot. It was the largest school of blackfish that was ever driven on the cape, and another remarkable circumstance is that there was only about a dozen calves among the lot of over seven hundred."*

1873.

"Ninety-three blackfish, yielding 100 barrels of oil, were taken in December at Scituate, near Sandwich, Mass."†

1874.

"In the clearing up of a snow-storm at Friendship, Me., one morning last week, the people living round the harbor were astonished to see it literally filled with blackfish. In a very short time every boat and dory was manned by hardy fishermen, who rowed to the mouth of the harbor, forming a line from shore to shore, and then commenced driving the fish slowly up the harbor, and through a narrow passage into Shipyard Cove. Then the work of killing them commenced. There were one hundred and eighty-one fish slaughtered, the largest 19 feet long, and probably weighing 2 tons; the smallest at least 10 feet; probable average length, 15 feet. It is estimated that they will make 150 barrels of oil, the blubber filling the decks of three large schooners. The oldest fishermen there never saw a blackfish that side of George's Island before."

"LARGE SCHOOL OF BLACKFISH.—Last Wednesday a school of twenty-eight blackfish went ashore near North Truro station. On Friday morning about 7 o'clock more were sighted from the shore. A great number of boats started in hot pursuit, and overtaking them it was discovered the school was a very large one. The driving toward shore immediately began amid great excitement on part of fish, and men too. It was with a good deal of difficulty that the fish were grounded, many having to be slaughtered in water 5 or 6 feet deep. Five hundred and forty-six were, however, landed; but before this was accomplished another school was sighted heading for shore; seventy-two were found to be in this lot, which were secured, making in all six hundred and eighteen fish landed that morning, and six hundred and forty-six during the week, lining the shore of North Truro for nearly a mile. There are, including boats, nearly three hundred shares to divide spoils among—clerks, printers, clergymen, veteran whalers, shipmasters, and photographers all participating in the fracas, and all coming in for a portion of the proceeds. The following gentlemen bought fish at the auction sale Saturday morning, Capt. Gideon Bowley, auctioneer: Eben Cook (for firms of E. & E. K. Cook & Co., and H. & S. Cook & Co.); Charles A. Cook; B. A. Lewis & Co.; Mr. Long, of Harwich; John Thompson, of Truro; George Holmes; Harvey S. Cook, and others. Several parties besides those named being associated with those bidding the fish in. They averaged $9.25 each, distributing $5,777.25 among the people of this town and Truro, many of whom it will materially assist in providing for their winter wants, aid well timed by an overruling Providence."‡

"In 1874 twenty-three hundred blackfish was driven ashore at Truro, stocking from $20,000 to $25,000. Two hundred and eight came on shore November 12, and were sold for $1,300 as they lay."§ "Six hundred and eighteen blackfish were captured at North Truro September 8, 1874, and sold for $5,805.25. The purchasers expect to make $20,000 from the oil."‖

1875.

In 1875 one hundred and nineteen were driven ashore in North Dennis, and sold for $1,309.

* New Bedford Standard, December 6, 1870.
† Provincetown Advocate, December 24, 1873.
‡ *Ibid.*, September 9, 1874.
§ New Bedford Mercury, November, 1874.
‖ Cape Ann Advertiser, September, 11, 1874.

1876.

In 1876 one hundred and eighty blackfish were driven by Provincetown people, and grounded at Orleans. They sold at auction for $2,200.

"October 27, 1876, one hundred and thirty were driven ashore at Yarmouth. The monsters were driven ashore by boat-hooks, axes, forks, &c. One hundred fish were captured, or nearly all the school. They were sold to out-of-town parties for $8 to $10 each."

1878.

In the first week in January, 1878, one school of one hundred and eleven, another of one hundred and fifty, blackfish were driven ashore at Cape Cod. The first were sold at an average price of $6.25 each.

1879.

About the 1st of November, 1879, a school of blackfish visited Ipswich Bay, Massachusetts. The fishermen on the north side of Cape Ann, as soon as they found it out, set to work to capture some of them, and a number were driven upon Coffin's Beach and killed. On the 5th of November they heard that another school had entered the bay; nine dories, containing twenty men, immediately set out from the shore, and about eighty blackfish were driven upon the beach; the next day fourteen were driven ashore, and five more were captured at Plum Cove, making in all ninety-nine fish secured in three days, and by twenty men. The fish varied in length from 8 to 20 feet. The blubber was sold to Dodd & Co., of Gloucester, at 2 cents per pound, and the heads at $1.25 and $1.50 each, yielding $1,000 to the fishermen.

A few blackfish had been taken here before this time. Capt. George Davis, one of the oldest residents in this vicinity, remembers a school of fourteen being driven ashore and captured in October, 1844 or 1845. He also says that a small number were taken here about ten years ago.

The following table shows some of the catches of blackfish on the New England coast during the past one hundred and forty years:

Year.	Month.	Locality.	Number taken.	Barrels of oil.	Value of oil.
1741	May to October	Cape Cod	1,000	1,300	.....
1828	November	Truro and Orleans	32	30	$600
1834	August	Barnstable	140	150	3,500
1837	October	Cape Ann	36	40	350
1843	July	Barnstable	100	75	1,200
1844	October	Cape Ann	22	25	500
1850	September	Truro and Eastham	330	350	6,000
1852	August	North Eastham	28	30	600
1854	.....	Nantucket	91	150	3,000
1855	March	Lynn	1	2	40
1855	July	Barnstable	71	75	1,500
1855	July	Wellfleet	230	250	5,000
1855	July	Eastham	50	45	1,000
1855	August	Truro	60	50	1,000
1859	August	Brewster	700	750	5,000
1865	November	Wellfleet	768	1,000	9,216
1870	.....	do	735	1,000	10,000
1873	December	Sandwich	93	100	1,000
1873	.....	Orleans	150	125	1,300
1874	September	Truro	*646	630	5,777
1874	November	do	208	200	1,300
1874	December	Friendship, Me	181	150	1,200
1875	August	North Dennis	119	125	1,309
1876	October	Orleans	180	160	2,200
1876	October	Yarmouth	130	125	1,040
1879	November	Cape Ann	93	80	1,000

* Caleb Cook states that three thousand blackfish were found stranded at different points on Cape Cod in 1874.

THE BLACKFISH FISHERY AT THE FAROE ISLES.*—At the Faroe Islands the blackfish (*Globiocephalus melas*) fishery is carried on in practically the same manner as at Cape Cod, on the Massachusetts coast. The schools of blackfish are driven ashore and killed, or are lanced and towed ashore. They are in some cases kept in the bays or fiords by a large net, a smaller one sometimes being used to gather the animals nearer together so as to drive them ashore. When impossible to drive them the crew of each boat kill as many as possible with lances or harpoons.

When a herd is discovered, a signal is given, and boats from the different islands meet at the place appointed by the signal fires or by the white-blanket signals displayed on the hills. The boats immediately form in half circle about the school, and by throwing stones in the water drive the animals to the fiord. A noise with tin pans is sometimes made to increase their confusion.

Leaders are elected, who give orders to the several boats, and every person is obliged to obey instructions given. Besides stones for throwing in the water, each boat has whale lances and hooks—the largest boats four lances and three hooks. The lances are 12 inches long and 4 inches broad, on a wooden shaft 6 feet long. The harpoon is seldom used, and only at the last extremity, when it is found impossible to drive the animals.

The net used for driving is 200 fathoms long, 8 fathoms deep, with meshes 6 inches square made of 9-yarn rope; lead sinkers on the bottom rope, and fifty oak barrels for floats.

The name "grind" is given to a herd of blackfish, a single whale being called a "grindshval" or "grindfish," the young ones being known as "Leiptur." In olden times these fish, sometimes known as "Huidingur," were a great source of food to the people of Iceland.

White-painted stones are useful to drive the whales. Tin plates beaten against stones are often used to scare the animals. A grind is sometimes held "at bay" in a fiord all night, or until the weather moderates so that they can be driven to the slaughtering ground. When thus "at bay" the herd is called "grinder," and lies quietly stowed together in a limited space as docile as a flock of sheep. The use of a harpoon is prohibited until it is evident that the animals cannot be driven, then each man "goes it alone." The net is trawled behind and about the herd so as to drive them into the fiord and keep them there. Sometimes they rush under or over the net. To avoid their loss in this manner a second net was devised, used within the first, and has been very successfully used for many years.

The smaller net, of 100 fathoms length, and "much easier to handle than the large one, is used to bar the grind upon a smaller portion of the harbor, by which means much time is saved when the grind breaks through the smaller net, as it has not a fourth part of the harbor to move in." Not a single fish has escaped since this plan was devised. From 1843 to 1878 six thousand and thirty whales were caught in this way, worth £20,100; while from 1584 to 1843, two hundred and sixty years, only two thousand one hundred and sixty-nine were caught.

"When the grind has arrived at the mouth of the whale voe the boats are arranged for the attack, generally in three rows, with a proper distance between each row, in order that if the grind should break through the first row the second may take its place and turn it, and so on."

The attack is called "holding a grind to." One of the boats in the first row approaches close to the herd as it swims about in 5 fathoms of water, and wounds one animal with a lance; the wounded animal rushes among the herd and frightens them, when they rush about, generally toward the beach, and many are stranded. The first row of boats rush among the herd and with lances and knives kill as many as possible. The second and third rows of boats keep outside, in clear water, until it is evident the animals are bewildered and seek the bloody water; they then join the other boats, and in a short time dispatch the entire herd.

* Compiled from prize essay by H. C. Müller, published in the Prize Essays of the Edinburgh Fisheries Exhibition.

The first animal is struck in the hind part of the body as the herd is headed toward the shore; if it be struck forward of the back fin it will roll on its side and swim obliquely, and the rest following will break through the rows of boats and perhaps escape.

"From the boats and from the shore the men rush into the shallow water and with a cut in the neck with knives kill the animals, and making fast with their hook and line drag the animals on the beach. On one occasion, in 1873, six hundred and fifty-seven whales were killed in four hours."

"When landed, sworn appraisers mark each whale with number and value; the valuing is done after the old computation of gylden and heind. A whale of medium fatness measures 10 feet from eye to anus, and, according to the regulations, is worth one gylden (20 heind). Few are larger than that."

Each whale yields on an average 1 Danish barrel of oil (30 English gallons), worth about 45*s* The meat is worth half as much, so that a whale of medium size is worth £3 7*s*. 6*d*.

The division is next made as soon as possible, so that each may get his share of meat, which is wholesome and nutritious, and generally pickled.

One-tenth share goes to the Crown, the church, and the minister. The largest and best animal is next selected by the crew of the boat that first reached the herd, and the head of this whale goes to the man who discovered them. A compensation is then made to the village where the killing is done, for entertainment of valuers, and then an allowance for damage to boats and implements and personal injuries; another allowance for keeping watch and valuing; also for the poor box and school fund. The remainder is then divided into four parts. The owner of the land where the whales are killed gets a share, and the rest goes to the "Ragstesmand," which includes the men who do the killing and also the villagers at the killing place.

About a tenth of the whales killed usually sink, and are within ten days fished up and sold at public auction, a salvage of one-tenth being deducted and expended in repairs of bridges and landing places, on the islands. After ten days the whales found are the property of the finder, with the tenth deduction. Each village and person entitled to a share receives a ticket with the number of the whale belonging to them, and they proceed at once to secure it. In the mean time dancing has been going on, and as each boat puts off with its whale or blubber and meat a song of praise is sung. Whales belonging to the public funds are sold at auction.

Number of blackfish taken at the Faroe Islands, 1813 to 1877, arranged by months.

[Add one-tenth for sunk whales.]

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1813 to 1859	223	205	348	873	798	7,152	16,491	16,499	6,666	1,607	897	721	52,480
1860								217	26		397		640
1861						10	111	73	147				341
1862		139					482	508					1,129
1863							318	186			205		709
1864	36								346	192			574
1865		182		146		92	95	468		270			1,254
1866					213	57	660	89	433	300			1,752
1867						2		40	171		177		390
1868										419	1		420
1869							203	409			98		711
1870	248								460			136	844
1871							259		510				769
1872						105		553	82	516	1,051		2,307
1873						142	35	1,389			101		1,667
1874							153	299		124			576
1875								506	237	26			769
1876					182					410	189		781
1877							252		125				377

2.—THE PORPOISE FISHERY.

THE PORPOISE FISHERY OF NEW ENGLAND AND NORTH CAROLINA.

The porpoise, though abundant along the Atlantic coast of the United States, is not captured except at a few places, and in limited numbers. In the Bay of Fundy the Indians shoot harbor porpoises to some extent for their oil. A very graphic description of porpoise shooting by the Passamaquoddy Indians appeared in Scribner's Monthly Magazine for October, 1880.

Along the North Carolina coast porpoises were formerly taken in considerable numbers, but the business was abandoned. There is a porpoise fishery of small importance on the Gulf coast of Florida.*

There appears to have been some interest taken in the porpoise fishery in the last century, for in 1740, according to the Annals of Salem, Mass., "Thomas Lee is on a committee to consider the proposal of William Paine, of Eastham, and his associates, to catch porpoise with a net. The report on this subject was accepted, and an order passed for granting the petition till the last of May, 1742, which was sent up and allowed. The conditions were, that 2*s.* should be paid by the province treasurer for each middle part of a porpoise's tail delivered, on oath, to the town clerk where the shipper or owner belonged, that it was caught in the vessel of the latter, and then the clerk gave a certificate that he had consumed the said part. One original certificate of 1740 declares that sixteen such parts had been consumed, and another that one hundred and ninety-one had been alike destroyed. As the fabled Venus is represented to have saved her life by assuming the shape of a fish, so many a porpoise experienced like preservation by the shortness of the above monopoly. The mode of securing this is among the curiosities whose practical existence has passed away. We love to have an occasional interview with them through the vision of memory and then dismiss them with a hearty good-bye."†

At various times numbers of porpoises have been taken at Cape Cod and other places, as in the summer of 1741 when one hundred and fifty porpoises as also a large number of blackfish were captured at Barnstable, Mass.

We are informed by Mr. Earll that the stretch of coast from Cape Hatteras to Bear Inlet, North Carolina, is a favorite run for the porpoise, and often immense herds of them may be seen moving along within a few rods of the shore. As early as 1810 parties engaged in this fishery, and from one to three crews followed it quite regularly up to 1860, when the fishery was discontinued and has not since been resumed.†

The method of capture consisted in having four seines of 200 yards each loaded in separate boats, and as the lookout gave the signal the boats took their positions, the two outer seines were lashed together, and at the next signal the seines were shot in the form of a semicircle to the shore, the inner ends of the shore seines reaching toward the land, while the outer ends met or overlapped the inner ends of the middle seines and were securely fastened. The distance between the boats was always about the length of the seine, and the boats always shot the outer ends of their respective seines first. While the ends of this united seine were being brought to land one or two boatmen would remain near by to pound on his boat or "jab" the bottom with an oar to keep the porpoise from escaping; but when the ends reached the shore and the porpoise securely penned, the net was

*Since the above was written porpoise fisheries have been resumed at New Jersey and North Carolina, and there is a prospect of the business increasing, as the skins have been found useful for leather, and the flesh may have a commercial value for food. See account by Frederick W. True in Bulletin U. S. Fish Commission, 1884.

†FELT: Annals of Salem, vol. ii, p. 226.

dropped and a smaller net, made of heavy rope, was used to drag them upon the shore. The outer nets were usually made with 11-inch mesh, while the inner was but 9 inches. Though the porpoise seldom tried to break through the net they often jumped over the cork line, and it is said that if one jumped it was difficult to keep the rest from following, and that they would often jump 4 to 6 feet out of the water.

An average catch in former years was from four to five hundred porpoise to the season, requiring from five to six for a barrel of oil. The crews usually numbered from fifteen to eighteen men, and the season lasted from the latter part of December to the 1st of April, some fishing as late as the 15th of April. There seems to be a growing disposition on the part of the fishermen to resume this fishery, but it requires an outlay of about $400 for nets and boats, and few have the money to invest in this way. During April, 1880, the porpoise were very abundant, and it was a common occurrence to see droves of fifty to a hundred together, while the fishermen say that they were even more abundant earlier in the season.

WATCH OIL FROM PORPOISE AND BLACKFISH.—"About the year 1816," says Caleb Cook, of Provincetown, "sailors and fishermen having caught a porpoise on their voyage, would sometimes extract the oil from the jaw-bone and give it to carpenters and those who used oil stones for sharpening their tools. Finding in this way that it did not gum or glue, suggested the idea that it was just what was wanted for a nice lubricator. It was noticed that the weather at zero would not congeal it, neither would it corrode on brass.

"Watchmakers were then using olive oil as the only fitting oil for watches; but by experimenting with the porpoise-jaw oil they found it superior to the olive or any other oil, consequently the sailors and fishermen found a ready market for all they were able to obtain.

"This state of things continued until the year 1829, when a shoal of blackfish, about forty in number, was taken at Provincetown, Mass., being the first for many years. Solomon Cook of that town took from the jaws of these blackfish a few gallons of oil and sent it to Ezra Kelley, of New Bedford, Mass., a skillful watchmaker, to be tested for watch oil. Mr. Kelley soon found that this oil was superior to the porpoise oil, as it had more substance and less chill. He contracted with Mr. Cook to supply him from year to year until 1840, when the latter died, and his son supplied Mr. Kelley until the demand was so great that the jaws of the blackfish were not sufficient to supply the market.

"Porpoise-jaw oil can be refined a little by exposure to the cold at zero, and in that state, with the atmosphere at zero, it is strained through a cotton-flannel strainer made in the shape of a cone, but when filtered through paper it is so limpid that it has no lubricating properties whatever, and becomes useless. This oil is called porpoise-jaw oil, but is taken from the blackfish, belonging in the family of whales, by a method known only to myself. It is warranted not to congeal at zero, though it will thicken and turn a little milky in appearance. It is warranted not to corrode on brass or rust on steel, and it will not glue on the finest watch. Ezra Kelley, of New Bedford, has made it a business for years to put it up for watch use, and has led in the market, while B. H. Tisdale, of Newport, R. I., and I. M. Batchelder, of Boston, are getting quite popular in the European market.

"Caleb Cook, youngest son of Solomon, from scientific experiments, did discover, about the year 1832, that the melon oil of the blackfish was far superior to the jaw oil in every respect, so much so, that Mr. Kelley, who had about this time become very popular in preparing this oil for the trade, would not buy it until he was told what it was produced from, and from that time to the present (1876) Caleb Cook's blackfish-melon (watch) oil has been refined by Kelley, of New Bedford, Batchelder, of Boston, Tisdale, of Newport, and many others on a smaller scale, for the world's use. Since

the year 1842 Caleb Cook, of Provincetown, Mass., claims to be the only person who understands the art of producing this oil free from all glutinous matter and fit for use. This, he says, is done by a process known only to himself—not by mixing other oils or liquids with it, but by extracting all the oil and gluten from it, and leaving the oil pure for the finest and most delicate machinery. This, he says, cannot be done by the chilling and straining process; for when it becomes perfectly transparent at zero, the lubricating properties are all gone, the oil runs off the pivots, spreads on the plates, dries up, the pivots cut, turn red, and the oil is worse than worthless, for the valuable timekeeper is no longer what it was once for the want of oil with more substance and lubricating properties.

"Porpoise-jaw oil and blackfish-melon oil are worth from $5 to $15 per gallon, according to supply. These oils are sold under the above trade names, and also under the names 'watch oil' and 'clock oil.' They are used largely by manufacturers of fire-arms, watches, and philosophical apparatus. Smith & Wesson, of Springfield, Mass., the Ethan Allen factory at Worcester, Bye & Johnson, of Worcester, the Howard Watch Company, the Elgin Watch Company, the Waltham Watch Company, and the clock factories in Connecticut, use them constantly. The philosophical instrument makers use them for air pumps, as they keep the leather soft and pliable. Telegraph instrument makers use them when they can get them. They are used in Government light-houses for the clocks of revolving lights. The color of the oils is very light, and can be made very white by placing in the window, where they will bleach in a short time. One drop of water in one pint of oil will injure it very much."

PART XVII.

THE PACIFIC WALRUS FISHERY.

By A. HOWARD CLARK.

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THE PACIFIC WALRUS FISHERY.

By A. Howard Clark.

1. GEOGRAPHICAL DISTRIBUTION AND HABITS OF THE PACIFIC WALRUS.

The Pacific walrus is found principally in the Bering Sea and the Arctic Ocean. In the latter part of May and the first of June the ice in the sea commences to break up and, borne northward by the current, carries the walrus with it. In the latter part of June they are very abundant in Bering Strait and soon after in the Arctic Ocean. It is while the whaling vessels are waiting in the Arctic near the Asiatic shore for the ice to break up sufficiently to allow a passage across to Point Barrow that they capture the walrus. During this period of waiting, which occupies nearly all of July and part of August, the walrus is found on the ice near the mainland north of the strait and drifting about the open parts of the ocean with the current.

In August they begin to return through the strait to Bering Sea, and are soon seen in great numbers on St. Matthew's Island and in Bristol Bay. Before October they have all left the Arctic and entered Bering Sea, where they pass their winters waiting until the warm currents of the next summer shall scatter the ice and again bear them northward into the cooler waters of the Arctic.

One of their chief resorts while in the Arctic is in the vicinity of Cape Serdze-kamen, on the Asiatic shore, where within a range of 130 miles they congregate in great numbers, the ice being black with them for miles. They are always found near the outer edges of the ice, never in the pack, so that they may better watch and observe the movements of one of their principal enemies, the polar bear. These groups of walrus on the ice are by the whalers called "pods."

They cannot endure great fatigue, and sleep is very necessary to them. In years past it was common for whale-boats to pursue them along the ice pack till the animals would drop asleep in the water and fall an easy prey to their pursuers. They sleep in different positions in the water, often with the head under water and raised only at intervals to breathe, which is done without waking. They often sleep in an upright position and it is an amusing sight to find them with their heads above the ice that has congealed around them while taking their repose.

They apparently have the power of inflating themselves with air so as to float more easily while sleeping, and if suddenly disturbed they cannot go down without expelling the air. They are extremely affectionate toward their young and courageous in defending them. The mother will never leave her calf but will rather perish than forsake it. In making their passage it is common to see the mother carrying her young, the little one clinging with its flippers to its dam.

Some of the whalers say that only the mothers care for the young and that the bulls never defend the little ones from danger; when the mother is shot the young walrus will immediately go to another female.

Captain Scammon states, on the authority of an experienced whaling master, that on one occasion a female walrus "was captured 2 miles from the ship, and the young cub kept close to the boats that were towing its dead mother to the vessel, and when arrived made every effort to follow her as she was being hoisted on board. A rope with a bowline was easily thrown over it, and the bereaved creature taken on deck, when it instantly mounted its mother's back and there clung with mouruful solicitude until forced by the sailors to again return to the sea; but even then it remained in the vicinity of the ship, bemoaning the loss of its parent by uttering distressful cries.

"A male and a female with her cub are often seen together; yet herds of old and young of both sexes are met with, both in the water and upon the ice. When undisturbed they are quite inoffensive, but if hotly pursued they make a fierce resistance. Their mode of attack is by hooking their tusks over the gunwales of the boat, which may overturn it, or they strike a blow through the planking, which has repeatedly been the means of staving and sinking it."*

2. DEVELOPMENT OF THE FISHERY.

It was not until twenty years after the whalers first entered the Arctic that they thought of capturing the walrus, partly because whales were so plenty that they needed nothing else to help make up a cargo and partly through a dread of these animals, of whose ferocity the men had read exaggerated accounts. For some years it was considered a bold thing for a vessel to capture half a dozen walrus; but as whales became scarce and men became better acquainted with the walrus, it was a common thing to hear of vessels taking fifty, seventy, and even a hundred barrels of oil. Although small quantities of oil were secured by various vessels, no great quantity was taken until the year 1860 or 1861, when the bark Carib, of San Francisco, took 100 barrels. In 1869 and 1870 some vessels took 500 barrels each, and according to Captain Scammon 50,000 barrels were taken from that time to 1874. It has been common since then for one vessel to take from 1,000 to 1,500 barrels in a season. Large numbers of walrus have been taken during the last few years, and they are rapidly decreasing; a few years hence they will not be worth seeking.

3. METHODS OF CAPTURE.

In the first few years of the walrus fishery the harpoon and lance were the instruments used in capturing them, but for ten years it has been customary for the whalers, and even the natives, to use a rifle.† Great numbers have been shot at one time, which is easily done, since they always congregate in large numbers; and often the number killed is only limited by the power to take care of them, for a ship's company cannot manage more than two or three hundred at one time.

An outfit for walrusing consists of a dingey, or small ship's boat, with a crew of three men, the gunner and two seamen, and includes a rifle, a box containing ammunition, and a boat which follows to assist in skinning the walrus, having as its equipment a small watch tackle, six gaffs, six pikes, six sheath knives, three rippers, two steels, a file, a whetstone, ice hooks, spade, hand-

* Marine Mammalia, p. 178.

† Capt. L. C. Owen thinks Everett Smith was the first whaleman to shoot walrus; this was in the season of 1869. About forty were thus killed that year.

lance, six hand-hooks to hold the blubber while skinning, an ax, four pieces of rope or short warps and several boat waifs. The dingey is used in the actual capture. Sometimes two rifles are carried, since the rapid firing soon overheats them.

If the whalemen, after shooting a few walrus, can get on the same piece of ice with the dead ones he may be sure of the whole lot, or as many as he chooses to kill. Great care must be taken when approaching the ice to be as quiet as possible, for if the walrus, which is very timid, detects your approach, the whole company will immediately tumble off into the water and disappear.

Capt. Wm. M. Barnes, of New Bedford, thinks that if this method of capturing the walrus is pursued for any length of time it will surely result in their extermination, for the greater part of the animals thus killed are females, accompanied by their offspring, nearly all too young to live without their mothers. When the earlier method of catching them with harpoons was employed, only a few could be caught out of a large herd, and the calves of those captured would follow the walrus that escaped. Often two or three calves were seen with a single cow, and the whalemen used to hope that the little orphans would be adopted into these families, and receive more charity from their kind than the human race had extended to them. But under the present method of shooting, the whole herd of grown animals is slaughtered, and the little ones remain on the ice hovering around the carcasses of their mothers until death from starvation silences their moanings These animals are very useful to the inhabitants of the Arctic shores, furnishing them with food, dwellings, and boats. Therefore to reduce the numbers of the walrus in a great degree, or to drive them to other regions, would be a sad calamity to those people.

The most common mode of capture among whalers is as follows: The captain of the vessel, with one or two men, quietly approach the herd in a dingey, or small boat, and when within 30 to 50 yards the captain shoots one of the animals in the temple between the eye and the ear, using for the purpose a Sharps' or Henry rifle. If successful in the first shot, he hastens on the ice and slays as many as can be cared for by the vessel's crew. If the animal is not killed it will immediately scramble for the water, followed by the whole herd, and none can be captured. Once among the herd the hunter shoots right and left as rapidly as possible, using a second rifle as soon as the first becomes heated. Walrus go by scent rather than sound, so that if the hunter approaches from leeward it is comparatively easy to get within a few yards before they are aware of danger. They seem to care little for sound, for they take scarcely any notice of the constant report of the rifle. Some of those caught by whalers are very large; one taken near Point Mulgrave, in the Arctic, weighed 1,854 pounds.

Capt. John Heppingstone, of East Wareham, Mass., an old whaleman and walrus hunter, has kindly furnished the following account of the walrus and its capture.

"Some of the difficulties encountered in the capture of walrus are as follows: Often a pod of walrus will be found on cakes of old and rotten ice, and after shooting a goodly number of them the large quantity of warm blood will melt the ice, causing it to break, with the loss of a part, and many times, the whole of the pod. Another difficulty we have to contend with, and to avoid, if possible, is the wounding of a walrus, as his bellowing will frighten and drive others off. Many times walrus will haul up on cakes of ice, where there is no shelter for the gunner, and in such cases they are shot from the dingey. A school of walrus in the water, bellowing, will keep the pod on the ice restless and make it difficult to shoot them. There is not much danger attending the capture of the walrus. Sometimes the ice breaks from their weight and results in the loss of the dead animals, and perhaps the rifle also, with a cold bath to the men who may chance to be upon the cake. In working through a school of walrus there is some danger of their coming up under the boat and rolling it over. Such cases have occurred. I have been pulling along in my boat

and had them come up and put their tusks into a plank and tear it down two streaks before clearing themselves. They frequently approach and throw their tusks over the gunwale of a boat. I have known of two cases where men were hurt in this way, one where the walrus put his tusk through the foot of one man, and in the other case he hooked his tusk into the clothes of the other man and took him down. Where two or more are shooting, great caution should be exercised, as serious results may happen. Sometimes a ball may strike a tusk and glance off. Such a case has occurred, and it resulted in the death of the man. The walrus shooting is exciting, and to the sportsman would be considered fine game.

"When walrus are raised from the mast-head, the ship is worked up to within about three miles of them, always keeping to leeward, as their scent is very keen. After placing the ship in position, the gunner with his two men takes his dingey and starts for the ice where the walrus are hauled up. We generally send a boat with the dingey to tow her, or to render assistance if needed. When within about a half mile of the ice the boat lets go and the dingey works carefully up towards the ice, as walrus are very easily gallied, and it is sometimes two or three hours before they can be approached near enough to be killed. The gunner gets out, and, crawling on hands and knees, seeks shelter behind a piece of ice to get a shot at them, care being exercised to keep to the leeward, for if the animals get scent of man they are apt to leave in haste. After getting a good position, and the gunner finding that the walrus are not aware of his presence, he picks his chance, as it is of importance that the first walrus he shoots should be killed at once, for if he were to wound one it might gally the rest and they would leave the ice. But after he has shot some of them, he may get on their carcasses and continue shooting; for at times the walrus do not seem to mind the presence of a man or a report of a gun, and at other times they take fright very easily. The gunner usually wears a white suit, to keep as near the color of the ice as possible. One of the best times for shooting walrus is a bright sunny day, as they are then stupid and sleepy; but as stupid as they seem, they can show fight. A captain in our fleet was one day shooting on the ice. He encountered one that showed pretty good play, and the captain had quite a tussle with him to see which should have the rifle. The captain, however, won the battle and a dead walrus to boot. I think he must have been a king walrus, as I have not heard of any more such battles; but as a rule the walrus is a harmless animal."

4. STRIPPING AND PREPARING THE BLUBBER.

When a sufficient number* of walrus have been killed, the men strip off the hide and blubber. For this purpose a sharp knife is used, often a razor fastened in a wooden handle. Cuts are made through the hide and blubber, making strips about 7 by 12 inches called "horse pieces." The end of a piece is held in one hand, while, with a knife in the other, the hunter separates the blubber from the flesh, and throws the pieces aside to be taken to the vessels. The head is cut off with an ax, and the tongue is saved to be pickled for food. Whalers frequently save the heart and liver, which are fried and eaten as in the case of bullocks; these dishes are said to be very palatable. The flesh is often cooked in the style of sausage meat, though it is sometimes roasted, and has been called by some whalers "marine beef." When made into sausage, as is also the meat of the whale, it is called "forced-meat balls." The galls are sometimes saved and sold to Chinamen at San Francisco, who are said to use them in the manufacture of silk. Whalers seldom save the hides on account of their little commercial value and the trouble of stripping them off. They are saved, however, by the natives and by foreign walrus hunters, and sell for quite a sum in Russia

*Capt. L. C. Owen states that his crew took 1,600 walrus from June 10 to July 4, 1877, and that they secured 700 of them in forty-eight hours.

and Sweden, where they are made into harness and sole leather; sometimes they are boiled into glue. But whalers care nothing for the hides, their purpose being to get as much oil and ivory as possible. Having prepared the blubber, heads, and tusks for transportation to the vessel, they are loaded in the whale-boats, which are capable of carrying the products of eight or ten walrus.

Arrived on board the vessel, the blubber is prepared for the try-pot. The horse pieces are spread on a cutting table, and with an ordinary skinning knife, having a blade 8 inches in length, the hide is separated from the blubber. The cutting table is usually of triangular shape, made of two boards nailed together at the edges, the ends generally resting on the top of casks, and the pieces of blubber are thrown over the upright edge of the table.

The next operation is to set the table up on one edge, and to cut the strips of blubber into small pieces, an inch or two in width, ready to be thrown into the try-pot. A few years ago the general custom was to put the skinned blubber in a shallow tub and mince it with a spade, but now the cutting table is almost universally used.

5. WALRUS IVORY.

The tusks of the walrus vary much, both in quality and weight, in the different animals. The tusks of the male sometimes weigh 16 or 18 pounds each, though often not more than one-quarter of a pound.

In the season of 1869, 3,000 pounds of ivory were secured from 700 walrus, averaging about $4\frac{2}{7}$ pounds to each animal. The tusks of the male are large and of a much coarser texture than those of the female, which are generally fine and free from cracks. The male tusks are less valuable than those of the female, the proportion of pith to sound exterior ivory being far greater in a large than in a small tusk. This ivory is better in some respects than elephant ivory, and is used for nearly the same purposes; but the pith spoils it for many uses, since it is slightly discolored and as the ivory becomes yellow by exposure it is not so valuable as that of the elephant. Among the articles made from it are knife handles, small brushes, umbrella handles, tally balls, dice, dog whistles, and small ornaments. Globular cane handles and parasol handles have been made from the pith alone, which presents a mottled appearance and is very pleasing. The Innuits near the Arctic sometimes dig out the tusks for drinking vessels, and also use them as implements of chase.

A large part of the walrus ivory received in the markets of the world during the past ten years has been supplied by the Arctic whaling fleet. It is received at San Francisco and transshipped by rail or vessel to New York, China, Japan, and London, where it is manufactured into various articles by the ivory workers. Walrus ivory is no harder to manipulate than elephant ivory, and is worked by the same methods.

The value of this ivory varies according to the quantity received in the market; in the year 1880 it was worth $1 to $1.25 per pound, while in 1879, when the supply was greater, it sold at 45 and 50 cents per pound. Nordenskiold, in his "Voyage of the Vega," says the largest walrus tusks he ever saw were two of a male purchased at Saint Lawrence Island in 1879. They were 830 and 825 millimeters in length, 227 and 230 millimeters in circumference, and weighed together 6,680 grams.* The tusks of a female were seen of nearly the same length, but much more slender. "The surface is always full of cracks, but under it there is a layer of ivory free of cracks, which again incloses a grained kernel of bone which at some places is semi-transparent, as if drenched with oil."

Walrus ivory often serves as the spare change of the whalemen. Whenever the vessels touch at the Sandwich Islands or other ports it is used to buy provisions or pay for repairs.

* A little more than 26 pounds.

6. WALRUS OIL.

Walrus blubber is easily tried out, and the oil is whiter and more expansive than whale oil. The quantity of oil to a single walrus varies very much in different animals and from year to year, for in some years they are much fatter than in others. The female yields more oil than the male. The whale ship Onward, in the season of 1874, took 1,000 walrus that stowed down 600 barrels of oil, which was considered an unusual yield, and in 1869 the Progress got 700 walrus that yielded 565 barrels of oil. The Mercury in 1877 killed 2,000 walrus that stowed down 1,100 barrels of oil. Captain Barnes, of the Sea Breeze, states that up to July 23, 1880, he had that season taken in the Arctic 400 walrus, yielding 300 barrels of oil.

7. STATISTICS OF OIL AND IVORY, 1870 TO 1880.

The Arctic whaling fleet from 1870 to 1880, inclusive, is estimated to have captured 100,000 walrus, producing 1,996,000 gallons of oil and 398,868 pounds of ivory, of a total value of $1,260,000.

Year.	Oil.	Ivory.	Total value oil and ivory.
	Gallons.	*Pounds.*	
1870	315,000	63,800	.....
1871	189,000	37,600	.....
1872	160,000	32,000	.....
1873	220,500	44,000	.....
1874	165,000	33,000	.....
1875	126,000	25,400	.....
1876	157,500	31,500	.....
1877	221,000	44,600	.....
1878	125,000	24,000	.....
1879	190,000	38,318	[$11,996]
1880	127,000	24,650	[8,735]
Total	1,996,000	398,868	1,260,000

PART XVIII.

THE SEAL AND SEA-OTTER INDUSTRIES.

1.—THE FUR-SEAL INDUSTRY OF THE PRIBYLOV ISLANDS, ALASKA.

By Henry W. Elliott.

1. Discovery of the Pribylov Islands.
2. Description of the Pribylov Islands.
3. Description of the fur-seal rookeries of Saint Paul and Saint George.
4. The total number of seals on the islands.
5. The increase or diminution of seal life, past, present, and prospective.
6. Statistics of seals killed.
7. The manner of taking the seals.
8. Manner of caring for and shipping the skins.
9. Economic value of the skins, oil, and flesh of the fur seal.
10. The Russian seal industry at the Pribylov Islands.
11. The organization of the Russian American Fur Company.
12. The Alaska Commercial Company.
13. The law protecting the seal islands.
14. Comments upon the legislation of Congress.

2.—THE FUR-SEAL INDUSTRY OF CAPE FLATTERY, WASHINGTON TERRITORY.

By James G. Swan.

1. History, present condition, and methods of the fishery.
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3.—THE ANTARCTIC FUR-SEAL AND SEA-ELEPHANT INDUSTRIES.

By A. Howard Clark.

1. Origin and development of the industries.
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4.—THE SEA-LION HUNT.

By Henry W. Elliott.

1. Capture of the sea-lion.
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5.—THE NORTH ATLANTIC SEAL FISHERY.

By A. Howard Clark.

1. The sealing grounds.
2. American sealing vessels.
3. The products.
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6.—THE SEA-OTTER FISHERY.

By Henry W. Elliott.

1. The discovery and geographical distribution of the sea-otter.
2. The habits of the sea-otter.
3. Methods of capture.

PART XVIII.

THE SEAL AND SEA-OTTER INDUSTRIES.

1.—THE FUR-SEAL INDUSTRY ON THE PRIBYLOV GROUP, ALASKA.

By Henry W. Elliott.

1. DISCOVERY OF THE PRIBYLOV ISLANDS.

Search of Russian explorers for sea-otters and seals.—All writers on the subject of Alaskan exploration and enterprise agree as to the cause of the discovery of the Pribylov Islands in the last century. It was due to the feverish anxiety of a handful of Russian fur-gatherers, who desired to find new fields of gain when they had exhausted those last uncovered. Altasov, and his band of Russians, Tartars, and Kossacks, arrived at Kamtchatka toward the close of the seventeenth century, and they first found, of all men, the beautiful, costly, rare fur of the sea-otter. The animal bearing this pelage abounded then on that coast, but by the middle of the eighteenth century they and those who came after them had entirely extirpated it from that country. Then the survivors of Bering's second voyage of observation, in 1741–'42, and Tscherikov brought back an enormous number of skins from Bering Island; then Michael Novodiskov discovered Attoo and the contiguous islands, in 1745; Paikov came after him and opened out the Fox Islands, in the same chain, during 1759; then succeeded Stepan Glotov, who determined Kadiak in 1763, and the peninsula of Alaska followed by Krenitsin, 1768. During these long years a great many Russian companies fitted out at the mouth of the Amoor River, in the Okhotsk Sea, and prospected therefrom this whole Aleutian Archipelago in search of the sea-otter. There were perhaps twenty-five or thirty different companies, with quite a fleet of small vessels, and so energetic and thorough were they in their search and capture of the sea-otter that by 1772 and 1774 the catch in that group had dwindled from thousands and tens of thousands at first, to hundreds and tens of hundreds at last. A change of search and inquiry was now in order, and then the fur-seal, which had been noted, but not valued much, every year as it went north in the spring through the passes and channels of the Aleutian chain, then going back south again in the fall, became the source of much speculation as to where it spent its time on land and how it bred. No one had ever heard of its landing on a rock or beach throughout all Alaska or the northwest coast. The natives, when questioned, expressed themselves as entirely ignorant, though they believed that these seals repaired to some unknown land in the north every summer and left every winter. They also reasoned then, that when they left the unknown land to the north in the fall, and went south into the North Pacific, they traveled to some other strange island or continent there, upon which in turn

to spend the winter. Naturally the Russians preferred to look for the supposed winter resting-places of the fur-seal, and forthwith a hundred schooners and shallops sailed into storm and fog to the northward occasionally, but generally to the southward, in search of this rumored breeding-ground. Indeed, if the record can be credited, the whole bent of this Russian attention and search for the fur-seal islands was devoted to that region south of the Aleutian Islands, between Japan and Oregon.

PRIBYLOV'S DISCOVERY OF THE ISLANDS WHICH BEAR HIS NAME.—It was not until 1786, after more than eighteen years of unremitting search by hardy navigators, that the Pribylov Islands were discovered. It seems that a rugged Muscovitic "stoorman" or ship's "mate," Gehrman Pribylov by name, serving under the direction and in the pay of one of the many companies at that time engaged in the fur business, was much moved and exercised in his mind by the revelations of an old Aleutian shaman at Oonalashka, who pretended to recite a legend of the natives wherein he declared that certain islands in the Bering Sea had long been known to the Aleuts.

Pribylov commanded a small sloop, the "Saint George,"which he employed for three successive years in constant, though fruitless, explorations to the northward of Oonalashka and Oonimak, ranging over the whole of Bering Sea from the straits above. His ill-success does not seem strange now, as we understand the currents, the winds, and fogs of those waters. Recently the writer has been on one of the best-manned vessels that ever sailed from any port, provided with those charts and equipped with all the marine machinery known to navigation, and that vessel has hovered for nine successive days off the north point and around Saint Paul's Island, sometimes almost on the reef, and never more than 10 miles away, without actually knowing where the island was. So Pribylov did well, considering, when, at the beginning of the third summer's tedious search, in July, 1786, his old sloop ran up against the walls of Tolstoi Mees, at Saint George; and then, though the fog was so thick that he could see scarce the length of his vessel, his ears were regaled by the sweet music of rookeries wafted out to him on the heavy air. He then knew that he had found the object of his search, and he at once took possession of the island in the Russian name and that of his craft.

But his secret could not long be kept. He had left some of his men behind him to hold the island, and when he returned to Oonalashka they were gone. And, after the next season had fairly opened, a dozen vessels were watching him and trimming in his wake. Of course they all found the island, and in that year, July, 1787, the sailors of Pribylov, on Saint George, while climbing the bluffs and straining their eyes for a relief-ship, descried the low coast and scattered cones of Saint Paul, 36 miles to the northwest of them. When they landed at Saint George, not a sign nor a vestige of human habitation was found thereon; but, during the succeeding year, as they crossed over to Saint Paul and took possession of it, in turn, they were surprised at finding on the south coast of that island, at a point now known as English bay, the remains of a recent fire. There were charred embers of driftwood, and places where grass had been scorched; there was a pipe, and a brass knife handle, which, I regret to say, have long passed beyond the cognizance of any ethnologist. This much appears in the Russian records.

2. DESCRIPTION OF THE PRIBYLOV ISLANDS.

The Pribylov Islands lie in the heart of Bering Sea, and are among the most insignificant landmarks known to that ocean. They are situated 192 miles north of Oonalashka, 200 miles south of Saint Matthews, and about the same distance to the westward of Cape Newenham on the mainland.

The islands of Saint George and Saint Paul are from 27 to 30 miles apart, Saint George lying to the southeastward of Saint Paul. They are far enough south to be beyond the reach during winter of permanent ice-floes, upon which polar bears would have made their way to the islands, though a few of these animals were, doubtless, always present. They were also distant enough from the inhabited Aleutian districts and the coast of the mainland to have remained unknown to savage men. Hence they afforded the fur-seal the happiest shelter and isolation, for their position seems to be such as to surround and envelop them with fog-banks that fairly shut out the sun nine days in every ten, during the summer and breeding season.

CLIMATE.—In this location, ocean currents from the great Pacific, warmer than the normal temperature of this latitude, trending up from the southward, ebb and flow around the islands, as they pass giving rise during the summer and early autumn to constant, dense, humid fog and drizzling mists, which hang in heavy banks over the ground and the sea line—seldom dissolving away to indicate a pleasant day. By the middle or end of October, strong cold winds, refrigerated on the Siberian steppes, sweep down over the islands, carrying off the moisture and clearing up the air. By the end of January or early in February, they usually bring, by their steady pressure from the north and northwest, great fields of broken ice, slushy floes, with nothing in them approximating or approaching glacial ice. They are not very heavy or thick, but as the wind blows hard they compactly cover the whole surface of the sea, shutting completely in and around the land, and for months at a time hushing the wonted roar of the surf. In the exceptionally cold seasons that succeed each other up there every four or five years, for periods of three and even four months—from December to May, and sometimes into June—the islands will be completely environed and ice-bound. The exceptional mild winters occur on the other hand, in about the same rotation, in which not even the sight of an ice-floe is recorded during the whole winter, and when there is very little skating on the shallow lakes and lagoons peculiar to Saint Paul and Saint George; this, however, is not often the case.

The breaking up of winter weather and the precipitation of summer (for there is no real spring or autumn in these latitudes) usually commences about the first week in April. The ice begins to leave or dissolve at that time, or a little later, so that by the 1st or 5th of May the beaches and rocky sea-margin beneath the mural precipices are generally clear and free from ice and snow; although the latter occasionally lies in gullies and on leeward hill-slopes where it has drifted during the winter, until the end of July or the middle of August. Fog, damp, thick, and heavy, rolls up from the sea, and closes over the land about the end of May; this, the habitual sign of summer, holds on steadily to the middle or end of October again.

The periods of change in climate are exceedingly irregular during the autumn and spring, so-called, but in summer the cool, moist, shady, gray fog is constantly present. To this certainty of favored climate, coupled with the perfect isolation and the exceeding fitness of the ground, is due, without doubt, that preference manifested by the warm-blooded animals which come here every year, in thousands and hundreds of thousands, to breed, to the practical exclusion of all other ground.

A large amount of information in regard to the climate of these islands has been collected and recorded by the Signal Service, United States Army, and similar observations are still continued by the agents of the Alaska Commercial Company. I simply remark here that the winter which I passed upon Saint Paul's Island (1872–'73) was one of great severity, and, according to the natives, such as is very seldom experienced. Cold as it was, however, the lowest marking by thermometer was only 12° Fahr. below zero, and that lasted but a few hours during a single day in February, while the mean of that month was 18° above. I found that March was the coldest month. Then

the mean was 12° above, and I have since learned that March continues to be the meanest month of the year. The lowest average of a usual winter ranges from 22° to 26° above zero; but these quiet figures are simply inadequate to impress the reader with the exceeding discomfort of winter in that location. It is the wind that tortures and cripples out-door exercises there, as it does on all the sea-coast and islands of Alaska. It is blowing, blowing, from every point of the compass and at all times; it is an everlasting succession of furious gales, laden with snow and sleety spiculæ, whirling in great drifts to-day, while to-morrow the wind will blow from a quarter directly opposite, and reverse its drift-building action of the day preceding.

Without being cold enough to suffer, one is literally confined and chained to his room from December to April by this æolian tension. I remember very well that, during the winter of 1872–'73, I was watching with all the impatience which a man in full health and tired of confinement can possess, every opportunity to seize upon quiet intervals between the storms in which I could make short trips out along the tracks over which I was habituated to walk during the summer; but in all that hyemal season I got out but three times, and then only by the exertion of great physical energy. On a day in March, for example, the velocity of the wind at Saint Paul, recorded by one of the signal service anemometers, was at the rate of 88 miles per hour, with as low a temperature as —4°! This particular wind-storm, with snow, blew at such a velocity for six days without an hour's cessation, while the natives passed from house to house crawling on all-fours; no man could stand up against it, and no man wanted to. At a much higher temperature—say at 15° or 16° above zero—with the wind blowing only 20 or 25 miles an hour, it is necessary when journeying to be most thoroughly wrapped up to guard against freezing for any journey to be made on foot.

As I have said, there are here virtually but two seasons—winter and summer. To the former belong November and the following months up to the end of April, with a mean temperature, of 20° to 28°; while the transition of summer is but a very slight elevation of that temperature, not more than 15° or 20°. Of the summer months, July, perhaps, is the warmest, with an average temperature between 46° and 50° in ordinary seasons. When the sun breaks out through the fog, and bathes the dripping, water-soaked hills and flats of the island in its hot flood of light, I have known the thermometer to rise to 60° and 64° in the shade, while the natives crawled out of the fervent and unwonted heat, anathematizing its brillancy and potency. Sunshine does them no good; for, like the seals, they seem under its influence to swell up at the neck. A little of it suffices handsomely for both Aleuts and pinnipedia during the summer months.

It is astonishing how rapidly snow melts here. This is due, probably, to the saline character of the air; for when the temperature is only a single degree above freezing, and after several successive days in April or May, at 34° and 36°, grass begins to grow, even if it be below melting drifts and the frost has penetrated the ground many feet below. I have said that this humidity and fog, so strongly and peculiarly characteristic of the Pribylov group, was due to the warmer ocean currents setting up from the coast of Japan, trending to the Arctic through Bering Strait, and deflected to the southward into the North Pacific, laving, as it flows, the numerous passes and channels of the great Aleutian chain; but I do not think, nor do I wish to be understood as saying, that my observation in this respect warrants any conclusion as to so large a gulf-stream flowing north, such as mariners and hydrographers recognize upon the Atlantic coast. I do not surmise that there is anything of the kind equal to it in Bering Sea. I believe, however, that there is a steady set up to the northward from the southward around the Seal Islands, which is continued through Bering Strait, and drifts steadily off to the northeast, until it is lost beyond Point Barrow. That this pelagic circulation exists, is clearly proven by the logs of the whalers, who, from 1845 to 1856, literally filled the air over those waters with the smoke of their "try-fires,"

and plowed every square rod of that superficial marine area with their adventurous keels. While no two, perhaps, of those old whaling captains living to-day, will agree as to exact course of tides,* for there does not seem to be any order to Alaskan tides, they all affirm the existence of a steady current, passing up from the south to the northeast, through Bering Strait. The flow is not rapid, and is doubtless checked at times, for short intervals, by other causes, which may not be discussed here. It is certain, however, that there is warm water enough abnormal to the latitude for the evolution of the characteristic fog-banks, which almost discomfited Pribylov nearly one hundred years ago, and which have remained ever since.

Without this fog the fur-seal would never have rested there as he has done; but when he came on his voyage of discovery ages ago, up from the rocky coasts of Patagonia mayhap, had he not found this cool, moist temperature of Saint Paul and Saint George, he would have kept on, completed the circuit, and returned to those congenial antipodes of his birth.

DIMENSIONS AND CONTOUR OF THE ISLANDS.—Until my arrival on the Seal Islands in April, 1872, no steps had ever been taken by any man whomsoever towards ascertaining the extent and the real importance of these interests of the Government, the Russians never having made even an approximate survey of the land, while our own people did no better. I was very much surprised, immediately after landing, and calling for a map of the island Saint Paul, to have an odd sketch, traced from an old Russian chart, placed before me, that my eye stamped instantly as grotesque, by the land-bearings which I took out of my window on the spot. It was a matter of no special concern however, to the Russians; had it been, doubtless they would have accurately surveyed the whole field. But it was and it is quite different with us; and, that no agent of the Treasury Department, or other branches of the Government, had, up to that date of my arrival, given it the slightest thought or attention, struck me as rather lame. It was, and is, and ever will be, a matter of first importance to a correct and succinct understanding of the subject, and it was the first thing about which I busied myself. I present, therefore, with this memoir, a careful chart of each island, and the contiguous islets, which are the first surveys ever made upon the ground, having the slightest pretension to accuracy or respect.† The reader will observe, as he turns to these maps, the striking dissimilarity which exists between them, not only in contour but in physical structure, Saint Paul's island being the largest in superficial area, and receiving a vast majority of the pinnipedia that belong to both. As it lies in Bering Sea to-day, this island is in its greatest length, between Northeast and Southwest Points, 13 miles, air line, and, at points of greatest width, a little less than 6. It has a superficial area of about 33 square miles, 21,120 acres, of diversified, rough, and rocky uplands, rugged hills, and smooth volcanic cones, which either set down boldly to the sea or fade out into extensive wet and mossy flats, passing at the sea-margins into dry, drifting, sand-dune tracts. It has 42 miles of shore line, and of this coast, 16½ miles are hauled over by fur seals *en masse*. At the time of its first upheaval above the sea, it doubtless presented the appearance of ten or twelve small rocky, bluffy islets and points, upon some of which were craters that vomited breccia and cinders, with little or no lava overflowing. Active plutonic agency must have soon ceased after this elevation, and then the sea around about commenced the work which it is now engaged in, of building on to the skeleton thus created; and it has progressed to-day so thoroughly

* The rise and fall of tide at the Seal Islands I carefully watched one whole season at St. Paul. The irregularity, however, of ebb and flow, is the most prominent feature of the matter. The highest rise in the spring tides was a trifle over 4 feet, while that of the neap tides not much over 2. Owing to the nature of the case, it is impossible to prepare a tidal calendar for Alaska, above the Aleutian Islands, which will even faintly foreshadow a correct registration in advance.

† These surveys have since been confirmed and elaborated by H. W. McIntyre, of the Alaska Commercial Co., and Lieutenant Maynard, U. S. N.

and successfully in its labor of sand-shifting, together with the aid of ice-floes, in their action of grinding, lifting, and shoving, that nearly all of these scattered islets within the present area of the island, and marked by its bluffs and higher uplands, are completely bound together by ropes of sand, changed into enduring bars and ridges of water-worn bowlders. These are raised above the highest tides by winds that whirl the sand up, over, and on them, as it dries out from the wash of the surf and from the interstices of those rocks, lifted up and pushed there by ice-fields.

The sand which plays so important a part in the formation of Saint Paul's Island, and which is almost entirely wanting in and around the others in this Pribylov Group, is principally composed of *foraminifera*, together with *diatomacea*, mixed in with a volcanic base of fine comminuted black and reddish lavas and old friable gray slates. It constitutes the chief beauty of the sea-shore here, for it changes color like a chameleon, as it passes from wet to dry, being a rich steely-black at the surf-margin and then drying out to a soft purplish brown and gray, succeeding to tints most delicate of reddish and pale neutral, when warmed by the sun and drifting up on to the higher ground with the wind. The sand-dune tracts on this island are really attractive in the summer, especially so during those rare days when the sun comes out, and the unwonted light shimmers over them and the most luxuriant grass and variety of beautiful flowers, which exist in profusion thereon. In past time, as these sand and bowlder bars were forming on Saint Paul's Island, they, in making across from islet to islet, inclosed small bodies of sea-water. These have, by evaporation and time, by the flooding of rains and annual melting of snow, become, nearly every one of them, fresh; they are all, great and small, well shown on my map, which locates quite a large area of pure water. In them, as I have hinted, are no reptiles; but an exquisite species of tiny viviparous fish exists in the lagoon estuary near the village, and the small pure-water lakes of the natives just under the flanks of Telegraph Hill. The Aleuts assured me that they had caught fish in the great lake toward Northeast Point, when they lived in their old village out there, but I never succeeded in getting a single specimen. The waters of these pools and ponds are fairly alive with vast numbers of minute *rotifera*, which sport about in all of them whenever they are examined. Many water-plants, pond lilies, &c., and algæ flourish, especially so in the large lake "Mee-sulk-mah-nee," which is very shallow.

The backbone of the island, running directly east and west from shore to shore between Polavina Point and Einahnuhto Hills, constitutes the high land of the island: Polavina Sopka, an old extinct cinder-crater, 550 feet; Bogaslov, an upheaved mass of splinted lava, 600 feet, and the hills frowning over the bluffs there, on the west shore, are also 600 feet in elevation above the sea. But the average height of the upland between is not much over 100 to 150 feet above water-level, rising here and there into little hills and broad rocky ridges, which are minutely sketched upon the map. From the northern base of Polavina Sopka a long stretch of low sand-flats extend, inclosing the great lake, and ending in a narrow neck where it unites with Novastoshnah, or Northeast Point. Here the volcanic nodule known as Hutchinson's Hill, with its low, gradual slopes, trending to the east and southward, makes a rocky foundation secure and broad, upon which the great single rookery of the island, the greatest in the world, undoubtedly, is located. The natives say that when they first came to these islands Novastoshnah was an island by itself, to which they went in boats from Vesolia Mista; and the lagoon now so tightly inclosed was then an open harbor, in which the ships of the old Russian company rode safely at anchor. To-day no vessel drawing 10 feet of water can safely get nearer than half a mile of the village, or a mile from this lagoon at low tide.

LACK OF HARBORS—ANCHORAGES.—The total absence of a harbor at the Pribylov Islands is much to be regretted. The village of Saint Paul, as will be seen by reference to the map, is so

located as to command the best landings for vessels that can be made during the prevalence of any and all winds, except those from the south. From these there is no shelter for ships, unless they run around to the north side, where they are unable to hold practicable communication with the people or to discharge. At Saint George matters are still worse, for the prevailing northerly, westerly, and easterly winds drive the boats away from the village roadstead; and weeks often pass at either island, but more frequently at the latter, ere a cargo is landed at its destination. Under the very best circumstances, it is both hazardous and trying to load and unload ship at any of these places. The approach to Saint Paul by water during thick weather is doubtful and dangerous, for the land is mostly low at the coast, and the fogs hang so dense and heavy over and around the hills as to completely obliterate their presence from vision. The captain fairly feels his way in, by throwing his lead-line and straining his ear to catch the muffled roar of the seal-rookeries, which are easily detected when once understood, high above the booming of the surf. At Saint George, however, the bold, abrupt, bluffy coast everywhere all around, with its circling girdle of flying water-birds far out to sea, looms up quite prominently, even in the fog; or, in other words, the navigator can notice it before he is hard aground or struggling to haul to windward from the breakers under his lee. There are no reefs making out from Saint George worthy of notice, but there are several very dangerous and extended ones peculiar to Saint Paul, which Capt. John G. Baker, in command of the vessel* under my direction, carefully sounded out, and which I have placed upon my chart for the guidance of those who may sail in my wake hereafter.

When the wind blows from the north, northwest, and west to southwest, the company's steamer drops her anchor in 8 fathoms of water abreast of the black bluffs opposite the village, from which anchorage her stores are lightered ashore; but in the northeasterly, easterly, and southeasterly winds, she hauls around to the Lagoon Bay west of the village, and there, little less than half a mile from the landing, she drops her anchor in 9 fathoms of water, and makes considerable headway at discharging the cargo. Sailing craft come to both anchorages, but, however, keep still farther out, though they choose relatively the same positions, but seek deeper water to swing to their cables in; the holding-ground is excellent. At Saint George the steamer comes, wind permitting, directly to the village on the north shore, close in, and finds her anchorage at 10 fathoms of water, over poor holding-ground; but it is only when three or four days have passed free from northerly, westerly, or easterly winds, that she can make the first attempt to safely unload. The landing here is a very bad one, surf breaking most all the year around.

Otter Island.—The observer will notice that 6 miles to the southward and westward of the reef of Saint Paul's Island is a bluffy islet, called by the Russians Otter Island, because in olden time the Promishlyniks are said to have captured many thousands of sea-otters on its rocky coast. It rises from the ocean, sheer and bold, an unbroken mural precipice of sea front, extending nearly all around, but dropping on its northern margin, at the water, low, and slightly elevated above the surf-wash, with a broken, rocky beach and no sand. The height of the bluffs, at their greatest elevation over the west end, is 300 feet, while the eastern extremity is quite low, and terminated by a queer funnel-shaped crater-hill, which is as distinctly defined, and as plainly scorched, and devoid of the slightest sign of vegetation within, as though it had burned up and out yesterday. This crater point on Otter Island is the only unique feature of the place, for with the exception of this low north shore, before mentioned, where a few thousand of "bachelor" seals haul out during the season every year, there is nothing else worthy of notice concerning it. A bad reef makes

* United States revenue-marine cutter Reliance, June to October, 1874. Captain Baker was and is one of the most thorough-going seamen that it has ever been my good fortune to be associated with. His work can be absolutely relied upon.

out to the westward and northward, which I have indicated from my observation of the rocks awash, looking down upon them from the bluffs. Great numbers of water-fowl roost upon the cliffs, and there are here about as many blue foxes to the acre as the law of life allows. A small, shallow pool of impure water lies close down to the north shore, right under a low hill, upon which the Russians in olden time erected a huge Greek cross, which is still standing; indeed, it was their habit to erect crosses on all the hills in those old times; one of them is standing at Northeast Point, on the huge sand-dune which I have called Saint John, or Cross Hill; and another one, a sound, stalwart stick, yet faces the gale and driving "poorgas" to-day on Boga Slov, as it has faced them for the last sixty years. Otter Island has, since my return in 1872, had considerable attention in the Treasury Department, owing to the fact that certain parties contended that it lies without the jurisdiction of the law which covers and protects the seal-life on the Pribylov Islands. This survey of mine, however, settles that question: the island is within the pale of law. It is a rock adjacent to and in the waters of Saint Paul, and resorted to only by those seals which are born and belong upon the breeding-grounds of Saint Paul and Saint George, and I have never seen at any one time more than three or four thousand "holluschickie" hauled out here.

Walrus Island.—To the eastward, 6 miles from Northeast Point, will be noticed a small rock named Walrus Island. It is a mere ledge of lava, flat-capped, lifted just above the wash of angry waves; indeed, in storms of great power, the observer, standing on either Cross or Hutchinson's Hills, with a field-glass, can see the water breaking clear over it. These storms, however, occur late in the season, usually in October or November. This island has little or no commercial importance, being scarcely more than a quarter of a mile in length and 100 yards in point of greatest width, with bold water all around, entirely free from reefs or sunken rocks. As might be expected, there is no fresh water on it. In a fog it makes an ugly neighbor for the sea-captains when they are searching for Saint Paul; they all know it, and they all dread it. It is not resorted to by the fur-seals or by sea-lions in particular; but, singularly enough, it is frequented by several hundred male walrus, to the exclusion of females, every summer. A few sea-lions, but only a very few, however, breed here. On account of the rough weather, fogs, etc., this little islet is seldom visited by the natives of Saint Paul, and then only in the egging season of late June and early July; then this surf-beaten rock literally swarms with breeding water-fowl.

This low, tiny, rocky islet is, perhaps, the most interesting single spot now known to the naturalist, who may land in northern seas, to study the habits of bird-life; for here, without exertion or risk, he can observe and walk among tens upon tens of thousands of screaming water-fowl, and as he sits down upon the polished lava rock, he becomes literally ignored and environed by these feathered friends, as they reassume their varied positions of incubation, which he disturbs them from by his arrival. Generation after generation of their kind have resorted to this rock unmolested, and to-day, when you get among them, all doubt and distrust seems to have been eliminated from their natures. The island itself is rather unusual in those formations which we find peculiar to Alaskan waters. It is almost flat, with slight, irregular undulations on top, spreading over an area of five acres, perhaps. It rises abruptly, though low, from the sea, and it has no safe beach upon which a person can land from a boat; not a stick of timber or twig of shrubbery ever grew upon it, though the scant presence of low, crawling grasses in the central portions prevents the statement that all vegetation is denied. Were it not for the frequent rains and dissolving fog, characteristic of summer weather here, the guano accumulation would be something wonderful to contemplate—Peru would have a rival. As it is, however, the birds, when they return, year after year, find their nesting-floor swept as clean as though they had never sojourned there before. The scene of confusion and uproar that presented itself to my astonished senses when I approached

this place in search of eggs, one threatening, foggy June morning, may be better imagined than described, for as the clumsy bidarrah came under the lee of the low cliffs, swarm upon swarm of thousands of murres or "aries" dropped in fright from their nesting-shelves, and before they had control of their flight, they struck to the right and left of me, like so many cannon balls. I was forced, in self-protection, to instantly crouch for a few moments under the gunwale of the boat until the struggling, startled flock passed, like an irresistible, surging wave, over my head. Words cannot depict the amazement and curiosity with which I gazed around, after climbing up to the rocky plateau and standing among myriads of breeding-birds, that fairly covered the entire surface of the island with their shrinking forms, while others whirled in rapid flight over my head, as wheels within wheels, so thickly inter-running that the blue and gray of the sky was hidden from my view. Add to this impression the stunning whir of hundreds of thousands of strong beating wings, the shrill screams of the gulls, and the muffled croaking of the "aries," coupled with an indescribable, disagreeable smell which arose from the broken eggs and other decaying substances, and a faint idea may be evoked of the strange reality spread before me. Were it not for this island and the ease with which the natives can gather, in a few hours, tons upon tons of sea-fowl eggs, the people of the village would be obliged to go to the westward, and suspend themselves over the lofty cliffs of Einahnuhto, dangling over the sea by ropes, as their neighbors are only too glad and willing to do at Saint George.

Saint Paul.—A glance at the map of Saint Paul shows that nearly half of its superficial area is low and quite flat, not much elevated above the sea. Wherever the sand-dune tracts are located, and that is right along the coast, is found an irregular succession of hummocks and hillocks drifted by the wind, which are very characteristic. On the summits of these hillocks the *Elymus* has taken root in times past, and as the sand drifts up, it keeps growing on and up, so that the quaint spectacle is presented of large stretches to the view, wherein sand-dunes, entirely bare of all vegetation at their base and on their sides, are crowned with a living cap of the brightest green, a tuft of long, waving grass blades, which will not down. None of this peculiar landscaping, however, is seen on Saint George, not even in the faintest degree. Travel about Saint Paul, with the exception of the road to Northeast Point, where the natives take advantage of the low water to run on the hard, wet sand, is exceedingly difficult walking, and there are examples of only a few white men who have ever taken the trouble and expended the physical energy necessary to accomplish the comparatively short walk from the village to Nahsayyernia, or the north shore. Walking over the moss-hidden and slippery rocks, or tumbling over slightly uncertain tussocks, is a task and not a pleasure. On Saint George, with the exception of a half-mile path to the village cemetery and back, nobody pretends to walk except the natives, who go to and from the rookeries in their regular seal-drives. Indeed, I am told that I am the only white man who has ever traversed the entire coast-line of both islands.

Saint George.—Turning to Saint George and its profile, presented by the accompanying map, the observer will be struck at once by the solidity of that little island and its great boldness, rising, as it does, sheer and precipitous from the sea all around, except at the three short reaches of the coast indicated on the chart, and where the only chance to come ashore exists.

The seals naturally have no such opportunity to gain a footing here as they have on Saint Paul, hence their comparative insignificance as to number. The island itself is a trifle over 10 miles in extreme length east and west, and about $4\frac{1}{4}$ miles of greatest width, north and south. It looks, when plotted, somewhat like an old stone ax; and, indeed, when I had finished my first contours from my field-notes, the ancient stone-ax outline so disturbed me that I felt obliged to resurvey the southern shore, in order that I might satisfy my own mind as to the accuracy of my

first work. It consists of two great plateaus, with a high upland valley between, the western table-land dropping abruptly to the sea at Dalnoi Mees, while the eastern falls as precipitately at Waterfall Head and Tolstoi Mees. There are several little reservoirs of fresh water—I can scarcely call them lakes—on this island; pools, rather, that the wet sphagnum seems to always keep full, and from which drinking-water in abundance is everywhere found. At Garden Cove a small stream, the only one on the Pribylov Group, empties into the sea.

Saint George has an area of about 27 square miles; it has 29 miles of coast-line, of which only $2\frac{1}{4}$ are visited by the fur-seals, and which is in fact all the eligible landing ground afforded them by the structure of the island. Nearly half of the shore of Saint Paul is a sandy beach, while on Saint George there is less than a mile of it all put together, namely, a few hundred yards in front of the village, the same extent on the Garden Cove beach, southeast side, and less than half a mile at Zapadnie on the south side.

Just above the Garden Cove, under the overhanging bluffs, several thousand sea-lions hold exclusive, though shy, possession. Here there is a half mile of good landing. On the north shore of the island, 3 miles west from the village, a grand bluff wall, of basalt and tufa intercalated, rises abruptly from the sea to a sheer height of 920 feet at its reach of greatest elevation, thence, dropping a little, runs clear around the island to Zapadnie, a distance of nearly 10 miles, without affording a single passage-way up or down to the sea that thunders at its base. Upon its innumerable narrow shelf-margins, and in its countless chinks and crannies, and back therefrom over the extended area of lava-shingled inland ridges and terraces, millions upon millions of water-fowl breed during the summer months.

The general elevation of Saint George, though in itself not great, has, however, an average three times higher than that of Saint Paul, the elevation of which is quite low, and slopes gently down to the sea east and north; Saint George rises abruptly, with exceptional spots for landing. The loftiest summit on Saint George, the top of the hill right back to the southward of the village, is 930 feet, and is called by the natives Ahluckeyak. That on Saint Paul, as I have before said, is Boga Slov Hill, 600 feet. All elevations on either island, 15 or 20 feet above sea-level, are rough and hummocky, with the exception of the sand-dune tracts at Saint Paul and the summits of the Cinder Hills, on both islands. Weathered out or washed from the basalt and pockets of olivine on both islands are aggregates of augite, seen most abundant on the summit slopes of Ahluckeyak Hill, Saint George. Specimens from the stratified bands of old, friable, gray lavas, so conspicuous on the shore of this latter island, show the existence of hornblende and vitreous feldspar in considerable quantity, while on the south shore, near the Garden cove, is a large dike of a bluish and greenish-gray phonolith, in which numerous small crystals of spinal are found. A dike, with well-defined walls of old, close grained, clay-colored lava, is near the village of Saint George, about a quarter of a mile east from the landing, in the face of those reddish breccia bluffs that rise from the sea. It is the only example of the kind on the islands. The bases or foundations of the Pribylov islands are, all of them, basaltic; some are compact and grayish-white, but most of them exceedingly porous and ferruginous. Upon this solid floor are many hills of brown and red tufa, cinder-heaps, &c. Polavina Sopka, the second point in elevation on Saint Paul Island, is almost entirely built up of red scoria and breccia; so is Ahluckeyak Hill, on Saint George, and the cap to the high bluffs opposite. The village hill at Saint Paul, Cone Hill, the Einahnuhto Peaks, Crater Hill, North Hill, and Little Polavina are all ash-heaps of this character. The bluffs at the shore of Polavina Point, Saint Paul, show in a striking manner a section of the geological structure of the island. The tufas on both islands, at the surface, decompose and weather into the base of good soil, which the severe climate, however, renders useless to the husbandman.

There is not a trace of granitic or a gneissic rock found *in situ*. Metamorphic bowlders have been collected along the beaches and pushed up by the ice-floes which have brought them down from the Siberian coast away to the northwest. The dark-brown tufa bluffs and the breccia walls at the east landing of Saint Paul Island, known as "Black Bluffs," rise suddenly from the sea 60 to 80 feet, with stratified horizontal lines of light-gray calcareous conglomerate, or cement, in which are imbedded sundry fossils characteristic of and belonging to the Tertiary age, such as *Cardium grœnlandicum*, *C. decoratum*, *C. astarte*, *C. pectunculata*, &c. This is the only locality within the purview of the Pribylov islands where any paleontological evidence of their age can be found. These specimens, as indicated, are exceedingly abundant. I brought down a whole series, gathered there at the east landing or "Navastock," in a short half-hour's search and labor.

WHY THESE ISLANDS ARE FREQUENTED BY FUR-SEALS.—The fact that the fur-seals frequent these islands and those of Bering and Copper, on the Russian side, to the exclusion of other land, seems at first a little singular, to say the least; but when we come to examine the subject we find that these animals, when they repair hither to rest for two or three months on the land, as they must do by their habit during the breeding season, require a cool moist atmosphere, imperatively coupled with firm, well-drained land, or dry, broken rocks, or shingle rather, upon which to take their positions and remain undisturbed by the weather and the sea for the lengthy period of reproduction. If the rookery ground is hard and flat, with an admixture of loam or soil, puddles are speedily formed in this climate, where it rains almost every day, and when not raining, rain-fogs take quick succession and continue the saturation, making thus a muddy slime, which very quickly takes the hair off the animals whenever it plasters or wherever it fastens on them; hence, they carefully avoid any such landing. If they occupy a sandy shore the rain beats that material into their large, sensitive eyes, and into their fur, so they are obliged, from simple irritation, to leave and hunt the sea for relief.

The seal-islands now under discussion offer to the *Pinnipedia* very remarkable advantages for landing, especially Saint Paul, where the ground of basaltic rock and of volcanic tufa or cement slopes up from so many points gradually above the sea, making thereby a perfectly adapted resting place for any number, from a thousand to millions, of those intelligent animals, which can lie out here from May until October every year in perfect physical peace and security. There is not a rod of this ground of that character offered to these animals elsewhere in all Alaska, not on the Aleutian chain, not on the mainland, not on Saint Matthew or Saint Lawrence. Both of the latter islands were surveyed by myself, with special reference to this query, in 1874; every foot of Saint Matthew shore line was examined, and I know that the fur-seal could not rest on the low clayey lava flats there in contentment a single day; hence he never has rested there, nor will he in the future. As to Saint Lawrence, it is so ice bound and snow-covered in spring and early summer, to say nothing of numerous other physical disadvantages, that it never becomes of the slightest interest to the seals.

COMMERCIAL IMPORTANCE OF THE ALASKA ROOKERIES.—With the exception of these seal-islands of Bering Sea, there are none elsewhere in the world of the slightest importance to-day; the vast breeding-grounds bordering on the Antarctic have been, by the united efforts of all nationalities—misguided, short-sighted, and greedy of gain—entirely depopulated; only a few thousand unhappy stragglers are now to be seen throughout all that southern area, where millions once were found, and a small rookery protected and fostered by the government of a South American state, north and south of the mouth of the Rio de la Plata. When, therefore, we note the eagerness with which our civilization calls for seal-skin fur, the fact that, in spite of fashion and its caprices, this fur is and always will be an article of intrinsic value and in demand, the thought at

once occurs, that the Government is exceedingly fortunate in having this great amphibious stock-yard far up and away in the quiet seclusion of Bering Sea, from which it shall draw an everlasting revenue, and on which its wise regulations and its firm hand can continue the seals forever.

3. DESCRIPTION OF THE FUR-SEAL ROOKERIES OF SAINT PAUL AND SAINT GEORGE.

DEARTH OF INFORMATION CONCERNING THE ROOKERIES.—Before I can intelligently and clearly present an accurate estimate of the aggregate number of fur-seals which appear upon these great breeding-grounds of the Pribylov group every season, I must take up, in regular sequence, my surveys of these remarkable rookeries which I have illustrated in this memoir by the accompanying sketch-maps, showing topographically the superficial area and distribution assumed by the seal-life at each locality.

It will be observed, that the sum total on Saint Paul Island preponderates, and completely overshadows that which is represented at Saint George. Before passing to the detailed discussion of each rookery, it is well to call attention to a few salient features in regard to the present appearance of the seals on these breeding-grounds. Touching the location of the fur-seals to-day, as I have recorded and surveyed it, compared with their distribution in early times, I am sorry to say that there is not a single line on a chart, or a word printed in a book, or a note made in manuscript, which refers to this all-important subject, prior to my own work, which I present herewith for examination. The absence of definite information in regard to what I conceive to be of vital interest and importance to the whole business, astonished me; I could not at first believe it; and, for four or five years, I searched carefully among the archives of the old Russian company, as I searched diligently when up there, and elsewhere in the Territory of Alaska, for some evidence in contradiction of this statement which I have just made. I wanted to find, I hoped to discover, some old record, some clew, by which I could measure with authority and entire satisfaction to my own mind, the relative volume of seal-life in the past, as compared with that which I record in the present, but was disappointed.

I am unable, throughout the whole of the following discussion, to cite a single reliable statement which can give any idea as to the condition and numbers of the fur-seal on these islands, when they were discovered in 1786–'87, or during the whole time of their occupation since, up to the date of my arrival. I mark this so conspicuously, for it is certainly a very strange oversight, a kind of neglect, which, in my opinion, has been, to say the least, inexcusable.

RUSSIAN RECORDS.—In attempting to form a conception of what the seals were or might have been in those early days, as they spread themselves over the hauling and breeding grounds of these islands, I have been thrown entirely upon the vague statements given to me by the natives and one or two of the first American pioneers in Alaska. The only Russian record which touches upon the subject* contains the remarkable statement, which is, in the light of my survey, simply ridiculous now, that is, that the number of fur-seals on Saint George during the first years of Russian occupation was nearly as great as that on Saint Paul. The most superficial examination of the geological character portrayed on the accompanying maps of the islands will satisfy any unprejudiced mind as to the error of such a statement. Only a mere tithe of the multitudes which

* VENIAMINOV: Zapieskie ob Oonalashkenskaho Otdayla, 2 vols., St. Petersburg, 1842. This work of Bishop Innocent Veniaminov is the only one which the Russians can lay claim to as exhibiting anything like a history of Western Alaska, or of giving a sketch of its inhabitants and resources, that has the least merit of truth, or the faintest stamp of reliability. Without it we should be simply in the dark as to much of what the Russians were about during the whole period of their occupation and possession of that country. Veniaminov died at Moscow, April 22, 1879, æt. 94.

repair to Saint Paul, in perfect comfort, over the 16 to 20 miles of splendid landing-ground found thereon could visit Saint George, when all of the coast-line fit for their reception at this island is a scant 2½ miles; there were afloat, at the time of the beginning of my investigation, a score of equally wild and incredible legends in regard to the rookeries on Saint Paul and Saint George. Finding, therefore, that the whole work must be undertaken *de novo*, I set about it without further delay.

IMMENSE MORTALITY OF THE SEALS IN 1836.—No native on the islands seemed to have any direct knowledge or was acquainted with a legendary tradition even, in relation to the seals, concerning their area and distribution on the land here, prior to the year 1835; but they all chimed in with great unanimity, saying that the winter preceding this season (1835–'36) was one of frightful severity; that many of their ancestors who had lived on these islands in large barraboras just back of the Black bluffs, near the present village, and at Polavina, then perished miserably.

They say that the cold continued far into the summer; that immense masses of clearer and stronger ice-floes than had ever been known about the islands, or were ever seen since, were brought down and shoved high up on to all the rookery margins, forming an icy wall completely around the island looming up 20 to 30 feet above the surf; they further state that this wall did not melt or in any way disappear until the middle or end of August, 1836.

They affirm that for this reason the fur-seals, when they attempted to land, according to their habit and their necessity, during June and July, were unable to do so in any considerable numbers. The females were compelled to bring forth their young in the water and at the wet, storm-beaten surf-margins, which caused multitudes of the mothers and all of the young to perish. The result was virtual annihilation of the breeding-seals. Hence, at the following season, only a spectral, a shadowy imitation of past times could be observed upon the seal-grounds of Saint Paul and Saint George.

On the Lagoon rookery, now opposite the village of Saint Paul, there were then only two males, with a number of cows. At Nah Speel, close by and right under the village, there were then only some 2,000; this the natives know because they counted them. On Zapadnie there were about 1,000 cows, bulls, and pups; at Southwest Point there were none. Two small rookeries were then on the north shore of Saint Paul, near a place called "Maroonitch"; and there were seven small rookeries running round Northeast Point, but on all of these there were only 1,500 males, females, and young; and this number includes the "holluschickie," which, in those days, lay in among the breeding-seals, there being so few old males that they were permitted to do so. On Polavina there were about 500 cows, bulls, pups, and "holluschickie"; on Lukannon and Keetavie about 300; but on Keetavie there were only ten bulls and so few young males lying in altogether, that these old natives, as they told me, took no note of them on the rookeries just cited. On the Reef, in Gorbotch, were only about 1,000; in this number last mentioned may be included some 800 "holluschickie," which lay in with the breeding-seals. There were only twenty old bulls on Gorboteh, and about ten old males on the Reef. The village was placed on its present site ten years prior to this period of 1835–'36.

Such, briefly and succinctly, is the sum and the substance of all information which I could gather prior to 1835–'36; and while I do not entirely credit these statements, yet the earnest, straightforward agreement of the natives has impressed me so that I narrate it here. It certainly seems as though this enumeration of the old Aleuts was painfully short.

Then, again, with regard to the probable truth of the foregoing statement of the natives, perhaps I should call attention to the fact that the entire sum of seal-life in 1836, as given by them, is just 4,100, of all classes, distributed as I have indicated above. Now, on turning to Bishop

Veniaminov, by whom was published the only statement of any kind in regard to the killing on these islands from 1817 to 1837, the year when he finished his work, I find that he makes a record of slaughter of seals in the year 1836, of 4,052, which were killed and taken for their skins; but if the natives' statements are right, then only 50 seals were left on the island for 1837, in which year, however, 4,220 were again killed, according to the bishop's table, according to which there was also a steady increase in the size of this return from that date along up to 1850, when the Russians governed their catch by the market alone, always having more seals than they knew what to do with.

Again, in this connection, the natives say that until 1847, the practice on these islands was to kill indiscriminately both females and males for skins; but after this year, 1847, the strict respect now paid to the breeding-seals, and exemption of all females, was enforced for the first time, and has continued up to date.

Thus it will be seen that there is, frankly stated, nothing to guide to a fair or even an approximate estimate as to the numbers of the fur-seals on these two islands, prior to my labor.

MANNER OF COMPUTING THE NUMBER OF SEALS.—After a careful study of the subject, during three entire consecutive seasons, and a confirmatory review of it in 1876, I feel confident that the following figures and surveys will, upon their own face, speak authoritatively as to their truthful character.

At the close of my investigation, during the first season of my labor on the ground, in 1872, the fact became evident that the breeding-seals obeyed an imperative and instinctive natural law of distribution—a law recognized by each and every seal upon the rookeries, prompted by a fine consciousness of necessity to its own well-being. The breeding-grounds occupied by them were, therefore, invariably covered by seals in exact ratio, greater or less, as the area upon which they rested was larger or smaller. They always covered this ground evenly, never crowding in at one place here, to scatter out there. The seals lie just as thickly together, where the rookery is boundless in its eligible unoccupied area at their rear and by them, as they do in the little strips which are abruptly cut off and narrowed by rocky walls behind. For instance, on a rod of ground, under the face of bluffs which hemmed it in to the land from the sea, there are just as many seals, no more and no less, as will be found on any other rod of rookery-ground throughout the whole list, great and small; always exactly so many seals, under any and all circumstances to a given area of breeding-ground. There are just as many cows, bulls, and pups on a square rod at Nah Speel, near the village, where, in 1874, all told, there were only seven or eight thousand, as there are on any square rod at Northeast Point, where a million of them congregate.

This fact being determined, it is evident that, just in proportion as the breeding-grounds of the fur-seal on these islands expand or contract in area from their present dimensions, the seals will increase or diminish in number.

My discovery, at the close of the season of 1872, of this law of distribution, gave me at once the clew I was searching for in order to take steps by which I could arrive at a sound conclusion as to the entire number of seals herding on the island.

I noticed, and time has confirmed my observation, that the period for taking these boundaries of the rookeries, so as to show this exact margin of expansion at the week of its greatest volume, or when they are as full as they are to be for the season, is between the 10th and 20th of July of every year; not a day earlier, and not many days later. After the 20th of July the regular system of compact, even organization breaks up. The seals then scatter out in pods or clusters, the pups

leading the way, straying far back—the same number instantly covering twice and thrice as much ground as they did the day or week before, when they lay in solid masses and were marshaled on the rookery ground proper.

There is no more difficulty in surveying these seal margins during this week or ten days in July, than there is in drawing sights along and around the curbs of a stone fence surrounding a field. The breeding seals remain perfectly quiet under your eyes all over the rookery, and almost within your touch, everywhere on the outside of their territory that you may stand or walk. The margins of massed life, which I have indicated on the topographical surveys of these breeding grounds of Saint Paul and Saint George, are as clean cut and as well defined against the soil and vegetation as is the shading on my maps. There is not much difficulty in making the surveys, and in making them correctly.

Now, with a knowledge of the superficial area of these breeding grounds, the way is clearly open to a very interesting calculation as to the number of fur-seals upon them. I am well aware of the fact, when I enter upon this discussion, that I cannot claim perfect accuracy, but, as shadowing my plan of thought and method of computation, I propose to present every step in the processes which have guided me to the result.

ROOKERY SPACE OCCUPIED BY SINGLE SEALS.—When the adult males and females, fifteen or twenty of the latter to every one of the former, have arrived upon the rookery, I think an area a little less than 2 square feet for each female may be considered as the superficial space required by each animal with regard to its size and in obedience to its habits; and this limit may safely be said to be over the mark. Now, every female, or cow, on this 2 square feet space, doubles herself by bringing forth her young; and in a few days or a week, perhaps, after its birth, the cow takes to the water to wash and feed, and is not back on this allotted space one-fourth of the time again during the season. In this way, is it not clear that the females almost double their number on the rookery grounds, without causing the expansion of the same beyond the limits that would be actually required, did they not bear any young at all? For every 100,000 breeding seals, there will be found more than 85,000 females, and less than 15,000 males; and in a few weeks after the landing of these females, they will show for themselves; that is, for this 100,000, fully 180,000 males, females, and young instead, on the same area of ground occupied previously to the birth of the pups.

It must be borne in mind, that perhaps 10 or 12 per cent. of the entire number of females were yearlings last season, and come up on to these breeding grounds as virgins for the first time during this season—as two-year old cows; they of course bear no young.

The males being treble and quadruple the physical bulk of the females, require about 4 feet square for their use of this same rookery ground, but as they are less than one-fifteenth the number of the females, much less, in fact, they therefore occupy only one-eighth of the space over the breeding ground, where we have located the supposed 100,000; this surplus area of the males is also more than balanced and equalized by the 15,000 or 20,000 virgin females which come on to this rookery for the first time to meet the males. They come, rest a few days or a week, and retire, leaving no young to show their presence on the ground.

Taking all these points into consideration, and they are features of fact, I quite safely calculate upon an average of 2 square feet to every animal, big and little, on the breeding grounds, as the initial point upon which to base an intelligent computation of the entire number of seals before us. Without following this system of enumeration, a person may look over these swarming myriads between Southwest Point and Novostohnah, guessing vaguely and widely, at any figure from one million up to ten or twelve millions, as has been done repeatedly. How few people know what a

million really is; it is very easy to talk of a million, but it is a tedious task to count it off, and makes one's statements as to "millions" decidedly more conservative after the labor has been accomplished.

REVIEW OF THE ROOKERIES OF SAINT PAUL.

Before summing up the grand total, I shall now, in sequence, review each one of the several rookeries of Saint Paul, taking them in their order as they occur, going north from the Reef point. The accompanying maps show the exact area occupied by the breeding seals and their young in the season of 1874, which is the date of my latest field work on the Pribylov Islands.

THE REEF ROOKERY.—By reference first to the general map, it will be observed that this large breeding-ground, on that grotesquely shaped neck which ends in the Reef point, is directly contiguous to the village—indeed, it may be fairly said to be right under the lee of the houses on the hill. It is one of the most striking of all the rookeries, owing probably to the fact that on every side it is sharply and clearly exposed to the vision, as the circuit is made in boats. A reach of very beautiful drifting sand, a quarter of a mile from the village hill to the Reef bluffs, separates the breeding grounds proper from the habitations of the people. These Zoltoi sands are, however, a famous rendezvous for the "holluschickie," and from them, during the season, the natives make regular drives, having only to step out from their houses in the morning and walk a few rods to find their fur-bearing quarry.

Passing over the sands on our way down to the point, we quickly come to a basaltic ridge or back-bone, over which the sand has been rifted by the winds, and which supports a luxuriant growth of *Elymus* and other grasses, with beautiful flowers. A few hundred feet farther along our course

brings us in full view, as we look to the south, of one of the most entrancing spectacles which seals afford to man. We look down upon and along a grand promenade ground, which slopes gently to the eastward, and trends southward down to the water from the abrupt walls bordering on the sea on the west, over a parade-ground as smooth as the floor of a ball-room, 2,000 feet in length, from 500 to 1,000 feet in width, over which multitudes of "hollusehickie" are filing in long strings, or deploying in vast platoons, hundreds abreast, in an unceasing march and countermarch; the breath which rises into the cold air from a hundred thousand hot throats hangs like clouds of white steam in the gray fog itself; indeed, it may be said to be a seal fog peculiar to the spot, while the din, the roar arising over all, defies our description.

We notice to our right and to our left, an immense solid mass of breeding seals at Gorboteh, and those stretching and trending around nearly a mile from our feet, far around to the Reef point below and opposite the parade ground, with here and there a neutral passage is left open for the "hollusehickie" to go down and come up from the waves.

The adaptation of this ground of the Reef rookery to the requirements of the seal is perfect. It falls gently from its high Zoltoi Bay margin on the west to the sea on the east; and upon its broad expanse not a solitary puddle of mud-spotting is to be seen, though everything is reeking with moisture, and the fog even dissolves into rain as we view the scene. Every trace of vegetation upon this parade has been obliterated; a few tufts of grass, capping the summits of those rocky hillocks, indicated on the eastern and middle slope, are the only signs of botanical life which the seals have suffered to remain.

A small rock, "Seevitchie Kammin," 500 or 600 feet right to the southward and out at sea, is also covered with the black and yellow forms of fur-seals and sea-lions. It is environed by shoal reefs, rough, and kelp-grown, which the navigators prudently avoid.

This rookery of the Reef proper has 4,016 feet of sea margin, with an average depth of 150 feet, making ground for 301,000 breeding seals and their young. Gorboteh rookery has 3,660 feet of sea margin, with an average depth of 100 feet, making ground for 183,000 breeding seals and their young; an aggregate for this great Reef rookery of 484,000 breeding seals and their young. Heavy as this enumeration is, yet the aggregate only makes the Reef rookery third in importance, compared with the others which we are yet to describe.

Lagoon rookery.—We now pass from the Reef up to the village, where one naturally would not expect to find breeding seals within less than a pistol-shot from the natives' houses; but it is a fact, nevertheless, for on looking at the sketch map of the Lagoon rookery herewith presented, it will be noticed that I have located a little gathering of breeding seals right under the village hill to the westward of that place called "Nah Speel." This is in itself an insignificant rookery and never has been a large one, though it is one of the oldest on the island. It is only interesting, however, superficially so, on account of its position, and the fact that through every day of the season half the population of the entire village go and come to the summit of the bluff, which overhangs it, where they peer down for hours at a time upon the methods and evolutions of the "kantickie" below, the seals themselves looking up with intelligent appreciation of the fact that, though they are in the hands of man, yet he is wise enough not to disturb them there as they rest.

If at Nah Speel, or that point rounding into the village cove, there were any suitable ground for a rookery to grow upon or spread over, the seals would doubtless have been there long ago. There are, however, no such natural advantages offered them; what there is they have availed themselves of.

Looking from the village across the cove and down upon the Lagoon, still another strange contradiction appears—at least it seems a natural contradiction to one's usual ideas. Here we see

the Lagoon rookery, a reach of ground upon which some twenty-five or thirty thousand breeding seals come out regularly every year during the appointed time, and go through their whole elaborate system of reproduction, without showing the slightest concern for or attention to the scene directly east of them and across that shallow slough not forty feet in width. There are the great slaughtering fields of Saint Paul Island; there are the sand flats where every seal has been slaughtered for years upon years back, for its skin; and even as we take this note, forty men are standing there knocking down a drove of two or three thousand "holluschickie" for the day's work, and as they labor, the whacking of their clubs and the sound of their voices must be as plain to those breeding seals which are not one hundred feet from them, as it is to us, a quarter of a mile distant. In addition to this enumeration of disturbances, well calculated to amaze, and dismay, and drive off every seal within their influence, are the decaying bodies of the last year's catch, 75,000 or 85,000 unburied carcasses, that are sloughing away into the sand, which two or three seasons from now nature will, in its infinite charity, cover with the greenest of all green grasses. The whitened bones and grinning skulls of over 3,000,000 seals have bleached out on that slaughtering spot, and are buried below its surface now.

Directly under the north face of the Village Hill, where it falls to the narrow flat between its feet and the cove, the natives have sunk a well. It was excavated in 1857, they say, and subsequently deepened to its present condition in 1868. It is 12 feet deep, and the diggers said that they found bones of the sea-lion and fur-seal thickly distributed every foot down, from top to bottom; how much lower these osteological remains of prehistoric pinnipeds can be found, no one knows as yet; the water here, on that account, has never been fit to drink, or even to cook with; but being soft, was and is used by the natives for washing clothes, etc. Most likely it records the spot where the Russians, during the heydays of their early occupation, drove the unhappy visitors of Nah Speel to slaughter. There is no Golgotha known to man elsewhere in the world as extensive as this one of Saint Paul.

Yet the natives say that this Lagoon rookery is a new feature in the distribution of the seals; that when the people first came there and located a part of the present village, in 1824 up to 1847, there never had been a breeding seal on that Lagoon rookery of to-day; so they have hauled up here from a small beginning, not very long ago, until they have attained their present numerical expansion, in spite of all these exhibitions of butchery of their kind, executed right under their eyes, and in full knowledge of their nostrils, while the groans and low moanings of their stricken species stretched out beneath the clubs of the sealers, must have been and are far plainer in their ears than they are in our own.

Still they come—they multiply, and they increase—knowing so well that they belong to a class which intelligent men never molest; to-day at least they must know it, or they would not submit to these manifestations which we have just cited, so close to their knowledge.

The Lagoon rookery, however, never can be a large one on account of the very nature of the ground selected by the seal; for it is a bar simply pushed up above the surf wash of bowlders, water-worn and rounded, which has almost inclosed and cut out the Lagoon from its parent sea. In my opinion the time is not far distant when that estuary will be another inland lake of Saint Paul, walled out from salt water and freshened by rain and melting snow, as are the other pools, lakes, and lakelets on the island.

Lukannon and Keetavie rookeries.—The next rookeries in order can be found at Lukannon and Keetavie. Here is a joint blending of two large breeding grounds, their continuity broken by a short reach of sea wall right under and at the eastern foot of Lukannon Hill. The appearance of these rookeries is like all the others, peculiar to themselves. There is a rounded,

swelling hill at the foot of Lukannon Bay, which rises perhaps 160 or 170 feet from the sea, abruptly at the point, but swelling out, gently up from the sand dunes in Lukannon Bay to its summit at the northwest and south. The great rookery rests upon the northern slope. Here is a beautiful adaptation of the finest drainage, with a profusion of those rocky nodules scattered everywhere over it, upon which the female seals so delight in resting.

Standing on the bald summit of Lukannon Hill, we turn to the south, and look over Keetavie Point, where another large aggregate of breeding rookery rests under our eyes. The hill falls away into a series of faintly terraced tables, which drop down to a flat that again abruptly descends to the sea at Keetavie Point. Between us and the Keetavie rookery is the parade ground of Lukannon, a sight almost as grand as that on the reef which we have feebly attempted to portray. The sand dunes to the west and to the north are covered with the most luxuriant grass, abruptly emarginated by the sharp abrasion of the hauling seals; this is shown very clearly on the general map. Keetavie Point is a solid basalt shelf. Lukannon Hill, the summit of it, is composed of volcanic tufa and cement, with irregular cubes and fragments of pure basalt scattered all over its flipper-worn slopes. Lukannon proper has 2,270 feet of sea margin, with an average depth of 150 feet, making ground for 170,000 breeding seals and their young. Keetavie rookery has 2,200 feet of sea margin, with an average depth of 150 feet, making ground for 165,000 breeding seals and their young, a whole aggregate of 335,000 breeding seals and their young. This is the point down along the flat shoals of Lukannon Bay, where the sand dunes are most characteristic, as they rise in their wind-whirled forms just above the surf wash. This also is where the natives come from the village during the early mornings of the season, for driving, to get any number of "holluschickie" or "bachelor" seals.

It is a beautiful sight, glancing from the summit of this great rookery hill, up to the north over that low reach of coast to Tonkie Mees, where the waves seem to roll in with crests that rise in unbroken ridges for a mile in length each, ere they break so grandly and uniformly on the beach. In these rollers the "holluschickie" are playing like sea birds, seeming to sport the most joyously at the very moment when the heavy billow breaks and falls upon them.

TOLSTOI ROOKERY.—Directly to the west from Lukannon, up along and around the head of the lagoon, is the sealpath-road over which the natives bring the "holluschickie" from Tolstoi. We follow this and take up our position on several lofty grass-grown dunes close to and overlooking another rookery of large size; this is Tolstoi.

We have here the greatest hill slope of breeding seals on either island, peculiarly massed on the abruptly sloping flanks of Tolstoi ridge, as it falls to the sands of English Bay, and ends suddenly in the precipitous termination of its own name, Tolstoi Point. Here the seals are in some places crowded up to the enormous depth of 500 measured feet, from the sea margin of the rookery to its outer boundary and limitation; and, when viewed as I viewed it in July, taking the angles and lines shown on the accompanying sketch-map, I considered it, with the bluffs terminating it at the south, and its bold sweep, which ends on the sands of English Bay, to be the most picturesque, though it is not the most impressive, rookery on the island, especially when that parade ground, lying just back and over the point, and upon its table-rock surface, is reached by the climbing seals.

If the observer will glance at the map, he will see that the parade ground in question lies directly over and about 150 feet above the breeding seals immediately under it. The sand-dune tracts which border the great body of the rookery seem to check these holluschickie from hauling to the rear, since sand drifts here, in this locality so high and exposed to the full force of winds, with more rapidity, and consequently more disagreeable energy to the seal, than anywhere else on the island.

A comical feature of this rookery is that appearance of blue foxes in the chinks under this parade ground and interstices of the cliffs; their melancholy barking and short yelps of astonishment, as we walk about, contrast quite sensibly with the utter indifference of the seals to our presence.

From Tolstoi at this point, sweeping around 3 miles to Zapadnie, is the broad sand reach of English Bay, upon which and back over its gently rising flats are the great hauling grounds of the holluschickie, which I have indicated on the general map, and to which I made reference in a previous section of this chapter. Looking at the myriads of "bachelor seals" spread out in their restless hundreds and hundreds of thousands upon this ground, one feels the utter impotency of verbal description, and reluctantly shuts his note and sketch books to gaze upon it with renewed fascination and perfect helplessness.

Tolstoi rookery has attained, I think, its utmost limit of expansion. The seals have already pushed themselves as far out upon the sand at the north as they can or are willing to go, while the abrupt cliffs, hanging over more than one-half of the sea margin, shut out all access to the rear for the breeding seals. The natives said that this rookery had increased very much during the last four or five years prior to the date of my making the accompanying survey. If it continues to increase, the fact can be instantly noted, by checking off the ground and comparing it with the sketch map herewith presented. Tolstoi rookery has 3,000 feet of sea margin, with an average depth of 150 feet, making ground for 225,000 breeding seals and their young.

Zapadnie rookery.—From Tolstoi, before going north, we turn our attention directly to Zapadnie on the west, a little over 2 miles as the crow flies, across English Bay, which lies between them. Here again we find another magnificent rookery, with features peculiar to itself, consisting of great wings separating one from the other, by a short stretch of 500 or 600 feet of the shunned sand reach, which makes a landing and a beach just between them. The northern Zapadnie lies mostly on the gently sloping, but exceedingly rocky, flats of a rough volcanic ridge which drops there to the sea. It, too, has an approximation to the Tolstoi depth, but not to such a solid extent. It is the one rookery which I have reason to believe has sensibly increased since my first survey in 1872. It has overflowed from the boundary which I laid down at that time, and has filled up for nearly half a mile, a long ribbon-like strip of breeding ground to the northeast from the hill slope, ending at a point where a few detached rocks jut out, and the sand takes exclusive possession of the rest of the coast. These rocks aforesaid are called by the natives "Nearhpahskie kammin," because they are a favorite resort for the hair-seals. Although this extension of a quite decided margin of breeding ground, over half a mile in length, between 1872 and 1876, does not, in the aggregate, point to a very large increased number, still it is gratifying evidence that the rookeries, instead of tending to diminish in the slightest, are more than holding their own.

Zapadnie, in itself, is something like the reef plateau on its eastern face, for it slopes up gradually and gently to the parade plateau on top—a parade ground not so smooth, however, being very rough and rocky, but which the seals enjoy. Just around the point, a low reach of rocks and beach connects it with the ridge walls of Southwest Point. A very small breeding rookery, so small that it is not worthy of a survey, is located here. I think, probably, on account of the nature of the ground, that it will never hold its own, and is more than likely abandoned by this time.

One of the prehistoric villages, the village of Pribylov's time, was established here between this point and the cemetery ridge on which the northern wing of Zapadnie rests. The old burying ground, with its characteristic Russian crosses and faded pictures of the saints, is plainly

marked on the ridge. It was at this bight of sandy landing that Pribylov's men first came ashore and took possession of the island, while others in the same season proceeded to Northeast Point and to the north shore, to establish settlements of their own order. When the indiscriminate sealing of 1868 was in progress, one of the parties lived here, and a salt-house which was then erected by them still stands; it is in a very fair state of preservation, although it has never been since occupied, except by the natives who come over here from the village in the summer to pick the berries of the *Empetrum* and *Rubus*, which abound in the greatest profusion around the rough and rocky flats that environ the little adjacent lake. The young people of Saint Paul are very fond of this berry festival, so-called among themselves, and they stay here every August, camping out a week or ten days at a time, before returning to their homes in the village.

Zapadnie rookery has, the two wings included, 5,880 feet of sea margin, with an average depth of 150 feet, making ground for 441,000 breeding seals and their young, being the second rookery on the island as to size and importance.

The holluschickie that sport here on the parade plateau, and indeed over all of the western extent of the English Bay hauling grounds, have never been visited by the natives for the purpose of selecting killing drives since 1872, inasmuch as more seals than were wanted have always been procured from Zoltoi, Lukannon, and Lower Tolstoi Points, which are all very close to the village. I have been told, since making this survey, that during the past year the breeding seals of Zapadnie have overflowed, so as to occupy all of the sand strip which is vacant between them on the accompanying map.

POLAVINA ROOKERY.—Half way between the village and Northeast Point lies Polavina, another one of the seven large breeding grounds on this island. The conspicuous cone-shaped head of Polavina Sopka rises clearly cut and smooth from the plateau at its base, which falls 2 miles to the eastward and southeastward, sharp off into the sea, presenting a bluff margin over a mile in length, at the base of which the sea thunders incessantly. It exhibits a very beautiful geological section of the simple structure of Saint Paul. The ringing, iron-like basaltic foundations of the island are here setting boldly up from the sea to a height of 40 or 50 feet—black and purplish-red, polished like ebony by the friction of the surf, and worn by its ageney into grotesque arches, tiny caverns, and deep fissures. Surmounting this lava bed is a cap of ferruginous cement and tufa, from 3 to 10 feet in thickness, making a reddish floor, upon which the seals patter in their restless, never-ceasing evolutions, sleeping or waking, on the land. It is as great a single parade plateau of polished cement as that of the Reef, but we are unable from any point of observation to appreciate it, inasmuch as we cannot stand high enough to overlook it, unless we ascend Polavina Sopka, and then the distances, with the perspective fore-shortening, destroy the effect.

The rookery itself occupies only a small portion of the seal-visited area at this spot. It is placed at the southern termination and gentle sloping of the long reach of bluff wall, which is the only cliff between Lukannon and Novastoshnah. It presents itself to the eye, however, in a very peculiar manner, and with great scenic effect, when the observer views it from the extreme point of its mural elevation; scanned from thence, nearly a mile to the northeast, it rises as a front of bicolored lava wall, high above the sea that is breaking at its base, and is covered with an infinite detail of massed seals in reproduction; at first sight, one wonders how they got there. No passages whatever can be seen, down or up. A further survey, however, discloses the common occurrence of rain water-runs between surf-beaten crevices, which make many stairways for the adhesive feet of *Callorhinus*, amply safe and comfortable.

For the reason cited in a similar example at Zapadnie, no "holluschickie" have been driven from this point since 1872, though it is one of the easiest worked. It was in the Russian times a

pet sealing ground with them. The remains of the old village have nearly all been buried in the sand near the lake, and there is really no mark of its early habitation, unless it be the singular effect of a human graveyard being dug out and despoiled by the attrition of seal bodies and flippers. The old cemetery just above and to the right of the barrabkie, near the little lake, was originally established, so the natives told me, far away from the hauling of the "hollnseuickie." It was, when I saw it in 1876, in a melancholy state of ruin—a thousand young seals at least moved off from its sufaee as I came up, and they had actually trampled out many sandy graves, rolling the bones and skulls of Aleutian ancestry in every direetion. Beyond this old barrabkie, whieh the present natives established as a house of refuge during the winter when they were trapping foxes, looking to the west over the lake, is a large expanse of low, flat swale and tundra, which is terminated by the rocky ridge of Kaminista; every foot of it has been placed there subsequent to the original elevation of the island by the action of the sea, beyond all question. It is covered with a thiek growth of the rankest sphagnum, which quakes and trembles like a bog under one's feet, but over which the most beatiful mosses ever and anon crop out, ineluding the eharacteristie floral display before referred to in speaking of the island; most of the way from the village up to Northeast Point, as will be seen by a cursory glanee at the map, with the exception of this bluff of Polavina and the terraeed table setting back from its faee to Polavina Sopka, the whole island is slightly elevated above the level of the sea, and its coast line is lying just above and beyond the reaeh of the surf, where great ridges of sand have been piled up by the wind, capped with sheafs and tufts of rank-growing *Elymus*.

There is a small rookery, which I eall "Little Polavina" indicated here, that does not promise much for the future; the sand cuts it off on the north, and sand has blown around so at its rear as to make all other ground not now occupied by the breeding seals there quite ineligible. Polavina rookery has 4,000 feet of sea margin, ineluding Little Polavina, with 150 feet of average depth, making ground for 300,000 breeding seals and their young.

Northeast Point or Novastoshnah rookery.—Though this is the last of the Saint Paul rookeries which I notice, yet it is so much greater than any other one on the island, or two others for that matter, that it forms the central feature of Saint Paul, and in truth presents a most astonishing and extraordinary sight. It was a view of sueh multitudes of amphibians, when I first stood upon the summit of Hutchinson Hill, and looked at the immense spread around me, that suggested to my mind a doubt whether the aeeurate investigation which I was making would give me courage to maintain the truth in regard to the subject.

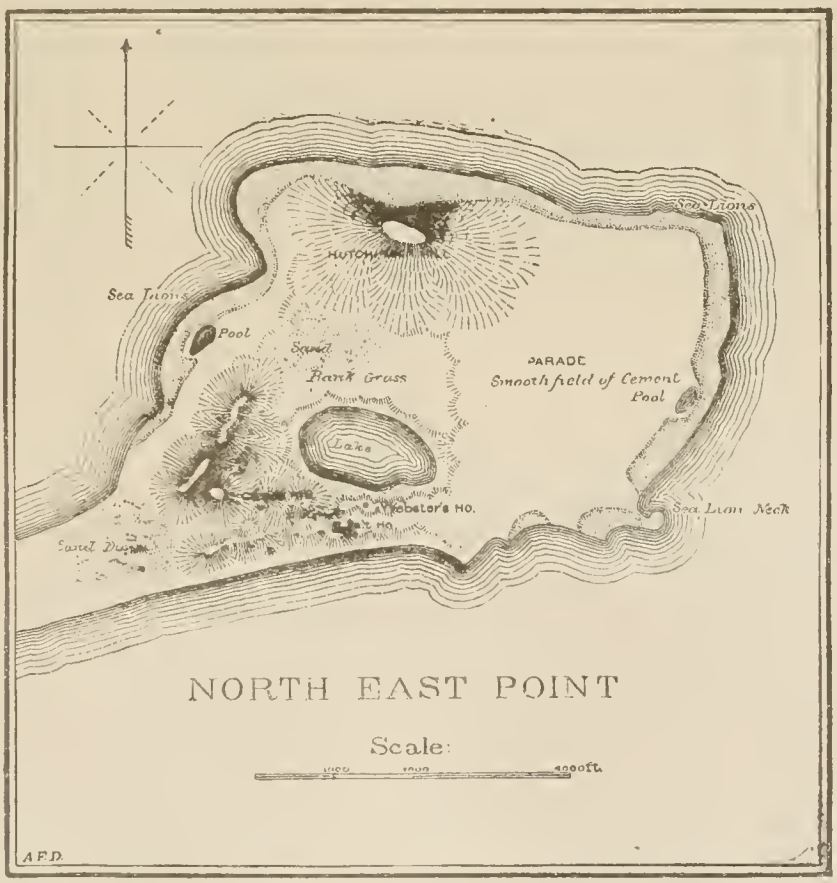
The result of my first survey here presented such a startling array of superficial area massed over by the breeding seals, that I was fairly diseoncerted at the magnitude of the result. It troubled me so when my initial plottings were made, and I had worked them out so as to plaee them tangibly before me, that I laid the whole preliminary survey aside, and seizing upon the next favorable day went over the entire field again. The two plats theu, laid side by side, substantially agreed, and I now present the great rookery to the public. It is in itself, as the others are, endowed with its own particular physiognomy, having an extensive sweep, everywhere surrounded by the sea, except at that interseetion of the narrow neck of sand which joins it to the main land. Hutehinson Hill is the foundation of the point, a solid basaltic floor, upon which a mass of breeeia has been poured at its northwest corner, which is so rough, and yet polished so highly by the countless pattering flippers of its visitors as to leave it entirely bare and bald of every spear of grass or traee of eryptogamic life. The hill is about 120 feet high; it has a rounded summit flecked entirely over by the "holluschickie," while the great belt of breeding rookery sweeps high up on its flanks, and around right and left, for nearly 3½ miles unbroken, an amazing sight in its aggregate, and infinite in its detail.

The picturesque feature, also, of the rookery here, is the appearance of the tawny, yellowish bodies of several thousand sea-lions,* which lay in and among the fur-seals at the several points designated on the sketch-map, though never far from the water. Sea-Lion Neck, a little tongue of low basaltic jutting, is the principal corner where the natives take these animals from when they capture them in the fall for their hides and sinews.

Cross, or Saint John's, Hill, which rises near the lake, to a height of 60 or 70 feet, and quite a landmark in itself, is a perfect cone of sand entirely covered with a luxuriant growth of *Elymus*. It is growing constantly higher by the fresh sand deposit brought by winds, and its retention by the annually rising grasses.

At this point, it will be noticed, there is a salt-house, and here is the killing ground for North-east Point, where nineteen or twenty thousand "holluschickie" are disposed of for their skins every season, their carcasses being spread out on the sand dunes between the foot of Cross Hill and Webster's house; a squad of sealers live there during the three or four weeks that they are engaged in the work. The "holluschickie" are driven from the large hauling grounds on the sand flats immediately adjacent to the killing grounds, being obtained without the slightest difficulty.

There also was the site of a village, once the largest one on this island ere its transfer to the sole control and charge of the old Russian-American Company, ten years after its discovery in 1786. The ancient cemetery and the turf lines of the decayed barraboras are still plainly visible.



*The sea-lions breed on no one of the rookeries at this island, the insignificant number that I noticed on Seevitchie Kammin excepted. At Southwest Point, however, I found a small sea-lion rookery, but there are no breeding fur-seals there. A handful of *Eumetopias* used to breed on Otter Island, but do not now since it has been necessary to station Government agents there, for the apprehension of fur-seal pirates, during the sealing season.

The company's steamer runs up here, watching her opportunity, and drops her anchor, as indicated on the general chart, right south of the salt house, in about 4 fathoms of water; then the skins are invariably hustled aboard, no time being lost, because it is an exceedingly uncertain place to load.

There is no impression in my mind to-day more vivid than is the one which was planted there during the afternoon of that July day, when I first made my survey of this ground; indeed, while I pause to think of the subject the great rookery of Novastoshnah rises promptly to my view, and I am fairly rendered dumb as I try to speak definitely of the spectacle. In the first place, this slope from Sea Lion Neck to the summit of Hutchinson's Hill is a sheer mile, smooth and gradual from the sea to the hill top; the parade ground lying between is also nearly three-quarters of a mile in width, sheer and unbroken. Now, upon that area before my eyes, this day and date of which I have spoken, were the forms of not less than three-fourths of a million seals—panse a moment—think of the number, three-fourths of a million seals engaged in moving in one solid mass from sleep to frolicksome gambols, backward, forward, over, around, changing and interchanging their heavy squadrons, until the whole mind is so confused and charmed by the vastness of mighty hosts that it refuses to analyze any further. Then, too, I remember that the day was one of exceeding beauty for that region; it was a swift alternation overhead of those characteristic rain fogs, between the succession of which the sun breaks out with transcendant brilliancy through the foggy halos about it; this parade field reflected the light like a mirror, and the seals, when they broke apart here and there for a moment, just enough to show its surface, seemed as though they walked upon the water. What a scene to put upon canvas, that amphibian host involved in those alternate rainbow lights and blue-gray shadows of the fog!

RECAPITULATION OF THE ESTIMATES OF NUMBER OF SEALS.—Below is a recapitulation of the figures made from my surveys of the area and position of the breeding grounds of Saint Paul Island between the 10th and 18th of July, 1872, confirmed and revised at that date in 1874. It is the first survey ever made on the island of its rookeries.

BREEDING-GROUNDS OF THE FUR-SEAL, SAINT PAUL ISLAND.	Number of seals, male, female, and young.
"Reef rookery" has 4,016 feet of sea margin, with 150 feet of average depth, making ground for	301,000
"Gorbotch rookery" has 3,660 feet of sea margin, with 100 feet of average depth, making ground for	183,000
"Lagoon rookery" has 750 feet of sea margin, with 100 feet of average depth, making ground for	37,000
"Nah Speel rookery" has 400 feet of sea margin, with 40 feet of average depth making ground for	8,000
"Lukannon rookery" has 2,270 feet of sea margin, with 150 feet of average depth, making ground for	170,000
"Keetavie rookery" has 2,200 feet of sea margin, with 150 feet of average depth, making ground for	165,000
"Tolstoi rookery" has 3,000 feet of sea margin, with 150 feet of average depth, making ground for	225,000
"Zapadnie rookery" has 5,880 feet of sea margin, with 150 feet of average depth, making ground for	441,000
"Polavina rookery" has 4,000 feet of sea margin, with 150 feet of average depth, making ground for	300,000
"Novastoshnah or Northeast point" has 15,840 feet of sea margin, with 150 feet of average depth, making ground for	1,200,000
A grand total of breeding seals and young for St. Paul Island in 1874 of	3,030,000

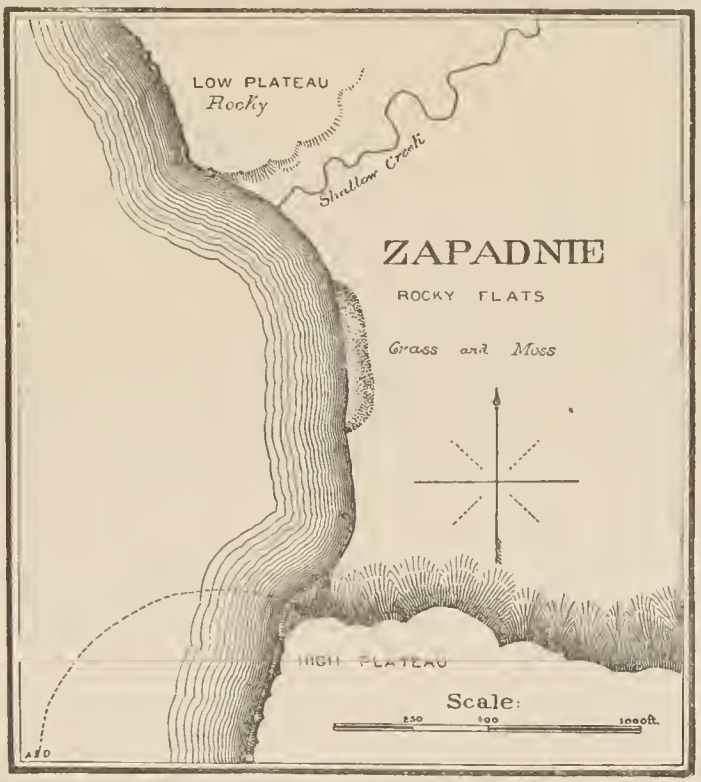
THE ROOKERIES OF SAINT GEORGE.

Saint George is now in order, and this island has only a trifling contribution for the grand total of the seal life; but though small, nevertheless it is of much value and interest. Certainly Pribylov, not knowing of the existence of Saint Paul, was as well satisfied as if he had possessed the boundless universe, when he first found it. As in the case of Saint Paul Island, I have been unable to learn much here in regard to the early status of the rookeries, none of the natives having any real information. The drift of their sentiment goes to show that there never was a great assemblage of

fur-seals on Saint George; in fact, never as many as there are to-day, insignificant as the exhibit is, compared with that of Saint Paul. They say that, at first, the sea-lions owned this island, and that the Russians, becoming cognizant of the fact, made a regular business of driving off the "seevitchie," in order that the fur-seals might be encouraged to land.* Touching this statement, with my experience on Saint Paul, where there is no conflict at all between the fifteen or twenty thousand sea-lions which breed around on the outer edge of the seal-rookeries there, and at Southwest Point, I cannot agree to the Saint George legend. I am inclined to believe, however, indeed it is more than probable, that there were a great many more sea-lions on and about Saint George before it was occupied by man—a hundredfold greater, perhaps, than now; because a sea-lion is an exceedingly timid, cowardly creature when it is in the proximity of man, and will always desert any resting place where it is constantly brought into contact with man.

The scantiness of the Saint George rookeries is due to the configuration of the island itself. There are five separate, well-defined rookeries on Saint George, as follows:

ZAPADNIE ROOKERY.—Directly across the island, from its north shore to Zapadnie Bay, a little over 3 miles from the village, is a point where the southern bluff walls of the island turn



* This statement of the natives has a strong circumstantial backing by the published account of Choris, a French gentleman of leisure, and amateur naturalist and artist, who landed at Saint George in 1820 (July); he passed several days off and on the land; he wrote at short length in regard to the sea-lion, saying "that the shores were covered with innumerable troops of sea-lions. The odor which arose from them was insupportable. These animals were all the time rutting," &c., yet nowhere does he speak in the chapter, or elsewhere in his volume, of the fur-seal on Saint George, but incidentally remarks that over on Saint Paul it is the chief animal and most abundant. Although this writing of Choris in regard to the subject is brief, superficial, and indefinite, yet I value the record he made, because it is *prima facie* evidence, to my mind, that had the fur-seal been nearly as numerous on Saint George then as it was on Saint Paul, he would have spoken of the fact surely, inasmuch as he was searching for just such items with which to illuminate his projected book of travels. The old Russian record as to the relative number of fur-seals on the two islands of Saint George and Saint Paul is clearly as palpably erroneous for 1820, as I found it to be in 1872, 1873. No intelligent steps toward ascertaining that ratio were ever taken until I made my survey.—*Voyage Pittoresque autour du Monde, Iles Aléoutiennes,* pp. 12, 13, pl. xiv. 1822.

north, and drop quickly down from their lofty elevation in a succession of heavy terraces, to an expanse of rocky flat, bordered by a sea sand beach; just between the sand beach, however, and these terraces, is a stretch of about 2,000 feet of low, rocky shingle, which borders the flat country back of it, and upon which the surf breaks free and boldly. Midway between the two points is the rookery; and a small detachment of it rests on the direct sloping of the bluff itself, to the southward; while in and around the rookery, falling back to some distance, the "holluschickie" are found.

A great many confusing statements have been made to me about this rookery—more than in regard to any other on the islands. It has been said, with much positiveness, that, in the times of the Russian rule, this was an immense rookery for Saint George; or, in other words, it covered the entire ground between that low plateau to the north and the high plateau to the south, as indicated on the map; and it is also cited in proof of this that the main village of the island, for many years, thirty or forty, was placed on or near the limited drifting sand dune tracts just above the plateau, to the westward. Be the case as it may, it is certain that for a great, great many years back, no such rookery has ever existed here. When seals have rested on a chosen piece of ground to breed, they wear off the sharp edges of fractured basaltic bowlders, and polish the breccia and cement between them so thoroughly and so finely that years and years of chiseling by frost, and covering by lichens, and creeping of mosses, will be required to efface that record. Hence I was able, acting on the suggestion of the natives at Saint Paul, to trace out those deserted fur-seal rookeries on the shores of that island. At Maroonitch, which had, according to their account, been abandoned for over sixty years by the seals, still, at their prompting, when I searched the shore, I found the old boundaries tolerably well defined; I could find nothing like them at Zapadnie.

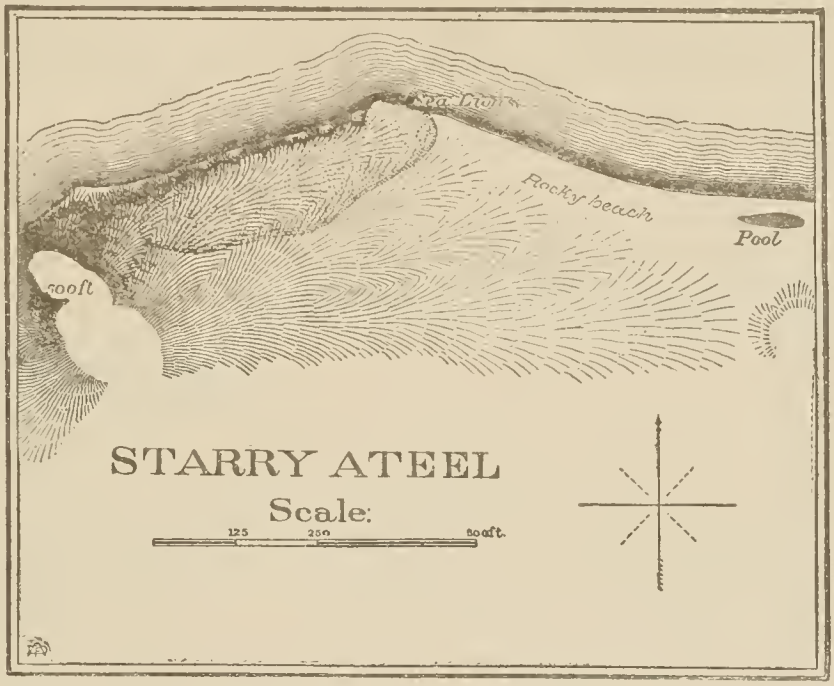
Zapadnie rookery in July, 1873, had 600 feet of sea margin, with 60 feet of average depth, making ground for 18,000 breeding seals and their young. In 1874 I resurveyed the field, and it seemed very clear to me that there had been a slight increase, perhaps to the number of 5,000 according to the expansion of the superficial area over that of 1873.

From Zapadnie we pass to the north shore, where all the other rookeries are located, with the village at a central point between them on the immediate border of the sea. And, in connection with this point, it is interesting to record the fact that every year, until recently, it has been the regular habit of the natives to drive the "holluschickie" over the 2½ or 3 miles of rough basaltic uplands which separate the hauling ground of Zapadnie from the village; driving them to the killing grounds there, in order to save the delay and trouble generally experienced in loading these skins in the open bay. The prevailing westerly and northwesterly winds during July and August make it, for weeks at a time, a marine impossibility to effect a landing at Zapadnie, suitable for the safe transit of cargo to the steamer.

This three miles of the roughest of all rough walks that can be imagined, is made by the fur-seals in about seven or eight hours, when driven by the Aleuts; and, the weather is cool and foggy. I have known one Treasury agent, who, after making the trip from the village to Zapadnie, seated himself down in the barrabkie there, and declared that no money would induce him to walk back the same way that same day, so severe is the exercise to one not accustomed to it; but it exhibits the power of land-locomotion possessed by the "holluschickie."*

* The peculiarly rough character to this trail is given by the large, loose, sharp-edged basaltic bowlders, which are strewn thickly over all those lower plateau that bridge the island between the high bluffs at Starry Ateel and the slopes of the Ahluckeyak Hill. The summits of the two broader, higher plateaus, east and west, respectively, are comparatively smooth and easy to travel over; and so is the sea-level flat at Zapadnie itself. On the map of Saint George, a number of very small ponds will be noticed; they are the fresh-water reservoirs of the island. The two largest of these are near the summit of this rough divide; the seal trail from Zapadnie to the village runs just west of them, and comes out on the north shore, a little to the eastward of the hauling grounds of Starry Ateel, where it forks and unites with that path. The direct line between the village and Zapadnie, though nearly a mile shorter on the chart, is equal to 5 miles more of distance by reason of its superlative rocky inequalities.

STARRY ARTEEL*.—This rookery is the next in order, and it is the most remarkable one on Saint George, lying as it does in one bold sweep from the sea, up a steeply inclined slope to a point where the bluffs that border it seaward are over 400 feet high; the seals being just as closely crowded at the summit of this lofty breeding plat as they are at the water's edge; the whole oblong oval on the side hill, as designated by the accompanying survey, is covered by their thickly clustered forms. It is a strange sight, also, to sail under these bluffs with the boat, in fair weather, for



a landing; and, as you walk the beach, over which the cliff wall frowns a sheer 500 feet, there, directly over your head, the craning necks and twisting forms of the restless seals, ever and anon, as you glance upward, appear as if ready to launch out and fall below, so closely and boldly do they press the very edge of the precipice.† There is a low, rocky beach to the eastward of this

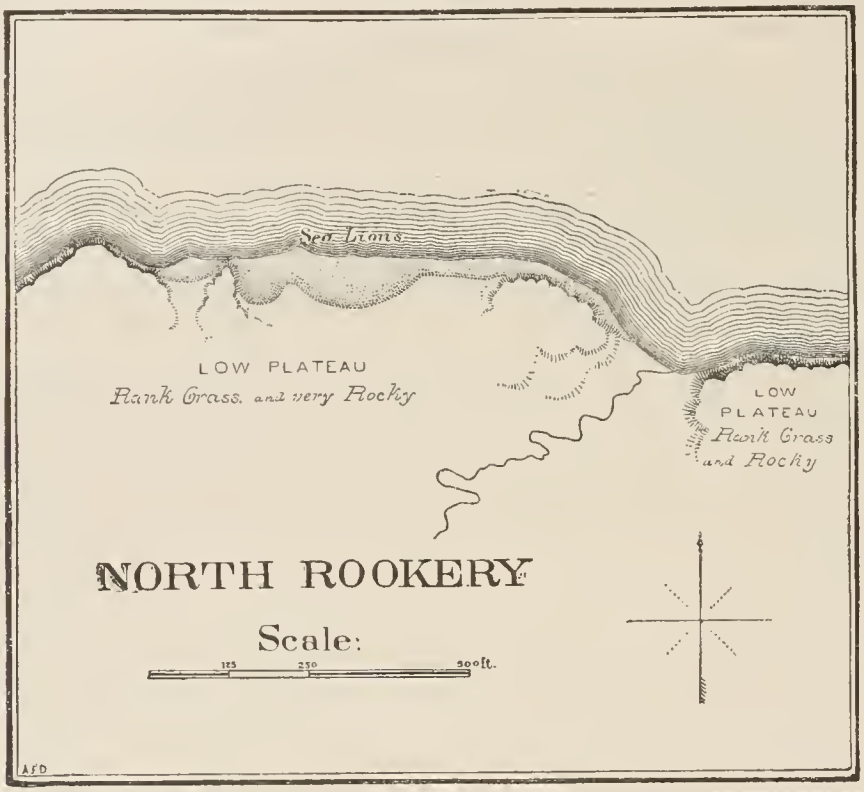
* "Starry Arteel" or "Old Settlement"; a few hundred yards to the eastward of the rookery is the earthen ruin of one of the pioneer settlements in Pribylov's time, and which the natives say, marks the first spot selected by the Russians for their village after the discovery of Saint George, in 1786. "Ateel" on the map should be "Arteel."

† I have been repeatedly astonished at a supernatural power possessed by the fur-seal of resistance to death shocks which would rationally occur to any other animal. To explain clearly, the reader will observe, by reference to the maps, that there are a great many cliffy places between the rookeries on the shore lines of the islands. Some of these bluffs are more than 100 feet in sheer elevation above the surf and rocks awash below. Frequently "holluschickie" in ones, or twos, or threes will stray far away back from the great masses of their kind, and fall asleep in the thick grass and herbage which covers these mural reaches. Sometimes they will lie down and rest very close to the edge, and then as you come tramping along you discover and startle them and yourself alike. They, blinded by their first transports of alarm, plunge promptly over the brink, snorting, coughing, and spitting as they go. Curiously peering after them and looking down upon the rocks, 50 to 100 feet below, instead of seeing their stunned and motionless bodies, you will invariably catch sight of them rapidly scrambling into the water; and, when in it, swimming off like arrows from the bow. Three "holluschickie" were thus inadvertently surprised by me on the edge of the west face to Otter Island. They plunged over from an elevation, there, not less than 200 feet in sheer elevation, and I distinctly saw them fall in scrambling, whirling evolutions, down, thumping upon the rocky shingle beneath, from which they bounded, as they struck, like so many rubber balls. Two of them never moved after the rebound ceased, but the third one reached the water and swam away like a bird on the wing.

While they seem to escape without bodily injury incident to such hard falls as ensue from dropping 50 or 60 feet upon pebbly beach and rough bowlders below, and even greater elevations, yet I am inclined to think that some internal injuries are necessarily sustained in most every case, which soon develop and cause death; the excitement and the vitality of the seal, at the moment of the terrific shock, is able to sustain and conceal the real injury for the time being.

rookery, over which the "holluschickie" haul in proportionate number, and from which the natives make their drives, coming from the village for this purpose, and directing the seals back, in their tracks.* Starry Arteel has 500 feet of sea and cliff margin, with 125 feet of average depth, making ground for 30,420 breeding seals and their young.

NORTH ROOKERY.—Next in order, and half a mile to the eastward, is this breeding ground, which sweeps for 2,750 feet along and around the sea front of a gently sloping plateau;† being in full sight of and close to the village. It has a superficial area occupied by 77,000 breeding seals



*Driving the "holluschickie" on Saint George, owing to the relative scantiness of hauling area for those animals there, and consequent small numbers found upon these grounds at any one time, is a very arduous series of daily exercises on the part of the natives who attend to it. Glancing at the map, the marked considerable distance, over an exceedingly rough road, will be noticed between Zapadnie and the village; yet, in 1872, eleven different drives across the island, of 400 to 500 seals each, were made in the short four weeks of that season.

The following table shows plainly the striking inferiority of the seal life, as to aggregate number, on this island, compared with that of Saint Paul.

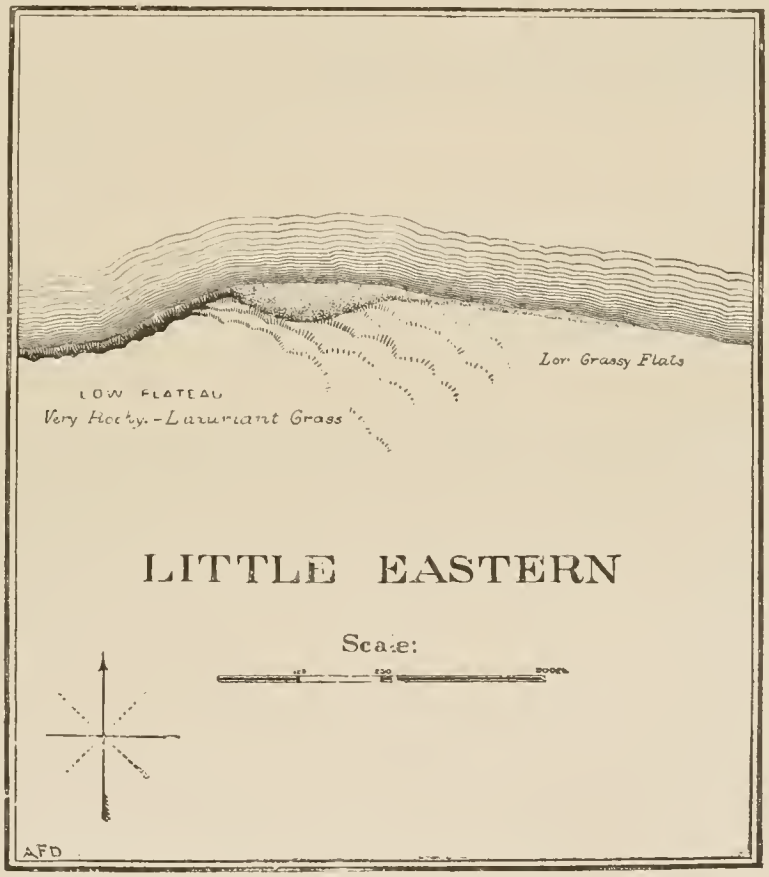
Rookeries of Saint George.	Number of drives made in 1872.	Number of seals driven.
"Zapadnie" (between June 14 and July 28)	11	5,194
"Starry Arteel" (between June 6 and July 29)	14	5,274
"North Rookery" (between June 1 and July 27)	16	4,818
"Little Eastern"		
"Great Eastern" (between June 5 and July 28)	16	9,714

The same activity in "sweeping" the hauling grounds of Saint Paul would bring in ten times as many seals, and the labor be vastly less. The driving at Saint Paul is generally done with an eye to securing each day of the season only as many as can be well killed and skinned on that day, according as it be warmish or cooler.

†I should say "a gently sloping and alternating bluff plateau;" 2,000 feet are directly under the abrupt faces of low cliffs, while the other 750 feet slope down gradually to the water's edge; these narrow cliff belts of breeding fur-seals might be properly styled "rookery ribbons."

and their young. From this rookery to the village, a distance of less than a quarter of a mile, the "holluschickie" are driven, which are killed for their skins, on the common track or seal-worn trail that not only the "bachelors" but ourselves travel over *en route* to and from Starry Artecl and Zapadnie; it is a broad, hard-packed erosion through the sphagnum, and across the rocky plateaux—in fact a regular seal road, which has been used by the drivers and victims during the last eighty or ninety years. The fashion on Saint George, in this matter of driving seals, is quite different from that on Saint Paul. To get their maximum quota of 25,000 annually, it is necessary for the natives to visit every morning the hauling grounds of each one of these four rookeries on the north shore, and bring what they may find back with them for the day.

LITTLE EASTERN ROOKERY.*—From the village to the eastward, about half a mile again, is a little eastern rookery, which lies on a low, bluffy slope, and is not a piece of ground admitting of much more expansion. It has superficial area for the reception of about 13,000 breeding seals and their young.



THE GREAT EASTERN.—This is the last rookery that we find on Saint George. It is an imitation, in miniature, of Tolstoi on Saint Paul, with the exception of there being no parade ground in the rear, of any character whatever. It is from the summit of the cliffs overlooking the narrow ribbon of breeding seals right under them that I have been able to study the movements of the fur-seal in the water to my heart's content; for out, and under the water, the rocks, to a considerable distance, are covered with a whitish algoid growth, that renders the dark bodies of the

*The site of this breeding ground and that of the marine slope of the killing grounds to the east of the village, on this island, is where sea-lions held exclusive possession prior to their driving off by the Russians—so the natives affirm—the only place on Saint George now where the *Eumetopias* breeds is that one indicated on the general chart between Garden cove and Tolstoi Mees.

swimming seals and sea-lions as conspicuous as is the image thrown by a magic lantern of a silhouette on a screen prepared for its reception.* The low rocky flats around the pool to the westward and northwest of the rookery seemed to be filled up with a muddy alluvial wash that the seals do not favor; hence nothing but "holluschickie" range round about them.

RECAPITULATION.—In recapitulation, therefore, the breeding grounds on Saint George Island according to these surveys, which I made between the 12th and 15th of July, 1873, gave the following figures. They are also, as in the case of Saint Paul, the first surveys ever made here:

Name of breeding grounds, July 12–15, 1873.	Seals: ♂ ♀ ⊙.
"Zapadnie" rookery has 600 feet of sea margin, with 60 feet of average depth, making ground for	18,000
"Starry Arteel" rookery has 500 feet of sea-margin, with 125 feet of average depth, making ground for	30,420
"North rookery" has 750 feet of sea margin, with 150 feet of average depth, and 2,000 feet of sea margin, with 25 feet of average depth, making grounds in all for	77,000
"Little Eastern" rookery has 750 feet of sea margin, with 40 feet of average depth, making ground for	13,000
"Great Eastern" rookery has 900 feet of sea margin, with 60 feet of average depth, making ground for	25,000
A grand total of the seal life for Saint George Island, breeding seals and young, of	163,420
Grand total for Saint Paul Island, brought forward, breeding seals and young, of	3,030,000
Grand sum total for the Pribylov Islands (season of 1873), breeding seals and young	3,193,420

4.—THE TOTAL NUMBER OF SEALS ON THE ISLANDS.

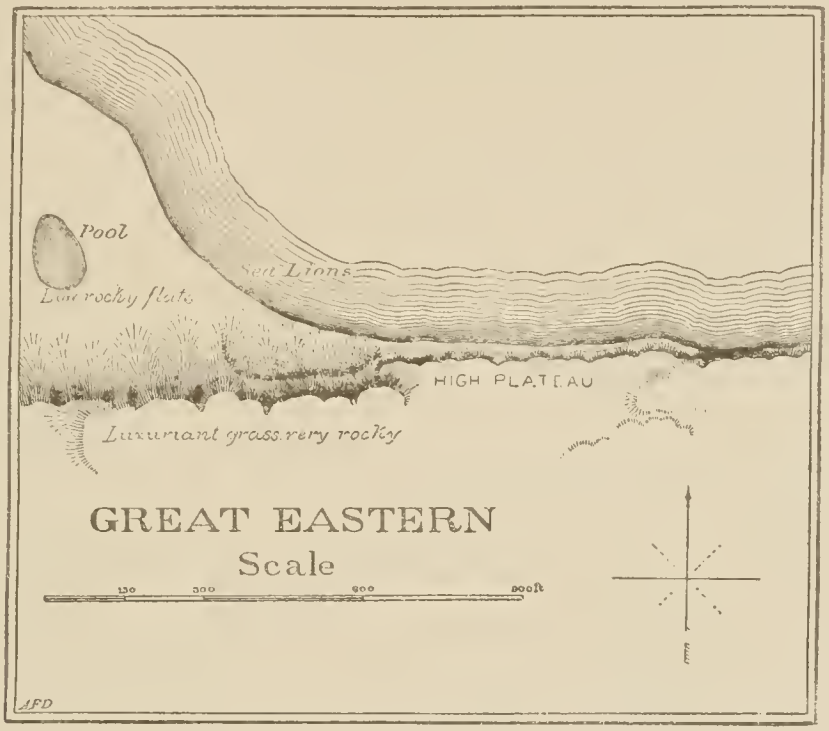
The figures above thus show a grand total of 3,193,420 breeding seals and their young. This enormous aggregate is entirely exclusive of the great numbers of the non-breeding seals, that, as we have pointed out, are never permitted to come up on these grounds, which have been surveyed and epitomized by the table just exhibited. That class of seals, the "holluschickie," in general terms, all males, and those to which the killing is confined, come up on the land and sea beaches between the rookeries, in immense straggling droves, going to and from the sea at irregular intervals, from the beginning to the closing of the entire season. The method of the "holluschickie" on these hauling grounds is not systematic—it is not distinct, like the manner and law prescribed and obeyed by the breeding seals, which fill up these rookery grounds to the certain points as surveyed, and keep these points intact for a week or ten days at a time during the height of every season in July and August; but, to the contrary, upon the hauling grounds to day, an immense drove

*The algoid vegetation of the marine shores of these islands is one that adds a peculiar charm and beauty to their treeless, sunless coasts. Every kelp bed that floats raftlike in Bering Sea, or is anchored to its rocky reefs, is fairly alive with minute sea shrimps, tiny crabs, and little shells, which cling to its masses of interwoven fronds or dart in ceaseless motion through, yet within, its interstices. It is my firm belief that no better base of operations can be found for studying marine invertebrata than is the post of Saint Paul or Saint George; the pelagic and the littoral forms are simply abundant beyond all estimation within bounds of reason. The phosphorescence of the waters of Bering's Sea surpasses, in continued strength of brilliant illumination, anything that I have seen in southern and equatorial oceans. The crests of the long unbroken line of breakers on Lukannon beach looked to me, one night in August, like instantaneous flashing of lightning, between Tolsti Mees and Lukannon head, as the billows successively rolled in and broke; the seals swimming under the water, here on Saint George and beneath the Black Bluffs, streaked their rapid course like comets in the sky; and every time their black heads popped above the surface of the sea they were marked by a blaze of scintillant light:

"Within the shadow of the ship
I watched their rich attire;
Blue, glossy-green, and velvet black
They coiled and swam; and every track
Was a flash of golden fire.
* * * * * * * * *
They moved in tracks of shining white
And when they reared, the elfish light
Fell off in hoary flakes."

[*Ancient Mariner.*

of 100,000 will be seen before you at English Bay, sweeping hither and surging thither over the polished surface which they have worn with their restless flippers, tracing and retracing their tireless marches; then, to-morrow, if the weather is rainy or hot, only a few desultory thousands will be seen over this same area whereon you observed swarming myriads yesterday; consequently the amount of ground occupied by the "holluschickie" is vastly in excess of what



they would require did they conform to the same law of distribution observed by the breeding seals; and this foundation is therefore wholly untenable for any such definite basis and satisfactory conclusion as is that which I have surveyed on the rookeries. Hence, in giving an estimate of the aggregate number of "holluschickie" or non-breeding seals, on the Pribylov Islands, embracing as it does all the males under six or seven years of age and all the yearling females, it must, necessarily, be a simple opinion of mine founded upon nothing better than my individual judgment. This is my conclusion:

The non-breeding seals seem nearly equal in number to that of the adult breeding-seals; but without putting them down at a figure quite so high, I may safely say that the sum total of 1,500,000 in round numbers is a fair enumeration, and quite within bonds of fact. This makes the grand sum total, of the fur-seal life on the Pribylov Islands, over 4,700,000.

5. THE INCREASE OR DIMINUTION OF THE SEAL-LIFE, PAST, PRESENT, AND PROSPECTIVE.

One stereotyped question has been addressed to me universally by my friends since my return, first in 1873, from the seal islands. The query is: "At the present rate of killing the seals, it will not be long ere they are exterminated; how much longer will they last?" My answer is now as it was then, "Provided matters are conducted on the seal islands in the future as they are to-day, 100,000 male seals under the age of five years and over one may be safely taken every year from the Pribylov Islands, without the slightest injury to the regular birth-rates, or natural increase

thereon; provided, also, that the fur-seals are not visited by any plague, or pests, or any abnormal cause for their destruction, which might be beyond the control of men; and to which, like any other great body of animal life, they must ever be subjected to the danger of."*

LOSS OF LIFE SUSTAINED BY THE YOUNG SEALS.—From my calculations, given above, it will be seen that 1,000,000 pups, or young seals, in round numbers, are born upon these islands of the Pribylov Group every year; of this million, one half are males. These 500,000 young males, before they leave the islands for sea, during October and November, and when they are between five and six months old, fat and hardy, have suffered but a trifling loss in numbers, say one per cent., while on and about the islands of their birth; surrounding which, and upon which, they have no enemies whatever to speak of; but, after they get well down to the Pacific, spread out over an immense area of watery highways in quest of piscatorial food they form the most helpless of their kind to resist or elude the murderous teeth and carnivorous attacks of basking sharks† and killer-whales.‡ By these agencies, during their absence from the islands until their reappearance in the following year, and in July, they are so perceptibly diminished in number that I do not think, fairly considered, more than one half of the legion which left the ground of their birth, last October, came up the next July to these favorite landing-places; that is, only 250,000 of them return out of the 500,000 born last year. The same statement, in every respect, applies to the going and the coming of the 500,000 female pups, which are identical in size, shape, and behavior.

As yearlings, however, these 250,000 survivors of last year's birth have become strong, lithe, and active swimmers; and, when they again leave the hauling-grounds as before, in the fall, they are fully as able as are the older class to take care of themselves; and when they reappear next year, at least 225,000 of them safely return in the second season after birth; from this on I believe that they live out their natural lives of fifteen to twenty years each; the death-rate now caused by the visitation of marine enemies not affecting them, in the aggregate, but slightly. And again, the same will hold good touching the females, the average natural life of which, however, I take to be only nine or ten years each.

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* The thought of what a deadly epidemic would effect among these vast congregations of *Pinnipedia* was one that was constant, in my mind, when on the ground and among them. I have found in the *British Annals* (Flemings), on page 17, an extract from the notes of Dr. Trail: "In 1833 I inquired for my old acquaintances, the seals of the Hole of Papa Westray, and was informed that about four years before they had totally deserted the island, and had only within the last few months begun to reappear. * * * About fifty years ago multitudes of their carcasses were cast ashore in every bay in the north of Scotland, Orkney, and Shetland, and numbers were found at sea in a sickly state." This note of Trail is the only record which I can find of a fatal epidemic among the seals; it is not reasonable to suppose that the Pribylov rookeries have never suffered from distempers in the past, or are not to, in the future, simply because no occasion seems to have risen during the comparatively brief period of their human domination.

† *Somniosus microcephalus*. Some of these sharks are of very large size, and when caught by the Indians of the northwest coast, basking or asleep on the surface of the sea, they will, when transfixed by the natives' harpoons, take a whole fleet of canoes in tow and run swiftly with them several hours before exhaustion enables the savages to finally dispatch them. A Hudson Bay trader, William Manson (at Fort Alexander, in 1865), told me that his father had killed one in the smooth waters of Millbank Sound, which measured 24 feet in length, and its liver alone yielded 36 gallons of oil. The *Somniosus* lies motionless for long intervals in calm waters of the North Pacific, just under and at the surface, with its dorsal fin clearly exposed above; what havoc such a carnivorous fish would be likely to effect in a "pod" of young fur-seals, can be better imagined than described.

‡ *Orca gladiator*. While revolving this particular line of inquiry in my mind when, on the ground and among the seals, I involuntarily looked constantly for some sign of disturbance in the sea which would indicate the presence of an enemy: and, save seeing a few examples of the *Orca*, I never detected anything; if the killer-whale was common here, it would be patent to the most casual eye, because it is the habit of this ferocious cetacean to swim so closely at the surface as to show its peculiar sharp, dorsal fin high above the water; possibly a very superficial observer could and would confound the long, trenchant fluke of the *Orca* with the stubby node upon the spine of the humpback whale, which that animal exhibits only when it is about to dive. Humpbacks feed around the islands, but not commonly—they are the exception; they do not, however, molest the seals in any manner whatever; and little squads of these pinnipeds seem to delight themselves by swimming in endless circles around and under the huge bodies of those whales, frequently leaping out and entirely over the cetacean's back, as witnessed on one occasion by myself and the crew of the Reliance, off the coast of Kadiak, June, 1874.

Out of these 225,000 young males, we are required to save only one-fifteenth of their number to pass over to the breeding-grounds, and meet there the 225,000 young females; in other words, the polygamous habit of this animal is such that, by its own volition, I do not think that more than one male annually out of fifteen born is needed on the breeding-ground in the future; but in my calculations, to be within the margin and to make sure that I save two-year-old males enough every season, I will more than double this proportion, and set aside every fifth one of the young males in question; that will leave 180,000 seals in good condition, that can be safely killed every year without the slightest injury to the perpetuation of the stock itself forever in all its original integrity.*

In the above showing I have put the very extreme estimate upon the loss sustained at sea by the pup-seals too large, I am morally certain; but in attempting to draw this line safely, I wish to place the matter in the very worst light in which it can be put, and to give the seals the full benefit of every doubt. Surely, I have clearly presented the case, and certainly no one will question the premises after they have studied the habit and disposition of the rookeries; hence, it is a positive and tenable statement, that no danger of the slightest appreciable degree of injury to the interests of the Government on the seal islands of Alaska exists as long as the present law protecting it, and the management executing it, continues.

COURSE PURSUED BY THE SEALS AFTER LEAVING THE ISLANDS.—These fur-seals of the Pribylov group, after leaving the islands in the autumn and early winter, do not visit land again until the time of their return, in the following spring and early summer, to these same rookery and hauling grounds, unless they touch, as they are navigating their lengthened journey back, at the Russian Copper, and Bering Islands, 700 miles to the westward of the Pribylov group. They leave the islands by independent squads, each one looking out for itself; apparently all turn by common consent to the south, disappearing toward the horizon, and are soon lost in the vast expanse below, where they spread themselves over the entire North Pacific as far south as the forty-eighth and even the forty-seventh parallels of north latitude. Over the immense area between Japan and Oregon, doubtless, many extensive submarine fishing shoals and banks are known to them; at least, it is definitely understood that Bering Sea does not contain them long when they depart from the breeding-rookeries and the hauling-grounds therein. While it is carried in mind that they sleep and rest in the water with soundness and with the greatest comfort on its surface, and that even when around the land, during the summer, they frequently put off from the beaches to take a bath and a quiet snooze just beyond the surf, we can readily agree that it is no inconvenience whatever, when the reproductive functions have been discharged, and their coats renewed, for them to stay the balance of the time in their most congenial element—the briny deep.

NATURAL ENEMIES OF THE FUR-SEALS.—That these animals are preyed upon extensively by killer-whales (*Orca gladiator*), in especial, and by sharks, and probably other submarine foes now unknown, is at once evident; for, were they not held in check by some such cause, they

* When regarding the subject in 1872–'73, of how many surplus young males could be wisely taken from the Pribylov stock, I satisfied myself that more than 100,000 could be drawn upon annually for their skins, and hence was impressed with the idea that the business might be safely developed to a greater maximum; since then, however, I have been giving attention to the other side of the question, which involves the market for the skins and the practical working of any sliding scale of increased killing, such as I then recommended. A careful review of the whole matter modifies my original idea and causes me to think that, all things considered, it is better to "let well enough alone." Although it would be a most interesting commercial experiment to develop the yield of the Pribylov Islands to their full capacity, yet, in view of the anomalous and curious features of the case, it is wiser to be satisfied with the assured guarantee of perpetuation in all original integrity, which the experience of the last ten years gives us on the present basis of 100,000, than to risk it by possibly doubling the revenue therefrom. Therefore, I am not now in favor of my earlier proposition of gradually increasing the killing, until the maximum number of surplus "holluschickie" should be ascertained.

would, as they exist to-day on Saint Paul, quickly multiply, by arithmetical progression, to so great an extent that the island, nay, Bering Sea itself, could not contain them. The present annual killing of one hundred thousand out of a yearly total of over a million males does not, in an appreciable degree, diminish the seal-life, or interfere in the slightest with its regular, sure perpetuation on the breeding grounds every year. We may, therefore, properly look upon this aggregate of four and five millions of fur-seals, as we see them every season on these Pribylov Islands, as the maximum limit of increase assigned to them by natural law. The great equilibrium, which nature holds in life upon this earth, must be sustained at Saint Paul as well as elsewhere.

FOOD CONSUMED BY THE FUR-SEALS.—Why, only think of the enormous food-consumption of these rookeries and hauling grounds; what an immense quantity of finny prey must pass down their voracious throats as every year rolls by. A creature so full of life, strung with nerves, muscles like bands of steel, cannot live on air, or absorb it from the sea. Their food is fish, to the practical exclusion of all other diet. I have never seen them touch, or disturb with the intention of touching it, one solitary example in the flocks of water-fowl which rest upon the surface of the water all about the islands. I was especially careful in noting this, because it seemed to me that the canine armature of their mouths must suggest flesh for food at times as well as fish; but fish we know they eat. Whole windrows of the heads of cod and wolf fishes (*Anarrhichas* sp.), bitten off by these animals at the nape, were washed up on the south shore of Saint George during a gale in the summer of 1873; this pelagic decapitation evidently marked the progress and the appetite of a band of fur-seals to the windward of the island as they passed into and through a stray school of these fishes.

How many pounds per diem is required by an adult seal, and taken by it when feeding, is not certain in my mind. Judging from the appetite, however, of kindred animals, such as sea-lions fed in confinement at Woodward's Gardens, San Francisco, I can safely say that 40 pounds for a full-grown fur-seal is a fair allowance, with at least 10 or 12 pounds per diem to every adult female, and not much less, if any, to the rapidly growing pups and young "holluschickie." Therefore, this great body of four and five millions of hearty, active animals which we know on the seal islands must consume an enormous amount of such food every year. They cannot average less than 10 pounds of fish each per diem (and this is not half enough for an adult male), which gives the consumption, as exhibited by their appetite, of over 6,000,000 tons of fish every year. What wonder, then, that nature should do something to hold these active fishermen in check.*

* I feel confident that I have placed this average of fish eaten per diem by each seal at a starvation allowance, or, in other words, it is a certain minimum of the whole consumption. If the seals can get double the quantity which I credit them with above, startling as it seems, still I firmly believe that they eat it every year. An adequate realization by ichthyologists and fishermen as to what havoc the fur-seal hosts are annually making among the cod, herring, and salmon of the northwest coast and Alaska would disconcert and astonish them. Happily for the peace of political economists who may turn their attention to the settlement and growth of the Pacific coast of America, it bids fair to never be known with anything like precision. The fishing of man, both aboriginal and civilized, in the past, present, and prospective, has never been, is not, nor will it be, more than a drop in the bucket contrasted with the piscatorial labors of these ichthyophagi in those waters of and adjacent to their birth. What catholic knowledge of fish and fishing banks any one of those old "seecatchie" must possess which we observe hauled out on the Pribylov rookeries each summer. It has, undoubtedly, during the eighteen or twenty years of its life, explored every fish eddy, bank, or shoal throughout the whole of that vast immensity of the North Pacific and Bering Sea. It has had more piscine sport in a single twelve month than Izaak Walton had in his whole life.

An old sea captain, Dampier, who, cruising around the world just about two hundred years ago, wrote diligently thereof (or, rather, one Funnel is said to have written for him), and wrote well. He had frequent reference to meeting hair-seals and sea-lions, fur-seals, &c., and fell to repeating this maxim, evidently of his own making: "For wherever there be plenty of fysh, there be seals." I am sure that, unless a vast abundance of good fishing ground was near by, no such congregation of seal-life as is that under discussion on the seal islands could exist. The whole eastern half of Bering Sea, in its entirety, is a single fish-spawning bank, nowhere deeper than 50 to 75 fathoms, averaging, perhaps, 40; also, there are great reaches of fishing shoals up and down the northwest coast, from and above the

PELAGIC RANGE OF FUR-SEALS FOR FOOD.—During the winter solstice—between the lapse of the autumnal and the verging of the vernal equinoxes—in order to get this enormous food supply, the fur-seals are necessarily obliged to disperse over a very large area of fishing ground, ranging throughout the North Pacific 5,000 miles across between Japan and the Straits of Fuca. In feeding, they are brought to the southward all this time; and, as they go, they come more and more in contact with those natural enemies peculiar to the sea of these southern latitudes, which are almost strangers and are really unknown to the waters of Bering Sea; for I did not observe, with the exception of ten or twelve perhaps, certainly no more, killer-whales,* a single marine disturbance, or molestation, during the three seasons which I passed upon the islands, that could be regarded in the slightest degree inimical to the peace and life of the *Pinnipedia*; and thus, from my own observation, I am led to believe that it is not until they descend well to the south of the Aleutian Islands, and in the North Pacific, that they meet with sharks to any extent, and are diminished by the butchery of killer-whales.†

The young fur-seals going out to sea for the first time, and following in the wake of their elders, are the clumsy members of the family. When they go to sleep on the surface of the water, they rest much sounder than the others; and their alert and wary nature, which is handsomely developed ere they are two seasons old, is in its infancy. Hence, I believe that large numbers of them are easily captured by marine foes, as they are stupidly sleeping, or awkwardly fishing.

BEHAVIOR OF FUR-SEALS IN THE WATERS AROUND THE ISLANDS.—In this connection I wish to record an impression very strongly made upon my mind, in regard to their diverse behavior when out at sea, away from the islands, and when congregated thereon. As I have plainly exhibited on a preceding page, they are practically without fear of man when he visits them on the land of their birth and recreation; but the same seal that noticed you with quiet indifference at St. Paul, in June and July, and the rest of the season while he was there, or gamboled around your boat when you rowed from the ship to shore, as a dog will play about your horses when you drive from the gate to the house, that same seal, when you meet him in one of the passes of the

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Straits of Fuca, bordering the entire southern, or Pacific, coast of the Aleutian Islands. The aggregate of cod, herring and salmon which the seals find upon these vast ichthyological areas of reproduction must be simply enormous, and fully equal to the most extravagant demand of the voracious appetites of *Callorhinii*.

When, however, the fish retire from spawning here, there, and everywhere over these shallows of Alaska and the northwest coast along by the end of September to 1st of November, every year, I believe that the young fur-seal, in following them into the depths of the great Pacific, must have a really arduous struggle for existence—unless it knows of fishing banks unknown to us. The yearlings, however, and all above that age, are endowed with sufficient muscular energy to dive rapidly in deep soundings, and to fish with undoubted success. The pup, however, when it goes to sea, five or six months old, is not lithe and sinewy like the yearling; it is podgy and fat, a comparative clumsy swimmer, and does not develop, I believe, into a good fisherman until it has become pretty well starved after leaving the Pribylovs. It sails away from the islands in the wake of its elder relatives very much as a kettle-bottomed scow trims its course after a graceful and speedy clipper-built ship.

I must not be understood as saying that fish alone constitutes the diet of the Pribylov pinnipeds; I know that they feed, to a limited extent, upon crustaceans and upon the squid (*Loligo*), also eating tender algoid sprouts; I believe that the pup-seals live for the first five or six months at sea largely, if not wholly, upon crustaceans and squids; they are not agile enough, in my opinion, to fish successfully in any great degree, when they first depart from the rookeries.

* But I did observe a very striking exhibition, however, of this character one afternoon while looking over Lukannon Bay. I saw a "killer" chasing the alert "holluschickie" out beyond the breakers, when suddenly, in an instant, the cruel cetacean was turned toward the beach in hot pursuit, and in less time than this is read the ugly brute was high and dry upon the sands. The natives were called, and a great feast was in prospect when I left the carcass.

But this was the only instance of the orca in pursuit of seals that came directly under my observation; hence, though it does undoubtedly capture a few here every year, yet it is an insignificant cause of destruction, on account of its rarity.

† In the stomach of one of these animals, year before last, 14 small harp-seals were found.—*Michael Carroll's Report of Seal and Herring Fisheries of Newfoundland.*

Aleutian chain, 100 or 200 miles away from here, as the case may be, or to the southward of that archipelago, is the shiest and wariest creature your ingenuity can define. Happy are you in getting but a single glimpse of him, first; you will never see him after, until he hauls out, and winks and blinks across Lukannon sands.*

But the companionship and the exceeding number of the seals, when assembled together annually, makes them bold; largely due, perhaps, to their fine instinctive understanding, dating, probably, back many years, seeming to know that man, after all, is not wantonly destroying them, and what he takes is from the ravenous maw only of the killer-whale or the saw-tipped teeth of a Japan shark. As they sleep in the water, off the Straits of Fuca, and the northwest coast as far as Dixon's Sound, the Indians belonging to that region surprise them with spears and rifle, capturing quite a number every year.

ENCYSTED BULLETS, ARROWS, &C., IN FUR-SEALS.—On the killing grounds at Saint George, in June, 1873, the natives would frequently call my attention to seals that they were skinning, in the hides of which buckshot were embedded and encysted just under the skin in the blubber. From one animal I picked out fifteen shot, and the holes which they must have made in the skin were so entirely healed over as not to leave the faintest trace of a scar. These buckshot were undoubtedly received from the natives of the northwest coast, anywhere between the Straits of Fuca and the Aleutian Islands. The number taken by these hunters on the high seas is, however, inconsiderable; the annual average, perhaps, of five thousand skins is a fair figure—some seasons more, some seasons less.† The natives have also found on the killing grounds, in the manner just indicated, specimens of the implements employed by the Aleuts to the southward, such as the tips of birds' spears and bone lances, comfortably encysted in the blubber under the skin; but only very small fragments are found, because I believe that any larger pieces would create suppuration and slough out of the wounds.‡

* When fur-seals were noticed, by myself, far away from these islands, at sea, I observed that then they were as shy and as wary as the most timorous animal which, in dreading man's proximity, could be—sinking instantly on apprehending the approach or presence of the ship, seldom to reappear to my gaze. But, when gathered in such immense numbers at the Pribylov Islands, they are suddenly metamorphosed into creatures wholly indifferent to my person. It must cause a very curious sentiment in the mind of him who comes for the first time, during the summer season, to the Island of St. Paul; where, when the landing boat or lighter carries him ashore from the vessel, the whole short marine journey is enlivened by the gambols and aquatic evolutions of fur-seal convoys to the "Bidarrah," which sport joyously and fearlessly round and round his craft, as she is rowed lustily ahead by the natives; the fur-seals, then, of all classes, "holluschickie" principally, pop their dark heads up out of the sea, rising neck and shoulders erect above the surface, to peer and ogle at him and at his boat, diving quickly to reappear just ahead or right behind, hardly beyond striking distance from the oars; these gymnastics of *Callorhinus* are not wholly performed thus in silence, for it usually snorts and chuckles with hearty reiteration.

The sea-lions up here also manifest much the same marine interest, and give the voyager an exhibition quite similar to the one which I have just spoken of, when a small boat is rowed in the neighborhood of its shore rookery; it is not, however, so bold, confident, and social as the fur-seal under the circumstances, and utters only a short, stifled growl of surprise, perhaps; its mobility, however, of vocalization is sadly deficient when compared with the scope and compass of its valuable relative's polyglottis.

The hair-seals (*P. vitulina*) around these islands never approached our boats in this manner, and I never caught more than a furtive glimpse of their short, bull-dog heads.

The walrus (*Rosmarus obesus*) also, like *Phoca vitulina*, gave undoubted evidence of sore alarm over the presence of my boat and crew anywhere near its proximity in similar situations, only showing itself once or twice, perhaps, at a safe distance by elevating nothing but the extreme tip of its muzzle and its bleared popping eyes above the water; it uttered no sound except a dull, muffled grunt, or else a choking, gurgling bellow.

† See report, in a subsequent chapter, by James G. Swan, on Fur Sealing at Cape Flattery, Straits of Fuca.

‡ Touching this matter of the approximate numbers of fur seals which are annually slain in the open sea, straits, and estuaries of Bering and the North Pacific Oceans, I have, necessarily, no definite data upon which to base a calculation; but, such as I have points to the capture every year of one thousand to one thousand four hundred young fur-seals in the waters of Oomnak Pass, and as many in the straits adjoining Borka Village, by the resident Aleuts; these are the only two points throughout the entire Aleutian chain and the peninsula where any *Callorhinus* is taken by the natives, except an odd example now and then elsewhere. On the northwest coast, between San Francisco and Prince William's Sound, the fur-seal is only apprehended, to any extent, at two points, viz, off the Straits of Fuca, 10 to 20

INCREASE OF THE SEAL-LIFE.—I am free to say that it is not within the power of human management to promote this end to the slightest appreciable degree over its present extent and condition as it stands in the state of nature, heretofore described. It cannot fail to be evident, from my detailed narration of the habits and life of the fur-seal on these islands during so large a part of every year, that could man have the same supervision and control over this animal during the whole season which he has at his command while they visit the land, he might cause them to multiply and increase, as he would so many cattle, to an indefinite number—only limited by time and the means of feeding them. But the case in question, unfortunately, is one where the fur-seal is taken, by demands for food, at least six months out of every year, far beyond the reach or even cognizance of any man, where it is all this time exposed to many known powerful and destructive natural enemies, and probably many others, equally so, unknown, which prey upon it, and, in accordance with that well-recognized law of nature, keeps this seal-life at a certain number—at a figure which has been reached, for ages past, and will continue to be in the future, as far as they now are—their present maximum limit of increase, namely, between four and five million seals, in round numbers. This law holds good everywhere throughout the animal kingdom, regulating and preserving the equilibrium of life in the state of nature; did it not hold good, these seal-islands and all Bering Sea would have been literally covered, and have swarmed like the *Medusæ* of the waters, long before the Russians discovered them. But, according to the silent testimony of the rookeries, which have been abandoned by the seals, and the noisy, emphatic assurance of those now occupied to-day, there were no more seals when first seen here by human eyes in 1786 and 1787, than there are now in 1881, as far as all evidence goes.

miles at sea, sweeping over a series of large fishing shoals which are located there, and in that reach of water between Queen Charlotte Island and the mouth of Dixon Sound. Several small schooners, with native crews, and the Indians, themselves, in their own canoes, cruise for them here during May and June of each year. How many they secure every season is merely a matter of estimation, and therefore not a subject of definite announcement. In my judgment, after carefully investigating the question at Victoria and Port Townsend in 1874, I believe, as an average, that these pelagic fur-sealers do not, altogether, secure five thousand animals annually.

Those seals killed by the Aleuts of Mankushin and Borka settlements, above referred to, are all pups, and are used at home—none exported for trade.

The last record which I can find of fur-seals being taken on land other than that of the Pribylov group of the American side, is the following brief table of Techmainov, who, in 1863, published (in 2 volumes) a long recapitulation of the Russian-American Company's labors in Alaska as illustrated by a voluminous series of personal letters by the several agents of that company. Techmainov says that these fur-seals were taken on the Farrallones, which are small islets just abreast the entrance to the Golden Gate, California.

Taken on the Farrallones, California coast	1824.	1825.	1826.	1827.	1828.	1829.	1830.	1831.	1832.	1833.	1834.
Fur-seals.....	1,050	455	290	.....	210	287	.....	205	118	54	.....

This period of 1824–1834 was the one passed by the Russians in their occupation of Ross or Bodega, California, where a colony was engaged in raising cereals and beef, &c., for the stations in Alaska. I am inclined so think, however, that very likely many of the specimens of *Callorhinus* counted in this table were shot or speared, as they now are out at sea off the Straits of Fuca. The number is insignificant, but the pelts were not very valuable in those days, and probably very slight exertions were made to get them; or, otherwise, three thousand or five thousand annually could have been secured at sea then, as they are to-day, by our people and the Indians of Cape Flattery.

The record, however, of killing fur-seals on the Farallones, between 1806 and 1837, by the Russians, who were established then at Bodega, California, is an honest one. I do not find any mention made of the fact that they bred there, and I am inclined to think they did not. I believe that when small squads of *Callorhinus ursinus* hauled out on the California Islets, they did so lured by the large numbers of breeding *Zalophus*, and the *Eumetopias* which repaired there then, as they do now, for that purpose. Had the-sea-lions not been there, in the manner aforesaid, the presence of fur-seals on North American land, elsewhere than on that of the Pribylov group, would not have been thus determined and established.

Again, in this connection, and corroborative is the fact that in 1878 a few hundred fur-seals were taken by sea-lion hunters among the *Zalophus* at Santa Barbara and Guadaloupe Islands, southern Californian coast. I am assured of this fact by the evidence of the gentleman who himself purchased the skins from the lucky hunters. None have ever been seen there before by our people, and none have been taken since. The Russian archives give no testimony on this score.

SITES OF ABANDONED ROOKERIES.—With reference to the amount of ground covered by the seals, when first discovered by the Russians, I have examined every foot of the shore line of both islands where the bones, polished rocks, &c., might be lying on any deserted areas. Since then, after carefully surveying the new ground now occupied by the seals, and comparing this area with that which they have deserted, I feel justified in stating that for the last twelve or fifteen years, at least, the fur-seals on these islands have not diminished, nor have they increased as a body to any noteworthy degree; and throughout this time the breeding grounds have never been disturbed except at that brief but tumultuous interregnum during 1868; and they have been living since in a perfectly quiet and natural condition. Without some stop-brake upon this seal-life, with a million of young born every year during the last ten or fifteen seasons, at least, the annual taking of one hundred thousand males would not, could not, in the slightest degree retard that increase which would set in at once, were it not for this check on the high seas aforesaid.

CAN THE NUMBER BE INCREASED?—What can be done to promote their increase? We cannot cause a greater number of females to be born every year than are born now; we do not touch or disturb these females as they grow up and live; and never will we, if the law and present management is continued. We save double—we save more than enough males to serve; nothing more can be done by human agency; it is beyond our power to protect them from their deadly marine enemies as they wander into the boundless ocean searching for food.*

In view, therefore, of all these facts, I have no hesitation in saying, quite confidently, that under the present rules and regulations governing the sealing interests on these islands, the increase or diminution of the seal-life thereon will amount to nothing in the future; that the seals will exist, as they do exist, in all time to come at about the same number and condition recorded in this report. To test this theory of mine, I here, in the record of my surveys of the rookeries, have put stakes down which will answer, upon those breeding grounds, as a correct guide as to their present, as well as their future, condition, from year to year.

SURVEYING THE CONDITION OF THE ROOKERIES.—During the first week of inspection of some of those earliest arrivals, the "seecatchie," or full-grown males, will frequently take flight to the water when approached; but these runaways quickly return. By the end of May, however, the same seals will hardly move to the right or left when you attempt to pass through them. Then, two weeks before the females begin to come in, and quickly after their arrival, the organization of the fur-seal rookery is rendered entirely indifferent to man's presence on visits of quiet inspection, or anything else, save their own kind, and so continues during the rest of the season.

I have called attention to the singular fact, that the breeding-seals upon the rookeries and hauling grounds are not affected by the smell of blood or carrion arising from the killing fields, or the stench of blubber fires which burn in the native villages. This trait is beautifully illustrated, and conclusively, by the attitude of those two rookeries near the village of Saint Paul; for the breeding ground on this spit, at the head of the lagoon, is not more than 40 yards from the great killing grounds to the eastward; being separated from those spots of slaughter, and the seventy or eighty thousand rotting carcasses thereon, by a slough not more than 10 yards wide. These seals can smell the blood and carcasses, upon this field, from the time they land in the spring until

*A great deal of speculation in regard to the probable increase of diminution of the seal-life would end, if it were possible to pen these animals up and feed them, like hogs, on the Pribylov Islands; but that is theoretically and practically out of the question. In the one case granted, for the sake of argument, that we could secure for them at the start the ten or twelve million tons of fish required as subsistence in a single year, what should we do with them when the snow and sleet of winter would render sea-bathing, on a large scale, imperative for their well-being? We can neither feed nor can we ever control their movements in the slightest degree, with reference to their protection in the sea or increase on the land, beyond what we are now doing. I trust that no man's desire, no matter how worthy his ambition, will ever get him or the seals into trouble on this score.

they leave in the autumn; while the general southerly winds waft to them the odor and sounds of the village of Saint Paul, not over 200 rods south of them, and above them, in plain sight. All this has no effect upon the seals—they know that they are not disturbed—and the rookery, the natives declare, has been slightly but steadily increasing. Therefore, with regard to surveying and taking these boundaries assumed by the breeding-seals every year, at that point of high tide, and greatest expansion, which they assume between the 8th and 15th of July, it is an entirely practicable and simple task. You can go everywhere on the skirts of the rookeries almost within reaching distance of the harems, and they will greet you with quiet, inoffensive notice, and permit close, unbroken observation, when it is subdued and undemonstrative, paying very little attention to your approach.

Ten years have passed, with the end of last season, in which nearly 100,000 young males have been annually taken on St. Paul and St. George; 75,000 from the former, and 25,000 from the latter, as a rule; and we now have the experience with which to enlighten our understanding, and to make our statements correct. That affirmation is, that if the effect of annually killing 100,000 young male seals is either to increase or diminish the seal-life on the Pribylov Islands, it cannot be seen; it cannot be noticed; it has not to a certainty wrought injury, and it has not promoted an increase. I advanced this hypothesis in 1873; and I now find it completely verified and confirmed by the united, intelligent testimony of those who have followed on the ground in my footsteps. The last reports received from the seal islands, filed in the Treasury Department, by gentlemen of the best character, and of excellent ability, with whom, I regret to say, I have not a personal acquaintance, declare that the seals are increasing; that the rookeries have expanded perceptibly over the margins which I have laid down on these maps. They had my data, because I left a copy of these manuscript surveys, reproduced herein, in their respective offices on the two islands.

Pecuniary value of the seal-life on the Pribylov Islands.—The theoretical value of these interests of the Government on the Pribylov Islands, represented by 2,500,000 to 3,000,000 fur-seals, male and female, in good condition, is not less than $10,000,000 to $12,000,000; taking, however, the females out of the question, and from this calculation, and looking at the "holluschickie" alone, as they really represent the only killable seals, then the commercial value of the same would be expressed by the sum of $1,800,000 to $2,000,000; this is a permanent principal invested here, which now nets the public treasury more than 15 per cent. annually; a very handsome rate of interest, surely.

Strange ignorance of this value in 1867.—Considering that this return is the only one made to the Government by Alaska since its transfer, and that it was never taken into account at first, by the most ardent advocates of the purchase of Russian America, it is in itself highly creditable and interesting; to Senator Sumner the friends of the acquisition of this territory in 1867 delegated the task of making the principal argument in its favor. Everything that was written in strange tongues was carefully translated by the Government, so that the choice bits of mention which could be found of Alaska's value should be placed in Sumner's hands. Hence his speech* on the subject possesses this interest: it is the embodiment of everything that could be scraped together, having the faintest shadow of authenticity, by all of the eager friends of the purchase, which gave the least idea of any valuable natural resources in Alaska; therefore, when, in summing all this up, Sumner makes no reference whatever to the seal islands, or the fur-seal itself, the extraordinary ignorance at home and abroad relative to the Pribylov Islands can be well appreciated.

* Speech on cession of Russian America, U. S. Senate, 1867; "*Summary*," p. 48.

THE SAFE PERPETUATION OF THESE INTERESTS.—We know now, to a certainty, that we can take 100,000 young male seals every year from these hauling grounds of Saint Paul and Saint Goerge, without the slighest injury to the interest of the Government thereon. How many more can be taken annually, is a problem which, perhaps, to the best interests of all concerned, had better remain unsolved. As a mere pleasure of calculation and evolution from known facts, I was satisfied, and am now, that 150,000 to 180,000 "holluschickie" could annually be taken without any sign of future detriment; but, though at first I did not, yet I should now, for one, object to a full business execution; because these curious, anomalous, and valuable interests of the Government might as well stand "well enough alone."

The Government derives a handsome revenue, as matters now go on, and the increased tax which might accrue to the public treasury from a higher development of the business, would hardly pay, when weighed against the slighest risk of its injury in the future.

THOUGHTS UPON THE POSSIBLE MOVEMENTS OF THE FUR-SEALS IN THE FUTURE.—As these animals live and breed upon the Pribylov Islands, the foregoing studies of their habit declare certain natural conditions of landing-ground and climate to be necessary for their existence and perpetuation. From my surveys made upon the islands to the north, Saint Matthew and Saint Lawrence, together with the scientific and corroborating testimony of those who have visited all of the mainland coast of Alaska, and the islands contignous, including the peninsula and the great Alentian Archipelago, I have no hesitation in stating that the fur-seal cannot breed, or rest for that matter, on any other land than that now resorted to, which lies within our boundary lines; the natural obstacles are insuperable. Therefore, so far as our possessions extend, we have, in the Pribylov Group, the only eligible land to which the fur-seal can repair for breeding; and on which, at Saint Paul Island alone, there is still room enough of unoccupied rookery-ground for the accommodation of twice as many seals as we find there to-day. But we must not forget a very important prospect; for, we know that to the westward, only 700 miles, and within the jurisdiction of Russia, are two other seal-islands—one very large, on which the fur-seal regularly breeds also; and though from the meager testimony in my possession, compared with Saint Paul, the fur-seal life upon them is small, still, if that land within the pale of the Czar's dominion be as suitable for the reception of the rookeries as is that of Saint Paul, then what guarantee have we that the seal-life on Copper and Bering Islands, at some future time, may not be greatly augmented by a corresponding diminution of our own, with no other than natural causes operating? Certainly, if the ground on either Bering or Copper Island, in the Commander Group, is as well situated for the wants of the breeding fur-seal as is that exhibited by the Pribylov Islands, then I say confidently that we may at any time note a diminution here and find a corresponding augmentation there; for I have clearly shown, in my chapter on the habits of these animals (see Section I of this report), that they are not so particularly attached to the respective places of their birth, but that they rather land with an instinctive appreciation of the fitness of that ground as a whole.

MORE DEFINITE KNOWLEDGE NEEDED OF THE RUSSIAN SEAL-ISLANDS.—If we, however, possess all the best suited ground, then we can count upon retaining the seal-life as we now have it, by a vast majority, and, in no other way; for it is not unlikely that some season may occur when an immense number of the fur-seals, which have lived during the last four or five years on the Pribylov Islands, should be deflected from their usual feeding-range at sea by the shifting of schools of fish, and other abnormal causes, which would bring them around quite close to the Asiatic seal-grounds, in the spring; and the scent from those rookeries would act as a powerful stimulant and attraction for them to land there, where the conditions for their breeding may be just as favorable as they desire. Such being the case, this diminution, therefore, which we would

notice on the Pribylov Group, might be the great increase observed at the Commander Islands, and not due to any mismanagement on the part of the men in charge of these interests. Thus, it appears to me necessary that definite knowledge concerning the Commander Islands and the Kuriles should be gathered; without it, I do not hesitate to say that any report made by an agent of the Government as to a visible diminution of the seal-life on the Pribylovs, due in his opinion to the effect of killing as it is conducted there, would be without good foundation; that this diminution would have been noticed just the same, in all likelihood, had there been no taking of seals at all on the Pribylov Islands, and that the missing seals were, more than probable, over on the Russian grounds.

If we find, however, that the character of this Russian seal-land is restricted to narrow beach-margins, under bluffs, as at Saint George, then we shall know that a great body of seals will never attempt to land there when they could not do so without suffering, and in violation of their laws during the breeding-season. Therefore, with this correct understanding to start on, we can then feel alarmed with good reason, should we ever observe any diminution, to a noteworthy degree, on our seal-islands of Bering Sea.

Possible deflection of seals in feeding.—I do not call attention to this subject with the slightest idea in my mind, as I write, of any such contingency arising, even for an indefinite time to come; but still I am sensible of the fact that it is possible for it to occur any season. But the seals undoubtedly feed on their pelagic fields in systematic routine of travel, from the time they leave the Pribylov Islands until that of their return; therefore, in all probability, unless the fish upon which they are nourished suddenly become scarce in our waters and soundings, the seals will not change their base, as matters now progress; but it is possible for the finny shoals and schools to be so deflected from their migration to and from their spawning-beds, as to carry this seal-life with it, as I have hinted above. Thus it cannot be superfluous to call up this question, so that it shall be prominent in discussion, and suggestion for future thought.

Need of careful yearly examination.—In the mean time the movements of the seals upon the great breeding-rookeries of Saint Paul and those of Saint George should be faithfully noted and recorded every year; and as time goes on, this record will place the topic of their increase or diminution beyond all theory or cavil.

6.—STATISTICS OF SEALS TAKEN FROM THE ISLANDS.

Exhibit of all skins shipped from the Pribylov Islands.—As an exhibit of the entire number of fur-seal skins taken for taxes and sale from the Pribylov Islands, between 1797 and 1880, inclusive, I present the following table, which, although it may vary a few thousand skins—not over one hundred thousand in all, from the true aggregate—during the long period of nearly one hundred years covered by it, I am nevertheless satisfied that it is the best evidence of the kind which can be obtained. Prior to the year 1868 it will be noticed that I have given only a series of estimates for the period antedating that year, as far back as 1862. The reason for this is, that I can find nowhere, in writing, an authenticated record of the catch. It was the policy of the old Russian Company invariably to take more skins, every year, from these islands down to Sitka than they could profitably dispose of annually in the markets of the world; a large surplus being yearly left over, which were suffered to decay or be destroyed by moths, and subsequently thrown into the sea. I can only judge, therefore, of what they took in that period, from what I know they had on hand in their salt-house at Saint George and Saint Paul during 1867, which was forty thousand to forty-eight thousand skins; and this the natives told me was a larger average than

they had taken for a great many years prior to that date. Hence, I have proportioned it back to the last record, which I find in Techmainov, whose figures, embraced in the three periods, from 1796 to 1861, have been given as copied by him from the authentic archives of the old Russian Company; he is careful to say in this connection that the exhibit does not show all skins that were taken from the seal-islands, but only those which the Russians took for sale from Sitka.

And, again, other Russian authors, rather than this historian of the Russian-American Company, have said that immense numbers of fur-seal skins—hundreds of thousands—were frequently accumulated in the warehouses at Sitka only to decay and be destroyed. Their aggregate cannot be estimated within any bound of accuracy, and it is not in the sum total of the following table. What we have taken on the island, since 1868, is presented below, almost correct. In the following table, relative to the Pribylov Group, it will be noticed that there is a gap of ten years between 1786, the date of their discovery, and 1797, the time of the earliest Russian record. How many were taken then, there is not the faintest evidence in black and white; but we do know that from the time of the discovery of the Pribylov Islands up to 1799, the taking of fur-seals on both of these islands progressed without count or lists; and without any responsible head or director; because there were then, upon those islands, seven or eight different companies, represented by as many agents or leaders, and all of them vied one with the other in taking as many fur-seals as they could.*

Fur-seal skins taken for shipment and sale (Callorhinus ursinus) from the Pribylov Islands.

Period.	Number of skins.	Period.	Number of skins.	Period.	Number of skins.
*1797–1821 (24 years)	1,232,374	1867	?48,000	1875	99,500
*1821–1842 (21 years)	458,502	1868	242,000	1876	99,000
*1842–1861 (19 years)	372,000	1869	87,000	1877	83,500
1862	?20,000	1870	9,965	1878	95,000
1863	?25,000	1871	93,000	1879	99,968
1864	?26,000	1872	99,000	1880	99,950
1865	?40,000	1873	99,630		
1866	?42,000	1874	99,820	Total, 1797 to 1880	3,561,051

* Including about 5,000 annually from the Commander Islands.

The following table shows the number of fur seals taken on Commander Islands from 1862 to 1880:

Fur-seal skins taken for shipment (Callorhinus ursinus) from the Commander Islands.

Years.	Number of seals taken.	Years.	Number of seals taken.	Years.	Number of seals taken.
1862	4,000	1869	24,000	1876	26,960
1863	4,500	1870	24,000	1877	21,532
1864	5,000	1871	3,614	1878	31,340
1865	4,000	1872	29,318	1879	42,752
1866	4,000	1873	30,396	1880	48,504
1867	4,000	1874	31,272		
1868	12,000	1875	36,274	Total, 1862 to 1880	387,462

* The attempt, on my part, to get an authentic list of the numbers of fur-seals slain upon the Pribylov Islands, prior to 1868, has simply been, to my mind, a partial failure. My investigation and search for such record has satisfied me that it does not exist; memoranda of shipments only, each season, were made by the agents of the Russian Company when the vessels took those skins from the seal islands to Sitka; and of these skins, again, count was only made of such as were exported to China or Russia, no mention being made anywhere of the number which was consumed in Alaska by the company's large force of attachés, or else destroyed at New Archangel. This method of accounting for the yield from the Pribylovs from 1806 or 1817 up to 1867, naturally confuses a correct determination as to the sum total—renders it, perhaps, very inaccurate.

7.—THE MANNER OF TAKING THE SEALS.

THE MANNER IN WHICH THE SEALS ARE TAKEN.—By reference to the habits of the fur-seal, which I have discussed elsewhere, it is now plain and beyond doubt that two-thirds of all the males which are born, and they are equal in numbers to the females born, are never permitted by the remaining third, strongest by natural selection, to land upon the same breeding ground with the females, which always herd thereupon *en masse*. Hence this great band of "bachelor" seals, or "holluschickie," so fitly termed, when it visits the island is obliged to live apart entirely—sometimes, and some places, miles away from the rookeries; and in this admirably perfect method of nature are those seals which can be properly killed without injury to the rookeries, selected and held aside by their own volition, so that the natives can visit and take them, as they would so many hogs, without disturbing, in the least degree, the utter peace and entire quiet of the breeding grounds, where the stock is perpetuated.

The manner in which the natives capture and drive the "holluschickie" up from the hauling grounds to the slaughter-fields near the two villages of Saint Paul and Saint George, and elsewhere on the islands, cannot be improved upon. The routine which they follow is most satisfactory; it is in this way: At the beginning of every sealing season, that is, during May and June, large bodies of the young "bachelor" seals do not haul up on land very far from the water—a few rods at the most—and, when these first arrivals are sought after, the natives, in capturing them, are obliged to approach slyly and run quickly between the dozing seals and the surf, before they can take alarm and bolt into the sea; thus, in this way a dozen Aleuts, running down the sand beach of English Bay, in the early morning of some June day, will turn back from the water thousands of seals, just as the mold-board of a plow lays over and back a furrow of earth. When the sleeping seals are first startled, they arise, and, seeing men between them and the water, immediately turn, lope, and scramble rapidly back up and over the land; the natives then leisurely walk on the flanks and in the rear of the drove thus secured, directing and driving them over to the killing grounds, close by the village.*

PROGRESSION OF A SEAL-DRIVE.—A drove of seals on hard or firm grassy ground, in cool and moist weather, may be driven with safety at the rate of half a mile an hour; they can be urged along, with the expenditure of a great many lives, however, at the speed of a mile or a mile and a quarter per hour; but this is highly injurious, and it is seldom ever done. An old bull seal, fat and unwieldy, cannot travel with the younger ones, though it can lope or gallop as it starts over the ground as fast as an ordinary man can run, over 100 yards; but then it fails utterly, falls to the earth supine, entirely exhausted, hot, and gasping for breath.

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* The task of getting up early in the morning, and going out to the several hauling grounds, closely adjacent, is really all there is of the labor involved in securing the number of seals required for the day's work on the killing grounds. The two, three, or four natives upon whom, in rotation, this duty is devolved by the order of their chief, rise at first glimpse of dawn, between 1 and 2 o'clock, and hasten over to Lukannon, Tolstoi, or Zoltoi, as the case may be, "walk out" their "holluschickie," and have them duly on the slaughter field before 6 or 7 o'clock, as a rule, in the morning. In favorable weather the "drive" from Tolstoi consumes two and a half to three hours' time; from Lukannon, about two hours, and is often done in an hour and a half; while Zoltoi is so near by that the time is merely nominal.

I heard a great deal of talk among the white residents of Saint Paul, when I first landed and the sealing-season opened, about the necessity of "resting" the hauling grounds; in other words, they said that if the seals were driven in repeated daily rotation from any one of the hauling grounds, that this would so disturb these animals as to prevent their coming to any extent again thereon, during the rest of the season. This theory seemed rational enough to me at the beginning of my investigations, and I was not disposed to question its accuracy; but subsequent observation, directed to this point particularly, satisfied me, and the sealers themselves with whom I was associated, that the driving of the seals had no effect whatever upon the hauling which took place soon or immediately after the field, for the hour, had been swept clean of seals by the drivers. If the weather was favorable for landing, *i. e.*, cool, moist, and foggy, the fresh hauling of the "holluschickie" would cover the bare grounds again in a very short space of time

The "holluschickie" are urged along over the path leading to the killing grounds with very little trouble, and require only three or four men to guide and secure as many thousand at a time. They are permitted to frequently halt and cool off, as heating them injures their fur. These seal-halts on the road always impressed me with a species of sentimentalism and regard for the creatures themselves. The men dropping back for a few moments, the awkward shambling and scuffling of the march at once ceases, and the seals stop in their tracks to fan themselves with their hind-flippers, while their heaving flanks give rise to subdued panting sounds. As soon as they apparently cease to pant for want of breath, and are cooled off comparatively, the natives step up once more, clatter a few bones with a shout along the line, and the seal-shamble begins again—their march to death and the markets of the world is taken up anew.

I was also impressed by the singular docility and amiability of these animals when driven along the road; they never show fight any more than a flock of sheep would do; if, however, a few old seals get mixed in, they usually get so weary that they prefer to come to a stand-still and fight rather than move; otherwise no sign whatever of resistance is made by the drove from the moment it is intercepted, and turned up from the hauling grounds, to the time of its destruction at the hands of the sealing gang.

This disposition of the old seals to fight rather than endure the panting torture of travel is of great advantage to all parties concerned; for they are worthless commercially, and the natives are only too glad to let them drop behind, where they remain unmolested, eventually returning to the sea. The fur on them is of little or no value, their under wool being very much shorter, coarser, and more scant than in the younger; especially so on the posterior parts along the median line of the back.

This change for the worse or deterioration of the pelage of the fur-seal takes place, as a rule, in the fifth year of their age; it is thickest and finest in texture during the third and fourth year of life, hence, in driving the seals on Saint Paul and Saint George up from the hauling-grounds the natives make as far as practicable a selection from males of that age.

It is quite impossible, however, to get them all of one age without an extraordinary amount of stir and bustle, which the Aleuts do not like to precipitate; hence the drive will be found to consist usually of a bare majority of three and four year olds, the rest being two-year-olds principally, and a very few, at wide intervals, five-year-olds, the yearlings seldom ever getting mixed up.

METHOD OF LAND TRAVEL.—As the drove progresses along the path to the slaughtering-grounds, the seals all move in about the same way; they go ahead with a kind of walking step and a sliding, shambling gallop. The progression of the whole caravan is a succession of starts, spasmodic and irregular, made every few minutes, the seals pausing to catch their breath, and make, as it were, a plaintive survey and mute protest. Every now and then a seal will get weak in the lumbar region, then drag his posteriors along for a short distance, finally drop breathless and exhausted, quivering and panting, not to revive for hours—days, perhaps—and often never. During the driest driving days, or those days when the temperature does not combine with wet

sometimes in a few hours after the driving of every seal from Zoltoi sands over to the killing fields adjacent, those dunes and the beach in question would be swarming anew with fresh arrivals. If, however, the weather is abnormally warm and sunny, during its prevalence, even if for several consecutive days, no seals to speak of will haul out on the emptied space; indeed, if these "holluschickie" had not been taken away by man from Zoltoi or any other hauling ground on the islands when "tayopli" weather prevailed, most of such seals would have vacated their terrestrial loating places pro tem. for the cooler embraces of the sea.

The importance of clearly understanding this fact as to the readiness of the "holluschickie" to haul promptly out on steadily "swept" ground, provided the weather is inviting, is very great; because, when not understood, it was deemed necessary, even as late as the season of 1872, to "rest" the hauling grounds near the village (from which all the driving has been made since), and make trips to far-away Polavina and distant Zapadnie—an unnecessary expenditure of human time, and a causeless infliction of physical misery upon phocine backs and flippers.

fog to keep the path moist and cool, quite a large number of the weakest seals in the drove will be thus laid out and left on the track. If one of these prostrate seals is not too much heated at the time, the native driver usually taps the beast over the head and removes its skin.*

PROSTRATION OF FUR-SEALS BY HEAT.—This prostration from exertion will always happen, no matter how carefully they are driven; and in the longer drives, such as 2½ and 5 miles from Zapadnie on the west, or Polavina on the north, to the village of Saint Paul, as much as 3 or 4 per cent. of the whole drive will be thus dropped on the road; hence I feel satisfied, from my observation and close attention to this feature, that a considerable number of those that are thus rejected from the drove, and are able to rally and return to the water, die subsequently from internal injuries sustained on the trip, superinduced by this over-exertion. I, therefore, think it highly improper and impolitic to extend drives of the "hollusehiekie" over any distance on Saint Paul Island exceeding a mile or a mile and a half; it is better for all parties concerned, and the business too, that salt-houses be erected, and killing-grounds established adjacent and contiguous to all of the great hauling-grounds, 2 miles distant from the village on Saint Paul Island, should the business ever be developed above the present limit: or should the exigencies of the future require a quota from all these places, in order to make up the 100,000 which may be lawfully taken.

ABUNDANT SUPPLY OF "HOLLUSCHICKIE."—As matters are to-day, 100,000 seals alone on Saint Paul can be taken and skinned in less than forty working days, within a radius of 1½ miles from the village, and from the salt-house at Northeast Point; hence the driving, with the exception of two experimental droves which I witnessed in 1872, has never been made from longer distances than Tolstoi to the eastward, Lukannon to the northward, and Zoltoi to the southward of the killing-grounds at Saint Paul village. Should, however, an abnormal season recur in which the larger proportion of days during the right period for taking the skins be warmish and dry, it might be necessary, in order to get even 75,000 seals within the twenty-eight or thirty days of their prime condition, for drives to be made from the other great hauling-grounds to the westward and northward, which are now, and have been for the last ten years, entirely unnoticed by the sealers.

KILLING THE SEALS.—The seals, when finally driven up on to those flats between the east landing and the village, and almost under the windows of the dwellings, are herded there until cool and rested. The drives are usually made very early in the morning, at the first breaking of day, which is 1.30 to 2 o'clock of June and July in these latitudes. They arrive and cool off on the slaughtering-grounds, so that by 6 or 7 o'clock a. m., after breakfast, the able-bodied male population turn out from the village and go down to engage in the work of slaughter. The men are dressed in their ordinary working-garb of thick flannel shirts, stout cassimere or canvas pants, over which the "tarbossa" boots are drawn; if it rains they wear their "kamlaikas," made of the intestines and throats of the sea-lion and fur-seal. Thus dressed, they are armed with a club piece, a stout oaken or hickory bludgeon, which have been made particularly for the purpose at New London, Connecticut, and imported here for this especial service. These sealing clubs are about 5 or 6 feet in length, 3 inches in diameter at their heads, and the thickness of a man's fore-

* The fur-seal, like all of the pinnipeds, has no sweat-glands; hence, when it is heated, it cools off by the same process of panting which is so characteristic of the dog, accompanied by the fanning that I have hitherto fully described; the panting and low grunting of a tired drove of seals, on a warmer day than usual, can be heard several hundred yards away. It is surprising how quickly the hair and fur will come out of the skin of a blood-heated seal—literally rubs bodily off at a touch of the finger. A fine specimen of a three-year-old "hollusehak" fell in its tracks at the head of a lagoon while being driven to the village killing-grounds. I asked that it be skinned with special reference to mounting; accordingly a native was sent for, who was on the spot, knife in hand, within less than thirty minutes from the moment that this seal fell in the road; yet, soon after he had got fairly to work, patches of the fur and hair came off here and there wherever he chanced to clutch the skin.

arm where they are grasped by the hands. Each native also has his stabbing-knife, his skinning-knife, and his whetstone; these are laid upon the grass convenient, when the work of braining or knocking the seals down is in progress. This is all the apparatus which they have for killing and skinning.

THE KILLING GANG AT WORK.—When the men gather for work they are under the control of their chosen foremen or chiefs; usually, on Saint Paul, divided into two working parties at the village, and a sub-party up at Northeast Point, where another salt-house and slaughtering-field is established. At the signal of the chief the work of the day begins by the men stepping into the drove, corraled on the flats; and, driving out from it one hundred or one hundred and fifty seals at a time, make what they call a "pod," which they surround in a circle, huddling the seals one on another as they narrow it down, until they are directly within reach and under their clubs. Then the chief, after he has cast his experienced eye over the struggling, writhing "kautickie" in the center, passes the word that such and such a seal is bitten, that such and such a seal is too young, that such and such a seal is too old; the attention of his men being called to these points, he gives the word "strike," and instantly the heavy clubs come down all around, and every one that is eligible is stretched out stunned and motionless, in less time, really, than I take to tell it. Those seals spared by order of the chief now struggle from under and over the bodies of their insensible companions, and pass, hustled off by the natives, back to the sea.*

METHOD OF ALEUTS IN SKINNING FUR-SEALS.—The clubs are dropped, the men seize the prostrate seals by the hind-flippers, and drag them out, so they are spread on the ground without touching each other; then every sealer takes his knife and drives it into the heart at a point between the fore-flippers of each stunned form; the blood gushes forth, and the quivering of the animal presently ceases. A single stroke of a heavy oak bludgeon, well and fairly delivered, will crush in at once the slight, thin bones of a fur-seal's skull, and lay the creature out almost lifeless. These blows are, however, usually repeated two or three times with each animal, but they are very quickly done. The bleeding, which is immediately effected, is so speedily undertaken in order that the strange reaction, which the sealers call "heating," shall be delayed for half an hour or so, or until the seals can all be drawn out, and laid in some disposition for skinning.

I have noticed that within less than thirty minutes from the time a perfectly sound seal was knocked down, it had so "heated," owing to the day being warmer and drier than usual, that, when touching it with my foot, great patches of hair and fur scaled off. This is a rather exceptionally rapid metamorphosis—it will, however, take place in every instance within an hour or an hour and a half, on these warm days, after the first blow is struck, and the seal is quiet in death;

* The aim and force with which the native directs his blow determines the death of the seal; if struck direct and violently, a single stroke is enough; the seals' heads are stricken so hard sometimes that those crystalline lenses to their eyes fly out from the orbital sockets like hail-stones, or little pebbles, and frequently struck me sharply in the face, or elsewhere, while I stood near by watching the killing-gang at work.

A singular lurid green light suddenly suffuses the eye of the fur-seal at intervals when it is very much excited, as the "podding" for the clubbers is in progress; and, at the moment when last raising its head it sees the uplifted bludgeons on every hand above, fear seems then for the first time to possess it and to instantly gild its eye in this strange manner. When the seal is brained in this state of optical coloration, I have noticed that the opalescent tinting remained well defined for many hours to a whole day after death; these remarkable flashes are very characteristic to the eyes of the old males during their hurly-burly on the rookeries, but never appear in the younger classes unless as just described, as far as I could observe.

This tenderness and extreme susceptibility of the whole seal-tribe, save the walrus, to a blow upon the ethmoid processes, was well understood by the Ancients, and is thus expressed by them:

> Non hami penetrant phocas, sævique tridentes
> In caput incutient, et circum tempora pulsat.
> Nam subita percunt capitas per vulnera morte.
>
> *Oppian.*

hence no time is lost by the prudent chief in directing the removal of the skins as rapidly as the seals are knocked down and dragged out. If it is a cool day, after bleeding the first "pod" which has been prostrated in the manner described, and after carefully drawing the slain from the heap in which they have fallen, so that the bodies will spread over the ground just free from touching one another, they turn to and strike down another "pod"; and so on, until a whole thousand or two are laid out, or the drove, as corraled, is finished. The day, however, must be raw and cold for this wholesale method. Then, after killing, they turn to work and skin; but, if it is a warm day, every pod is skinned as soon as it is knocked down.

The labor of skinning is exceedingly severe, and is trying even to an expert, demanding long practice ere the muscles of the back and thighs are so developed as to permit a man to bend down to, and finish well, a fair day's work. The knives used by the natives for skinning are ordinary kitchen or case-handle butcher-knives. They are sharpened to cutting edges as keen as razors; but, something about the skins of the seal, perhaps fine comminuted sand along the abdomen, so dulls these knives, as the natives work, that they are constantly obliged to whet them.

The body of the seal, preparatory to skinning, is rolled over and balanced squarely on its back; then the native makes a single swift cut through the skin down along the neck, chest, and belly, from the lower jaw to the root of the tail, using, for this purpose, his long stabbing knife.* The fore and hind flippers are then successively lifted, as the man straddles the seal and stoops down to his work over it, and a sweeping circular incision is made through the skin on them just at the point where the body-fur ends; then, seizing a flap of the hide on either one side or the other of the abdomen, the man proceeds to rapidly cut with his smaller, shorter butcher-knife, the skin, clean and free from the body and blubber, which he rolls over and out from the skin by hauling upon it as he advances with his work, standing all this time stooped over the carcass so that his hands are but slightly above it or the ground. This operation of skinning a fair-sized "holluschak" takes the best men only one minute and a half; but the average time made by the gang on the ground is about four minutes to the seal. Nothing is left of the skin upon the carcass save a small patch of each upper lip on which the coarse mustache grows, the skin on the top of the lower jaw, the insignificant tail, together with the bare hide of the flippers.

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* When turning the stunned and senseless carcasses, the only physical danger which the sealers run the slightest risk of, during the whole circuit of their work, occurs thus: at this moment the prone and quivering body of the "holluschak" is not wholly inert, perhaps, though it is nine times out of ten, and, as the native takes hold of a fore-flipper to jerk the carcass over on to its back, the half-brained seal rouses, snaps suddenly and viciously, often biting the hands or legs of the unwary skinners, who then come leisurely and unconcernedly up into the surgeon's office at the village for bandages, &c.; a few men are bitten every day or two during the season on the islands in this manner, but I have never learned of any serious result following in any case.

They, the sealers, as might be expected, become exceedingly expert in keeping their knives sharp, putting edges on to them as keen as razors, and in an instant detect any dullness, by passing the balls of their thumbs over the suspected edges to the blades.

The white sealers of the Antarctic always used the orthodox butchers' "steel" in sharpening their knives, but these natives never have, and probably never will abandon those little whetstones above referred to.

During the Russian management, and throughout the strife in killing by our own people, in 1868, a very large number of the skins were cut through, here and there, by the slipping of the natives' knives, when they were taking them from the carcasses, and "flensing" them from the superabundance, in spots, of blubber. These knife cuts through the skin, no matter how slight, give great annoyance to the dresser; hence they are always marked way down in price. The prompt scrutiny of each skin on the islands, by the agent of the Alaska Commercial Company, who rejects every one of them thus injured, has caused the natives to exercise greater care, and the number now so damaged every season is absolutely trifling.

Another source of small loss is due to a habit which the "holluschickie" have of occasionally biting one another when they are being urged along in the drives, and thus crowded once in a while one upon the other; usually these examples of "zoobäden" are detected by the natives prior to the "knocking down," and spared; yet those which have been nipped on the chest or abdomen cannot be thus noticed; and, until the skin is lifted, the damage is not apprehended.

BLUBBER OF FUR-SEAL: UNPLEASANT ODOR.—On the removal of the skin from the body of the fur-seal, the entire surface of the carcass is then covered with a more or less dense layer, or envelope, of a soft, oily, fat blubber, which in turn completely conceals the muscles or flesh of the trunk and neck; this fatty substance, which we now see, resembles that met with in the seals generally everywhere, only possessing that strange peculiarity not shared by any other of its kind, of being positively overbearing and offensive in odor to the unaccustomed human nostril. The rotting, sloughing carcasses around about did not, when stirred up, affect me more unpleasantly than did this strong, sickening smell of the fur-seal blubber. It has a character and appearance intermediate between those belonging to the adipose tissue found on the bodies of cetacea and some carnivora.

This continuous envelope of blubber to the bodies of the "holluschickie" is thickest in deposit at those points upon the breast between the fore-flippers, reaching entirely around and over the shoulders, where it is from 1 inch to a little over in depth. Upon the outer side of the chest it is not half an inch in thickness, frequently not more than a-quarter; and it thins out considerably as it reaches the median line of the back. The neck and head are clad by an unbroken continuation of the same material, which varies from one-half to one-quarter of an inch in depth. Toward the middle line of the abdominal region there is a layer of relative greater thickness. This is coextensive with the sterno-pectoral mass; but it does not begin to retain its volume as it extends backward, where this fatty investment of the carcass upon the loins, buttocks, and hinder limbs fades out finer than on the pectoro-abdominal parts, and assumes a thickening corresponding to the depth on the cervical and dorsal regions. As it descends on the limbs this blubber thins out very perceptibly; and when reaching the flippers it almost entirely disappears, giving way to a glistening aureolar tissue, while the flipper skin finally descends in turn to adhere closely and firmly to the tendinous ligamentary structures beneath, which constitute the tips of the *Pinnipedia*.

The flesh and the muscles are not lined between, or within, by fat of any kind. This blubber envelope contains it all with one exception—that which is found in the folds of the small intestine and about the kidneys, where there is an abundant secretion of a harder, whiter, though still offensive, fat.

FLESH OF FUR-SEAL AS AN ARTICLE OF DIET—It is quite natural and very much the fashion for our people, when they first eat a meal on the Pribylov Islands, to ask questions in regard to what seal meat looks and tastes like; some of the white residents will answer, saying that they are very fond of it, cooked so and so; others will reply that in no shape or manner can they stomach the dish. The inquirers must needs try the effect on their own palates. I frankly confess that I had a slight prejudice against seal meat at first, having preconceived ideas that it must be fishy in flavor, but I soon satisfied myself to the contrary, and found that the flesh of young seals not over three years old was full as appetizing and toothsome as most of the beef, mutton, and pork I was accustomed to at home; the following precautions must be rigidly observed, however, by the cook who prepares fur-seal steaks and sausage balls for our delectation and subsistence—he will fail, if he does not:

(1.) The meat must be perfectly cleaned of every vestige of blubber or fat, no matter how slight.

(2.) Cut the flesh, then, into very thin steaks or slices, and soak them from six to twelve hours in salt and water (a tablespoon of fine salt to a quart of fresh water); this whitens the meat and removes the residuum of dark venous blood that will otherwise give a slightly disagreeable taste, hardly definable, though existing.

(3.) Fry these steaks, or stew them *à la mode*, with a few thin slices of sweet "breakfast" bacon, seasoning with pepper and salt; a rich brown gravy follows the cooking of the meat; serve hot, and it is, strictly judged, a very excellent meal for the daintiest feeder—and I hereby recommend it confidently as a safe venture for any newcomer to make.

MEAT OF THE SEA-LION.—The flesh of young sea-lions is still better than that of the fur-seal, while the natives say that the meat of the hair-seal (*Phoca vitulina*) is superior to both, being more juicy; fur-seal meat is exceedingly dry, hence the necessity of putting bacon into the frying-pan or stew-pot with it; sea-lion flesh is an improvement in this respect, and also that its fat, strange to say, is wholly clear, white, and inodorous, while the blubber of the "hollusehickie" is sickening to the smell, and will, nine times out of ten, cause any civilized stomach to throw it up as quickly as it is swallowed. The natives, however, eat a great deal of it simply because they are too lazy to clean their fur-seal cuts, and not because they really relish it.

In this connection it may be well to add, that the liver of both *Callorhinus* and *Eumetopias* is sweet and wholesome; or, in other words, it is as good as liver usually is in Fulton Market; the tongues are small, white, and fat; they are regularly cut out to some extent, and salted in ordinary water-buckets for exportation to curious friends; they have but slight claim to gastronomic favor. The natives are, however, very partial to the liver; but, though they like the tongues, yet they are too lazy to prepare them. A few of them, in obedience to pressing and prayerful appeals from relatives at Oonalashka, do exert themselves enough every season to undergo the extra labor of putting up a few barrels of fresh salted seal-meat, which, being carried down to Illoolook by the company's vessels, affords a delightful variation to the steady codfish diet of the Aleutian Islanders.

8. MANNER OF CARING FOR AND SHIPPING THE FUR-SEAL.

CURING THE RAW SKINS.—The skins are taken from the field to the salt-house where they are laid out, after being again carefully examined, one upon another, "hair to fat," like so many sheets of paper, with salt profusely spread upon the fleshy sides as they are piled up in the "kenches," or bins.* The salt-house is a large, barn-like frame structure, so built as to afford one-

* The practice of curing in early times was quite different from this rapid and effective process of salting. The skins were then all air-dried, pegged out, when "green," upon the ground, or else stretched upon a wooden trellis or frame, which stood like a rude fence adjacent to the killing grounds; it was the accumulation of such air-dried skins from the Pribylov Islands at Sitka which rotted so in 1803 that "750,000 of them were cut up or thrown out into the sea," completely destroyed. Had they been treated as they now are, such a calamity and hideous waste could not have occurred.

The method of air-drying which the old settlers employed is well portrayed by the practice of the natives up there now, who treat a few hundred sea-lion skins to the process every fall; preparing them thus for shipment to Oonalashka, where they are used by brother Aleuts in covering their bidarkies or kyacks.

The natives, in speaking to me of this matter, said that whenever the weather was rough and the wind blowing hard these air-dried seal skins, as they were tossed from the bidarrah to the ship's deck, numbers of them would frequently turn in the wind and fly clean over the vessel into the water beyond, where they were lost.

Under the old order of affairs, prior to the present management, the skins were packed up and carried on the backs of the boys and girls, women and old men, to the salt-houses or drying-frames. When I first arrived, season of 1872, a slight variation was made in this respect by breaking a small Siberian bull into harness and hitching it to a cart, in which the pelts were hauled. Before the cart was adjusted, however, and the bull taught to pull, it was led out to the killing grounds, by a ring in its nose, and literally covered with the green seal hides, which were thus packed to the kenches. The natives were delighted with even this partial assistance; but now they have no further concern about it at all, for several mules and carts render prompt and ample service. They were introduced here, first, in 1874. The Russian Alaska Company and also the Alaska Commercial Company have brought up three or four horses to Saint Paul, but they have been unfortunate in losing them all by their dying soon after landing, the voyage and the climate combined being inimical to equine health; but the mules of the present order of affairs have been successful in their transportation to and residence in the Pribylov Islands. One, the first of these horses just referred to, perhaps did not have a fair chance for its life. It was saddled one morning, and several camp-kettles, coffee-pots, &c., slung on the crupper for the use of the Russian agent, who was going up to Northeast Point for a week or ten days' visit. He got into the saddle, and while en route, near Polavina, a kettle or pot broke loose behind, the alarmed horse kicked its rider promptly off, and disappeared on a full run, in the fog, going toward the bogs of Kaninista, where its lifeless and fox-gnawed body was eventually found several days afterwards.

third of its width in the center, from end to end, clear and open as a passage-way, while on each side are rows of stanchions with sliding planks, which are taken down and put up in the form of deep bins, or boxes—"kenches," the sealers call them. As the pile of skins is laid at the bottom of an empty "kench," and salt thrown in on the outer edges, these planks are also put in place, so that the salt may be kept intact until the bin is filled as high up as a man can toss the skins. After lying two or three weeks in this style they become "pickled," and they are suited then at any time to be taken up and rolled into bundles of two skins to the package, with the hairy side out, tightly corded, ready for shipment from the islands.*

AVERAGE WEIGHT OF RAW SKINS.—The average weight of a two-year-old skin is 5½ pounds; of a three-year-old skin, 7 pounds; and of a four-year-old skin, 12 pounds, so that, as the major portion of the catch is two or three year-olds, these bundles of two skins each have an average weight of from 12 to 15 pounds. In this shape they go into the hold of the company's steamer at Saint Paul, and are counted out from it in San Francisco. Then they are either at once shipped to London by the Isthmus of Panama in the same shape, only packed up in large hogsheads of from twenty to forty bundles to the package, or expressed by railroad, via New York, to the same destination.

PACKING SKINS FOR SHIPMENT.—The work of bundling the skins is not usually commenced by the natives until the close of the last week's sealing; or, in other words, those skins which they first took, three weeks ago, are now so pickled by the salt in which they have been lying ever since as to render them eligible for this operation and immediate shipment. The moisture of the air dissolves and destroys a very large quantity of the saline preservative which the company brings up annually in the form of rock salt, principally obtained at Carmen Island, Lower California.

LAW PROTECTING THE SEALS.—The Alaska Commercial Company, by the provisions of law under which they enjoy their franchise, are permitted to take one hundred thousand male seals annually, and no more, from the Pribylov Islands. This they do in June and July of every year. After that season the skins rapidly grow worthless, as the animals enter into shedding, and, if taken would not pay for transportation and the tax. These natives are paid 40 cents a skin for the catch, and they keep a close account of the progress of the work every day; they do so, as it is all done by them, and they know within fifty skins, one way or the other, when the whole number have been secured each season. This is the only occupation of the three hundred and ninety-eight people here, and they naturally look well after it. The interest and close attention paid by these natives, on both islands, to the "hollusehickie" and this business was both gratifying and instructive to me during my residence there.

ERRONEOUS POPULAR IDEAS.—The common or popular notion with regard to seal skins is that they are worn by those animals just as they appear when offered for sale; that the fur-seal swims about, exposing the same soft coat with which our ladies of fashion so delight to cover their tender forms during inclement winter. This is a very great mistake; few skins are less attractive than is the seal skin when it is taken from the creature. The fur is not visible; it is concealed entirely by a coat of stiff overhair, dull, gray-brown, and grizzled. It takes three of them to make a lady's sacque and boa, and, in order that the reason for their costliness may be apparent, I take great pleasure in submitting a description of the tedious and skillful labor necessary to their dressing ere they are fit for sale. A description of this process will be found in the Section of this report on PREPARATION OF FISHERY PRODUCTS.

*The bundled skins are carried from the salt-houses to the baidar, when the order for shipment is given, and tossed into that lighter, one by one, to be rapidly stowed; 700 to 1,200 bundles make the average single load; then, when alongside the steamer, they are again tossed up, and on her deck, from whence they are stowed in the hold.

SHIPMENT OF SEAL SKINS TO LONDON.—As I have said before, all of the fur-seal catch on Saint Paul and Saint George, and the Russian Islands to the westward, is shipped by the Alaska Commercial Company directly to London every season, and there offered for sale in the great fur warehouses of that metropolis, where fur buyers, ever since the palmy days of the Hudson Bay Company when it controlled the fur market of the world, have been accustomed to repair twice a year for the purpose of bidding in everything known to the trade that was collected over the whole world and considered of commercial importance.

9. ECONOMIC VALUE OF THE SKINS, OIL, AND FLESH OF THE FUR-SEAL.

REASON WHY FUR-SEAL-SKINS ARE ALL SOLD IN LONDON.—On account of the fact that the labor in this country, especially skilled labor, commands so much more per diem in the return of wages than it does in London or Belgium, it is not practicable for the Alaska Commercial Company, or any other company, to attempt to dress and put upon the market the catch of Bering Sea, which is almost the entire catch of the whole world. Our people understand the theory of dressing these skins perfectly, but they cannot compete with the cheaper labor of the Old World. Therefore, nine-tenths nearly of the fur-seal skins taken every year are annually purchased and dressed in London, and from thence distributed all over the civilized world where furs are worn and prized.

CAUSE OF VARYING PRICES OF DRESSED SEAL SKINS.—The great variations of the value of seal skin sacques, ranging from $75 up to $350, and even $500, is not often due to the variance in the quality of the fur originally, but it is due to the quality of the work whereby the fur was treated and prepared for wear. For instance, the cheap sacques are so defectively dyed that a little moisture causes them to soil the collars and cuffs of their owners, and a little exposure causes them speedily to fade and look ragged. A properly dyed skin, one that has been conscientiously and laboriously finished, for it is a labor requiring great patience and great skill, will not rub off or "crock" the whitest linen when moistened; and it will wear the weather, as I have myself seen it on the form of a sea captain's wife, for six and seven successive seasons, without showing the least bit of dimness or raggedness. I speak of dyeing alone; I might say the earlier steps of unhairing, in which the over hair is deftly combed out and off from the skin, heated to such a point that the roots of the fur are not loosened, while those to the coarser hirsute growth are. If this is not done with perfect uniformity, the fur will never lay smooth, no matter how skillfully dyed; it will always have a rumpled, ruffled look. Therefore the hastily dyed sacques are cheap, and are enhanced in order of value just as the labor of dyeing is expended upon them.

GRADATION OF THE FUR OF CALLORHINUS URSINUS.—The gradation of the fur of *Callorhinus* may, perhaps, be best presented in the following manner:

1 YEAR OLD ♂ : WELL GROWN: *at July* 1 *of every season:*

FUR fully developed as to uniform length and thickness and evenness of distribution; it is lighter in color, and softer in texture, than hereafter, during the life of the animal; average weight of skin, as removed by the sealers from the carcass, 4½ pounds.

2 YEAR OLD ♂ : WELL GROWN: *at June* 1 *of every season:*

FUR fully developed as to even length and thickness and uniformity of distribution; it has now attained the darker buff and fawn color, sometimes almost brown, which it retains throughout the rest of the life of the animal; it is slightly and perceptibly firmer and stiffer than it was last year, not being at all "fluffy" as in the yearling dress now; average weight of skin, as taken from the body, 5½ pounds.

3 YEAR OLD ♂ : WELL GROWN: *at June* 1 *of every season:*

FUR fully developed, as to even length, but a shade longer over the shoulders, where the incipient "wig" is forming; otherwise perfectly uniform in thickness and even distribution; this is the very best grade of pelt which the seal affords during its life; average weight of skin, as taken from the body, 7 pounds.

4 YEAR OLD ♂ : WELL GROWN: *at June* 1 *of every season:*

FUR fully developed as to even length, except a decided advance in length and perceptible stiffness over the shoulders, in the "wig"; otherwise perfectly uniform in thickness and even distribution; this grade is almost as safe to take, and as good as is the three-year-old; average weight of skin, as removed, 12 pounds.

5 YEAR OLD ♂ : WELL GROWN: *at May to June* 1 *every season:*

FUR fully developed, but much longer and decidedly coarser in the "wig" region; otherwise, uniform in thickness and distribution; the coarseness of the fur over the shoulders and disproportionate length thereon destroys that uniformity necessary for rating A 1 in the market; in fact it does not pay to take this skin; average weight, 16 pounds.

6 YEAR OLD ♂ : WELL GROWN: *from May to June* 1 *every season:*

FUR fully developed, still longer and stiffer in the "wig" region, with a slightly thinner distribution over the post-dorsal region, and shorter; this skin is never taken—it is profitless; average weight, 25 pounds.

7 YEAR OLD AND UPWARD ♂ : *from May to June* 1 *every season:*

FUR fully developed, but very unevenly distributed, being relatively scant and short over the posterior dorsal region, while it is twice as long and very coarse in the covering to the shoulders especially and the neck and chest. Skins are valueless to the fur trade; weights, 45 to 60 pounds.

The analysis, as above, is a brief epitome of the entire subject; only it should be added that the female skins are as finely furred as are the best grades of the males; and also, that age does not cause the quality of their pelage to deteriorate, which it does to so marked an extent in the males. But, taking them into consideration is entirely out of the question, and ought to be so forever.

The fœtal coat of the pup is composed of coarse black hair alone: the underwool not at all developed; when this is shed and the new coat put on in September and October, it is furred and haired as a yearling, which I diagnose above; this pelage has, however, no commercial value.

All the skins taken by the company for the last eight years have been prime skins, in the fair sense of the term; but all the seal-skin sacques made therefrom have not been of the first quality, by any means.

In order that the rules and regulations and the law governing and protecting the interests of the Government on these islands may be fully understood, I give them below, pages 388, 390.

OIL OF THE FUR-SEAL.—I have spoken of the blubber, and as I mentioned it, doubtless the thought will occur, what becomes of the oil contained therein; is it all allowed to waste? A most natural query, and one that I made instantly after my first arrival on the islands. I remember seeing 40 or 50 hogsheads and tierces headed up and standing near the foot of the village hill, in which there were many thousands of gallons of fur-seal oil. I asked the agent of the company when he was going to ship it; he shrugged his shoulders and said: "As soon as it will pay."

I made, during the season, careful notes as to the amount of oil represented by the blubber exposed on the 100,000 young male seal carcasses, and I found that the two and three year old "hollnschickie" bodies as left by the skinner would not clean up on an average more than half a gallon of oil; while the four-year-old males would make nearly a gallon. It should be remembered that quite a large portion of the seal's fat is taken off with the skin, as its presence thereon is necessary to that proper amalgamation and preservation by the salt when it is applied to its fresh surface in the "kenches"; hence the amount of oil represented by these carcasses every year is not much over 60,000 gallons.

CONDITION OF THE FUR-SEAL OIL MARKET.—When among the seal-oil dealers in New York City, during the month of May, in 1876, I took these notes with me and investigated the standing and the demand for fur-seal oil in their market and the markets of the world; and the statements of these oil experts and dealers were all in accord as to the striking inferiority of fur-seal oil, compared with the hair-seal and sea-elephant oil, which they dealt in largely. The inferiority of the fur-seal oil is due primarily to the offensive odor of the blubber, which I have spoken of heretofore. This singularly disagreeable smell does not exist in the blubber of the hair-seal (*Phocidæ*),

the sea-elephant or sea-lion, and it makes the process of refining it very difficult. They said it was almost impossible to properly deodorize it and leave the slightest margin of profit for the manufacturer and the dealer. It was gummy and far darker in color than any other seal oil, hence it possessed little or no commercial value. Then, again, when the subject of taking oil from the seal islands of Alaska is considered, the following obstacles, in addition to the first great objection just cited, arise at once to financial success: The time, trouble, and danger in loading a vessel with oil at the islands where, on account of the absence of a harbor and the frequent succession of violent gales, a ship is compelled to anchor from 1½ to 3 miles from the coast, on which the surf is always breaking. The costs, again, of casks and cooperage will amount to 10 cents per gallon; the cost of the natives' work in securing and bringing the blubber to the try-works, 10 cents per gallon; the cost of refining it, 10 cents; and the cost of transportation of a cargo of, say, 60,000 gallons will amount to nearly 20 cents per gallon; thus making a gallon of fur-seal oil aggregate in cost to the taker 50 cents, which entails upon him nothing but pecuniary loss when the cargo goes upon the market, and where it is worth only from 40 to 50 cents retail, with a dull sale at that.*

FRAGILE CHARACTER OF FUR-SEAL BONES.—I looked at the fur-seal bones, and at first sight it seemed as though a bone factory might be established there; but a little examination of the singularly light and porous osseous structure of the *Callorhinus* quickly stifled that enterprise. The skull and larger bones of the skeleton are more like pasteboard than the bone which is so common to our minds. When dried out, the entire skeleton of a three-year-old male will not weigh 7 pounds; indeed, I am inclined to think it would be much less than that if thoroughly kiln-dried, as after the fashion of the bone-mills. Therefore, although one hundred thousand of these skeletons bleach out and are trodden down annually, upon the Pribylov Islands, yet they have not the standing for any commercial value whatsoever, considering their distance and difficulty of access from those impoverished fields where they might serve our farmers as fertilizing elements. The bones of *Callorhinus*, though apparently strong, are surprisingly light and porous; indeed, they resemble those of *Aves* more than those commonly credited to mammalia; the osseous structure, however, of *Phoca vitulina*, the hair-seal which I examined there, side by side with that of the fur-seal, was very much more solid and weighed, bone for bone of equal age, just about one-third more, the skull especially; also the shoulder-blades and the pelvic series. If the bones of the animals were not divested of their cartilaginous continuations and connections, then the aggregate weight of the fur-seal is equal to its hairy-skinned relative; the entire skeleton of a three-year-old ♂ *Callorhinus*, completely divested by sea-fleas (*Amphipoda*) of all flesh and fat, but with every ligamentary union and articulation perfect (the cartilaginous toe-ends all present), was just 8 pounds, and I have reason to believe that when it became air-dried and bleached it did not weigh more than 4 or 5. The bones of the older seals are relatively very much heavier, but only relatively; the frailness and fragility is constant through life, though the skulls of the old males do thicken up on their crests and about the rami of their jaws very perceptibly.

* In 1873, not having had any experience and not even knowing the views of the oil dealers themselves, I left the seal islands believing that if the special tax which was then laid upon each gallon of oil as it might be rendered was removed, that it would pay the manufacturer, and in this way employ the natives, many days of the year otherwise idle, profitably. The company assured me that as far as its conduct in the matter was concerned, it would be perfectly willing to employ the natives in rendering fur-seal oil, and give them all the profit, not desiring itself to coin a single penny out of the whole transaction; possibly this could be done if the special tax of 55 cents per gallon was stricken off. The matter was then urged upon the Treasury Department, by myself, in October, 1873, and the tax was repealed by the Department soon after. But it seems that I was entirely mistaken as to the quality and value of the oil itself. I made, to satisfy myself, a very careful investigation of the subject in 1876, going personally to the leading dealers in whale and seal oil of New York City, and they were unanimous in their opposition to handling fur-seal oil, some of them saying that they would not touch it at any price. I felt considerably chagrined, because had I known as much in 1873, I would have saved myself then, and my friends subsequently, a good deal of unnecessary trouble and profitless action.

Sea-lion bones are, however, normally strong and heavy; the bone of the fur-seal is evidently stout enough, but it is singularly light, while the walrus, that dull, sluggish brute, has a massive osteological frame. I made these relative examinations more especially to ascertain something which might pass for a correct estimate of what the bony waste on the killing-grounds of the Pribylov islands amounted to annually, with a view of its possible utilization. The spongy bones of the whole one hundred thousand annually laid out would not render, according to my best judgment, 50 tons of dry bone-meal—an insignificant result and unworthy of further notice on these islands.

Decay of seal carcasses.—Another singular and striking characteristic of the Island of Saint Paul, is the fact that this immense slaughtering-field, upon which seventy-five to ninety thousand fresh carcasses lay every season, sloughing away into the sand beneath, does not cause any sickness among the people who live right over them, so to speak. The cool, raw temperature, and strong winds, peculiar to the place, seem to prevent any unhealthy effect from the fermentation of decay. The blubber envelopes left upon the carcasses really act as air-tight retorts, holding the gases arising from the decomposition of the viscera within until they are absorbed and soak away into the sand below; the skinned carcasses seem to fairly melt down into this foundation, so that they disappear entirely the third season after their creation. The *Elymus* and other grasses once more take heart and grow with magical vigor over the unsightly spot, to which the sealing-gang again return, repeating their bateau, which we have marked before, upon this place, three years ago. In that way this strip of ground, seen on my map between the village, the east landing, and the lagoon, contains the bones and the oil-drippings and other fragments thereof, of more than three million seals slain since 1786 thereon, while the slaughter-fields at Novastoshnah record the end of a million more.

I remember well the unmitigated sensations of disgust that possessed me when I first landed, April 28, 1872, on the Pribylov islands, and passed up from the beach, at Black Bluffs, to the village, over the killing-grounds; though there was a heavy coat of snow on the fields, yet each and every one of seventy-five thousand decaying carcasses was there, and bare, having burned, as it were, their way out to the open air, polluting the same to a sad degree. I was laughed at by the residents who noticed my facial contortions, and assured that this state of smell was nothing to what I should soon experience when the frost and snow had fairly melted. They were correct; the odor along by the end of May was terrific punishment to my olfactories, and continued so for several weeks until my sense of smell became blunted and callous to this stench by sheer familiarity. Like the other old residents I then became quite unconscious of the prevalence of this rich "funk," and ceased to notice it.

Those who land here, as I did, for the first time nervously and invariably declare that such an atmosphere must breed a plague or a fever of some kind in the village, and hardly credit the assurance of those who have resided in it for whole periods of their lives that such a thing was never known to Saint Paul, and that the island is remarkably healthy. It is entirely true, however, and, after a few weeks' contact, or a couple of months' experience at the longest, the most sensitive nose becomes used to that aroma, wafted as it is hourly, day in and out, from decaying seal flesh, viscera, and blubber; and, also, it ceases to be an object of notice. The cool, sunless climate during the warmer months has undoubtedly much to do with checking too rapid decomposition, and consequent trouble therefrom, which would otherwise arise from the killing-grounds.

The freshly-skinned carcasses of this season do not seem to rot substantially until the following year; then they rapidly slough away into the sand upon which they rest; the envelope of blubber left upon each body seems to act as an air-tight receiver, holding most of the putrid gases within

that spring from the decaying viscera until this volatile tension causes it to give away; fortunately the line of least resistance to that merciful retort is usually right where it is adjacent to the soil, so both putrescent fluids and much of the stench thereof is deodorized and absorbed before it can contaminate the atmosphere to any great extent. The truth of my observation will be promptly verified if the skeptic chooses to tear open any one of the thousands of gas-distended carcasses in the fall that were skinned in the killing season; if he does so, he will be smitten by the worst smell that human sense can measure; and should he chance to be accompanied by a native, that callous individual, even, will pinch his grimy nose and exclaim, it is a "keeshla pahknoot!"

At the close of the third season after the skinning of the seal's body it will have so rotted and sloughed away as to be marked only by the bones and a few of the tendinous ligaments; in other words, it requires from thirty to thirty-six months' time for a seal carcass to rot entirely away, so nothing but whitened bones remain above ground. The natives govern their driving of the seals and laying out of the fresh bodies according to this fact; for they can, and do, spread this year a whole season's killing out over the same spot of the field previously covered with such fresh carcasses three summer's ago; by alternating with the seasons thus, the natives are enabled to annually slaughter all of the "holluschickie" on a relatively small area, close by the salt-houses, and the village, as I have indicated on the map of Saint Paul's.

DESCRIPTION OF KILLING-GROUND OF SAINT PAUL.—The killing-ground of Saint Paul is a bottomless sand flat, only a few feet above high water, and which unites the village hill and the reef with the island itself; it is not a stone's throw from the heart of the settlement—in fact, it is right in town—not even suburban.

DESCRIPTION OF THE KILLING-GROUND AT SAINT GEORGE.—On Saint George the "holluschickie" are regularly driven to that northeast slope of the village hill, which drops down gently to the sea, where they are slaughtered, close by and under the houses, as at Saint Paul; those droves which are brought in from the North Rookery to the west, and also Starry Ateel, are frequently driven right through the village itself. This slaughtering field of Saint George is hard tufa and rocky, but it slopes down to the ocean rapidly enough to drain itself well; hence the constant rain and humid fogs of summer carry off that which would soon clog and deprive the natives from using the ground year after year in rotation, as they do. Several seasons have occurred, however, when this natural and heavenly cleansing of the ground above-mentioned has not been as thorough as must be to be used again immediately; then the seals were skinned back of the village hill, and in the ravine to the west on the same slope from the summit.

This village site of Saint George to-day, and the killing-grounds adjoining, used to be, during early Russian occupation, in Pribylov's time, a large sea-lion rookery, the finest one known to either island, Saint Paul or Saint George. Natives are living there who told me that their fathers had been employed in shooting and driving these sea-lions so as to deliberately break up the breeding-ground, and thus rid the island of what they considered a superabundant supply of the *Eumetopias*, and thereby to aid and encourage the fresh and increased accession of fur-seals from the vast majority peculiar to Saint Paul, which could not take place while the sea-lions held the land.*

* The Saint Paul village site is located wholly on the northern slope of the village hill, where it drops from its greatest elevation, at the flag-staff, of 125 feet gently down to the sandy killing-flats below and between it and the main bod of the island. The houses are all placed facing the north, at regular intervals along the terraced streets, which run east and west. There are sixty-four or seventy native houses, ten large and smaller buildings of the company, the treasury agent's residence; the church, the cemetery crosses, and the school building are all standing here in coats of pure white paint. The survey of the town site, when rebuilt, was made by Mr. H. W. McIntyre, of the Alaska Commercial Company, who himself planned and devised the entire construction. No offal or decaying refuse

10. THE RUSSIAN SEAL INDUSTRY AT THE PRIBYLOV ISLANDS.*

From the time of the discovery of the Pribylov Islands up to 1805 (or, that is, until the time of the arrival in America of General Resanov), the taking of fur-seals on both islands progressed without count or lists, and without responsible heads or chiefs, because then (1787 to 1805, inclusive) there were a number of companies, represented by as many agents or leaders, and all of them vied with each other in taking as many as the could before the killing was stopped. After this, in 1806 and 1807, there were no seals taken, and nearly all the people were removed to Oonalashka.

In 1808 killing was again commenced, but the people in this year were allowed to kill only on Saint George. On Saint Paul hunters were not permitted this year or the next. It was not until the fourth year after this that as many as half the number previously taken were annually killed. From this time (Saint George 1808, and Saint Paul 1810) up to 1822, taking fur-seals progressed on both islands without economy and with slight circumspection, as if there were a race in killing for the most skins. Cows were taken in the drives and killed, and were also driven from the rookeries to places where they were slaughtered.

It was only in 1822 that G. Moorayvev (governor) ordered that young seals should be spared every year for breeding, and from that time there were taken from the Pribylov Islands, instead of 40,000 to 50,000, which Moorayvev ordered to be spared in four successive years, no more than 8,000 to 10,000. Since this, G. Chestyahkov, chief ruler after Moorayvev, estimated that from the increase resulting from the legislation of Moorayvev, which was so honestly carried out on the Pribylov Islands that, in these four years the seals on Saint Paul had increased to double their previous number, (that) he could give an order which increased the number to be annually slain to 40,000; and this last order, or course, directed for these islands, demanded as many seals as could be got; but with all possible exertion hardly 28,000 were obtained.

After this, when it was most plainly seen that the seals were, on account of this wicked killing, steadily growing less and less in number, the directions were observed for greater caution in killing the grown seals and young females, which came in with the droves of killing-seals, and to endeavor to separate, if possible, these from those which should be slain.

But all this hardly served to do more than keep the seals at one figure or number, and hence did not cause an increase. Finally, in 1834, the governor of the company, upon the clear (or "handsome") argument of Baron Wrangel, which was placed before him, resolved to make new regulations respecting them, to take effect in the same year (1834), and, following this, on the island of Saint Paul only 4,000 were killed, instead of 12,000.

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of any kind is allowed to stand around the dwellings or lie in the streets. It required much determined effort on the party of the whites to effect this sanitary reform, but now most of the natives take equal pride in keeping their surroundings clean and unpolluted.

The sight of the Saint George settlement is more exposed and bleak than is the one we have just referred to on Saint Paul. It is planted directly on the rounded summit of one of the first low hills that rise from the sea on the north shore; indeed, it is the only hill that does slope directly and gently to the salt water on the island. Here are twenty-four to thirty native cottages, laid with their doors facing the opposite sides of a short street between, running also east and west, as at Saint Paul. There, however, each house looks down upon the rear of its neighbor, in front and below. Here the houses face each other, on the top of the hill. The treasury agent's quarters, the company's six or seven buildings, the school-house, and the church are all neatly painted, and this settlement, from its prominent position, shows from the sea to a much better advantage than does the larger one of Saint Paul. The same municipal sanitary regulations are enforced here.

* Translated, by the author, from Veniaminov's Zapieskie, &c., St. Petersburg, 1842, vol. ii, pp. 568. The italics are the author's, and the translation is nearly literal, as might be inferred by the idiom here and there.—H. W. E.

On the island of Saint George the seals were allowed to rest in 1826 and 1827, and since that time greater caution and care have been observed, and headmen or foremen have kept a careful count of the killing.*

RUSSIAN WASTE AND SLAUGHTER.—In the first years, on Saint Paul Island, from 50,000 to 60,000 seals were taken annually, and on Saint George from 40,000 to 50,000 every year. Such horrible killing was neither necessary nor demanded. The skins were frequently taken without any list or count. In 1803, 800,000 seal-skins had accumulated, and it was impossible to make advantageous sale of so many skins; for in this great number so many were spoiled that it became necessary to cut or throw into the sea 700,000 pelts. If G. Resanov (our minister to Japan) had not given this his attention, and put himself between the animals and this foolish management of them, it appears plainly to me that these creatures would have long ago changed for the worse.

NO RECORDS PRIOR TO 1817: EARLY DRIVING.—Of the number of skins taken up to 1817, I have no knowledge to rely upon, but from that time and up to the present writing I have true and reliable accounts, from which it appears that still in 1820, on both islands, there were killed more than 50,000 seals, viz, on Saint Paul, 39,700; and on Saint George, 10,250. There were eye-witnesses to the reason for this diminution of the seals, and it is only wonderful, beside, that they are still existing, as they have been treated almost without mercy so many years. The cows produce only one pup each, every year. They have known deadly enemies, and also are still exposed to many foes unknown. From this killing of the seals they steadily grew less, except on one occasion, which was on Saint George Island, where an opportunity was given suddenly to kill a large number; but the circumstances do not seem to be important. On this occasion a drive was made of 15,000 male and female seals, but the night was dark, and it was not practicable to separate the cows from the males, and they were therefore allowed to stand over until daylight should come. The men put in charge of the herding of the drove were careless, and the seals took advantage of that negligence and made an attempt to escape by throwing themselves from the bluffs over the beach near by into the sea: but, as this bluff was steep, high, rough, and slippery, they fell over and were all injured. Now, for the first time, great numbers of seals were missed, and why, it was not significant or apparent; but in the following year, instead of the appearance and catch of 40,000 or 50,000, less than 30,000 were killed and taken, and then, too, the numbers of seals were known to diminish, and in the same way, only greater, on the other island. For instance, in the first years, on the island of Saint George, the seals were only five or six times less than on Saint Paul, but in 1817 they were only less than one-fourth; but in 1826 they were almost one-sixth again.

The diminution of seals there (Saint Paul) and on the other island, from 1817 to 1835, was very gradual and visible every year, but not always equal.

The killing of seals in 1834, instead of being 80,000 or 60,000, was only 15,751 from both islands (Saint Paul, 12,700; Saint George, 3,051).

SUM TOTAL OF FUR-SEALS TAKEN.—In the first thirty years (according to Veniaminov's best understanding), there were taken "more than two and a half millions of seal-skins;" then, in the next twenty-one years, up to 1838, they took 578,924. During this last taking, from 1817 to 1838, the skins were worth on an average "no more than 30 rubles each" ($6 apiece).

A great many sea-otters (*Enhydra marina*) were found on Saint Paul Island at first, and as many as 5,000 were taken from the island, but years have passed since one has been seen in the vicinity, even, of the islands.

* A considerable portion of the translation is here omitted. This contains a very interesting exhibition of the results of the legal protection of the seals, and tables showing the annual capture from year to year. See Elliott's Report, Tenth Census, vol. 8, pp. 142, 144.

AN EXHIBIT OF VALUES GIVEN BY VENIAMINOV.—Pt. i: *Zapieskie, &c.*, p. 83, showing the relative importance, commercially, of the land and marine furs taken from the Oonalashka district (and sold) in 1833, by the Russian-American Company. (This district embraces the Pribylov Islands.)

Sort of fur.	Number of skins.	Price per skin.	Sum of value.	Reduced to our currency.	Remarks by the author, H. W. E.
Sea-otters	100	450 paper rubles	45,000	$9,000	*Enhydra marina.*
Black foxes	300	150 paper rubles	45,000	9,000	*Vulpes fulvus* var. *argentatus.*
Cross foxes	600	25 paper rubles	15,000	3,000	*Vulpes fulvus* var. *decussatus.*
Red foxes	500	10 paper rubles	5,000	1,000	*Vulpes fulvus.*
Blue foxes	1,500	10 paper rubles	15,000	3,000	*Vulpes lagopus.*
Land-otters	80	50 paper rubles	4,000	800	*Lutra canadensis.*
Fur-seals	15,000	50 paper rubles	750,000	150,000	*Callorhinus ursinus.*
Walrus-ivory	100 poods	80 paper rubles	8,000	1,600	A "pood" is 36.1 pounds avoirdupois.
Whalebone	200 poods	40 paper rubles	8,000	1,600	The baleen from the right whale, *Balæna.*
Miscellaneous furs			1,000	200	Deer and sea-lion skins, odds and ends, &c.
Sum total			896,000	179,200	

* * * "The country (Alaska) is divided up into five districts: Sitka, Kadiak, Oonalashka, Atka, and the North." * * *

This whole country is under the control and government of the "Russian American Company." * * * The business is conducted with a head, or a colonial governor, assisted by officers of the Imperial navy (Russian), and those of the company's fleet, and other chiefs; in every one of the districts the company has an office, which is under the direction of an office chief (or agent), and he in turn has foremen (or "bidarsheeks").

* * * "The company on the island of Saint Paul killed from 60,000 to 80,000 fur-seals per annum, but in the last time (1833?), with all possible care in getting them, they took only 12,000. On the island of Saint George, instead of getting 40,000 or 35,000, only 1,300 were killed." * * * [Veniaminov: *Zapieskie, &c.*, Pt. i: chap. xii, 1840.]

The table and extracts which I quote above give me the only direct Russian testimony as to the value of the Pribylov fur-seal catch when the skins were in scant supply. It will be seen that they were worth then only $10 each.

I now append a brief but significant extract from Tcehmainov—significant simply because it demonstrates that all Russian testimony, other than Veniaminov's, is utterly self-contradictory in regard to the number of seals taken from the Pribylov Islands. Tcehmainov first gives a series of tables which he declares are a true transcript and exhibit of the skins sold out of Alaska by the Russian-American Company. The latest table presented, and up to the date of his writing, 1862, shows that 372,894 fur-seal skins were taken from the Pribylov Islands, via Sitka, to the Russian markets of the world, in the years 1842–1862, inclusive; or giving an average catch of 18,644 per annum (p. 221). Then, further on, as he writes (nearly one hundred pages), he stultifies his record above quoted by using the language and figures as follows:

* * * "In earlier times more were taken than in the later; at present (1862) there are taken from the island of Saint Paul 70,000 annually without diminishing the number for future killing; on Saint George, 6,000. * * * From 1842 to 1861 there were taken from the island of Saint Paul 277,778 seal-skins; blue foxes, 10,508; walrus teeth, 104 poods; from Saint George, 31,923 fur-seals; blue foxes, 24,286." [*P. Tcehmainov, Ecstorccheskoi Obozcrainia Obrazovania Russian-American Company, pt. ii, p.* 310, 1863, *St. Petersburg.*] Further comment is unnecessary upon this author, who thus writes a "history of the doings of the Russian-American Company." Still, since Veniaminov's time, 1838–1840, it is the only *prima facie* testimony that we have touching these subjects while under Russian domination.

11. THE ORGANIZATION OF THE RUSSIAN-AMERICAN FUR COMPANY.

PRIBYLOV ISLANDS PASS INTO ITS CONTROL.—The mention made by Veniaminov, of that occupation of the Pribylov Islands immediately after their discovery by a score or so of rival traders and their butchering suites, is authentic; it is not necessary to paint the selfish details of the mercenary crews, as I find them drawn in several Russian chronicles. In 1799 the whole territory of Alaska went into the control of the Russian-American Company, and a picture of this organization which managed affairs on the seal-islands for sixty-seven long years, may be interesting in this connection.

CAUSES OF EARLY RUSSIAN FUR-TRADE.—The accidental circumstances connected with Bering's ill-fated voyage in 1741 were the first direct means of impetus given to Russian exploration and trade in the waters of the North Pacific and Bering Sea; the skins of the sea-otter and the blue foxes, in especial, which the survivors took from Bering Island back to Kamtchatka and Russia, sold for such high prices that it stimulated a large number of hardy, reckless men to scour those seas in search of fur-bearing lands. This trade, thus commenced, was for many years carried on by individual adventurers, each of whom acted alternately as a seaman, as a hunter, and as a trader, solely for his individual profit.

INCEPTION OF THE RUSSIAN-AMERICAN COMPANY.—At length, however, an association was formed in 1785 among a number of Siberian merchants to carry on the fur trade of the North Pacific. It received the protection and encouragement of the Empress Catherine, who bestowed upon it many valuable privileges. G. Shellikov was the ruling spirit of the corporation. Catherine's son and successor, Paul, was, at the outset of his reign, disposed to abolish these imperial advantages extended to this company by his mother on account of the heartless conduct of affairs in Alaska. Reasons of state, however, caused him to abandon this resolution, and he issued a "ukase," dated July 8, 1799, which granted to these united merchants aforesaid a charter, under the title of the Russian-American Company, that gave them exclusive use and control, for a period of twenty years, of all the coasts of America on the Pacific and the islands in that ocean, from Bering Strait to the 55th degree of south latitude, together with the right of occupying any other territories not previously possessed by civilized nations. The residence of the directors of this company was first fixed at Irkutsk, Siberia, which was the great depository or bonded warehouse for the Chinese trade with all the Russias, a short distance only from Kiachta, on the frontier, where the Mongols and Muscovites alone could meet for barter. It was afterward transferred to St. Petersburg, and these directors were personally made known to and placed under the surveillance of the imperial department of commerce.

Those privileges thus accorded by Paul were confirmed and extended, even, by Alexander, and under these favorable auspices the power and influence of the Russian-American Company rapidly advanced. In 1803 its establishments extended from Attoo to Sitka; during 1806 preparations were made to occupy the north of the Columbia River, but that plan was soon abandoned.

AUTOCRATIC POWER OF THE RUSSIAN-AMERICAN COMPANY.—The government of Alaska by this company was arranged and directed in simple despotism; each trading post was superintended by a Russian overseer or "precashcheek," who, with the aid of a small number of Russians, maintained absolute control over all the natives in his district; he compelled them to labor incessantly, in and out of season, for the benefit of the company. These overseers were in turn under subserviency to a chief agent, one of which resided in the limits of four natural divisions of the country; these men were again directly responsible to the authority of the governor-general, who resided at Sitka, and who was appointed really by the Imperial Government, though nomi-

nally by the directors; his powers were supposed to be limited and defined by regulations drawn up and signed by him in St. Petersburg; but, in fact, they were absolute, and irresponsible to any court on earth.

THE IRON-WILLED BARANOV.—The person who filled the office of governor-general soon after the organization of the Russian-American Company and for many years afterward, was Alexander Baranov; he was a man of iron will, of dauntless courage, shrewd, and wholly devoid of tender feeling. Under his autocratic management the affairs of this company prospered pecuniarily, and its stock rose accordingly in value; hence his proceedings were always approved at St. Petersburg.

BAD REPUTATION OF PROMYSHLINEKS.—In addition to the natives themselves, the company transported to Alaska some four or five hundred Russians, who were termed "promyshlineks," or "hunters." They were employed as trappers, fishermen, seamen, soldiers, or mechanics, just as their superiors might demand, and they were under the same rule as that I have just described as applicable to the natives; their lot, according to Krusenstern, a Russian who voyaged thither in 1804–1805, seems to have been more uninviting even than that of the wretched natives.

BARANOV'S ATTEMPT TO COLONIZE CALIFORNIA.—Prior to 1812 Sitka was the extreme southern limit of the Russian-American Company. But old Baranov, greatly annoyed by the loss of supply ships from the Okhotsk, by which their bread at Kadiak and Sitka was cut off for years at a time, determined to settle somewhere south, where these necessaries to a comfortable physical existence could be raised from the soil; so he asked the Spanish governor at Monterey permission to erect a few houses on the shore of the small bay of Bodega, California, in order to "procure and salt the meat of the wild cattle," which overran that part of the country north of the harbor of San Francisco, for the "use of the governor's table at New Archangel" (Sitka). The Castilian was only too happy to oblige a peer; but in the course of two or three years after this permit was given, the Russians had formed a large settlement and built a fort. The Spanish governor at first remonstrated, then commanded Baranov to move off, in the name of his most Catholic Majesty, the King of Spain. The Spaniard could not enforce this order. The Russian-American Company remained here unmolested until 1842, when they sold their fixtures to General Sutter, a Swiss-American, for $30,000, and vacated California.

ATTEMPT TO SECURE THE SANDWICH ISLANDS.—In 1815 Baranov, instead of feeling chilled by the California unpleasantness, then in full headway, turned his ambitious eyes to the Sandwich Islands, and actually dispatched a vessel, or rather two of them, under the direction of Dr. Shaeffer, a German surgeon, who landed on Atooi, with one hundred picked Aleuts; but they were, at the lapse of a year, so discouraged by the open opposition of the Russian Government to this scheme that they abandoned the project.

RAPID DECAY OF THE RUSSIAN-AMERICAN COMPANY AFTER DEATH OF BARANOV.—In 1862, when the third extension of twenty years' lease had expired, the affairs of the Russian-American Company were in a bad condition financially—deeply in debt, and the Imperial Government was not disposed to renew the charter. This state of affairs gave rise in 1864–'1867 to negotiation with other trading organizations for the lease, which finally culminated in the purchase of Alaska by our Government July, 1867. Such, in brief, was the Russian-American Company; it flourished under Baranov, but declined steadily to bankruptcy twenty years after his removal, when eighty years old, on account of extreme age, in 1818. In short its great compeer, the Hudson Bay Company, was very much earlier initiated in the same manner June, 1670, then it organized with the Northwest Company under its present title, with renewed royal prerogatives

and despotic sway over all British North America in 1821; it, too, has declined to a commercial cipher to day, with its autocratic rights abolished long since; in 1857, I think, they were wholly rescinded.

FIRST EXEMPTION OF FEMALES IN DRIVING.—In the details of an old letter from the Russian agent of the Russian-American Company, on Saint Paul, in 1847, I find the following side reference to the number of skins which were shipped from the Pribylov Islands that season: [Ms. letter of Kazean Shiesncekov, Saint Paul Island, 1847.]

5,607 "hollnschickov" (young males).
1,890 "sairieę" (4 and 5 year-old males), or a total of 7,497.

This is interesting because it is the record of the first killing on the seal-islands when the females were entirely exempted from slaughter.

THE SEAL-ISLANDS WERE THE EXCHEQUER OF THE RUSSIAN-AMERICAN COMPANY: 1799–1825.—"The Russians in their colonial possession under Baranov, made, first, the seal-skin the basis of all transactions with foreigners by buying up whole cargoes of goods and provisions brought into this country by English and American traders, and paying for the same in this way. In other words, the seal-islands were the exchequer where the Russian authorities could with certainty turn and lay their hands upon the necessary currency. These American, English, and other foreign sea captains having disposed of their supplies at Sitka or Kadiak in this manner, took their fur-seal skins to China and disposed of them at a handsome advance for tea, rice, &c., in exchange. The profits made by these foreigners having reached the ears of the Russian home management of the fur company controlling Alaska, it was ordered then that payments in fur-seal skins for these foreign supplies should cease, and that the Russians themselves would ship their skins to China and enjoy the emolument thereof. The result of this action was that the Chinese market did not prove as valuable to them as it was to the foreigners; it became overstocked, and a general stagnation and depression of the seal business took place and continued until a change of base in this respect was again made, and the skins of the fur-seal were shipped, together with the beaver, in bulk to the great Chinese depot of Kiakhta, where the Russians exchanged these peltries for the desired supplies of tea; the trade thereof assuming such immense proportions that the record is made where in a single year the Russian Fur Company paid to their Government the enormous duty upon importations of tea alone of 2,000,000 silver rubles, or $1,500,000. This was the period in the history of the seal-islands when, for a second time, and within the writing of Veniaminov, the seal life thereon was well nigh exterminated. The first decimation of these interests took place in the last decade of the eighteenth century and shortly after the discovery of the islands, when, it is stated, two million skins of these animals were rotting on the ground at one time. Rezanov applied the correction very promptly in the first instance of threatened exter mination of these valuable interests, and when the second epoch of decimation occurred, in 1834 to 1836, Baron Wrangell, admirably seconded by Father Veniaminov, checked its consumption. These are instances of care and far-sightedness which are refreshing to contemplate."*

12. THE ALASKA COMMERCIAL COMPANY.

OCCUPATION OF THE ISLANDS BY AMERICANS IN 1868.—The Alaska Commercial Company deserves and will receive a brief but comprehensive notice at this point. In order that we may follow it to these islands, and clearly and correctly appreciate the circumstances which gave it footing and finally control of the business, I will pass back and review the chain of evidence adduced in this direction from the time of our first occupation, in 1867, of the Territory of Alaska.

* IVAN PETROV: Rept. on Pop. and Resources of Alaska, Ex. Doc. No. 40, 46th Cong., 3d sess., 1881.

It will be remembered by many people that when we were ratifying the negotiation between our Government and that of Russia it was apparent that nobody in this country knew anything about the subject of Russian America. Every schoolboy knew where it was located, but no professor or merchant, however wise or shrewd, knew what was in it. Accordingly, immediately after the purchase was made and the formal transfer effected, a large number of energetic and speculative men, some coming from New England even, but most of them residents of the Pacific coast, turned their attention to Alaska. They went up to Sitka in a little fleet of sail and steam vessels, but among their number it appears there were only two of our citizens who knew of or had the faintest appreciation as to the value of the seal-islands. One of these, Mr. H. M. Hutchinson, a native of New Hampshire, and the other, Captain Ebenezer Morgan, a native of Connecticut, turned their faces in 1868 toward them. Also, they were known to Captain Gustav Niebaum, who, as an ex-employé of the Russian American company, became a United States citizen by the terms of the treaty of transfer in 1867. Captain Niebaum was the first to put in an appearance on the Seal Islands after the new order of ownership was proclaimed, for he knew the character of the business thoroughly. He was almost immediately followed by Messrs. Hutchinson and Morgan. Mr. Hutchinson gathered his information at Sitka—Captain Morgan had gained his years before by experience on the South Sea sealing-grounds. Mr. Hutchinson represented a company of San Francisco or California capitalists when he landed on Saint Paul; Captain Morgan represented another company of New London capitalists and whaling merchants. They arrived almost simultaneously, Morgan a few days or weeks anterior to Hutchinson. He had quietly enough commenced to survey and pre-empt the rookeries on the islands, or, in other words, the work of putting stakes down and recording the fact of claiming the ground, as miners do in the mountains; but later agreed to co operate with Mr. Hutchinson. These two parties passed that season of 1868 in exclusive control of those islands, and they took an immense number of seals. They took so many that it occurred to Mr. Hutchinson unless something was done to check and protect these wonderful rookeries, which he saw here for the first time, and which filled him with amazement, that they would be wiped out by the end of another season; although he was the gainer then, and would be perhaps at the end, if they should be thus eliminated, yet he could not forbear saying to himself that it was wrong and should not be. To this Captains Morgan and Niebaum also assented.

The island of Saint George in 1868 was occupied by their deputies, though all the sealing there was done entirely by the natives, the white men giving their chief concern to Saint Paul, where the vast bulk of seal life was exhibited.

Organization of the Alaska Commercial Company.—In the fall of 1868 Mr. Hutchinson and Captain Morgan, by their personal efforts, interested and aroused the Treasury Department and Congress, so that a special resolution was enacted declaring the seal-islands a governmental reservation, and prohibiting any and all parties from taking seals thereon until further action by Congress. In 1869 seals were taken on those islands, under the direction of the Treasury Department, for the subsistence of the natives only; and in 1870 Congress passed the present law, a copy of which I append, for the protection of the fur-bearing animals on those islands, and under its provisions, and in accordance, after an animated and bitter struggle in competition, the Alaska Commercial Company, of which Mr. Hutchinson was a prime organizer, secured the award and received the franchise which it now enjoys and will enjoy for another decade. The company is an American corporation, with a charter, rules, and regulations, which I reproduce herein on a subsequent page. They employ a fleet of vessels, sail and steam: four steamers, a dozen or fifteen ships, barks, and sloops. Their principal occupation and attention is given naturally to the seal-islands, though they have stations scattered over the Aleutian Islands and that portion of Alaska west and north of Kadiak. No post of theirs is less than 500 or 600 miles from Sitka.

Outside of the seal-islands all trade in this Territory of Alaska is entirely open to the public. There is no need of protecting the fur-bearing animals elsewhere, unless it may be by a few wholesome general restrictions in regard to the sea-otter chase. The country itself protects the animals on the mainland and other islands by its rugged, forbidding, and inhospitable exterior.

The Treasury officials on the seal-islands are charged with the careful observance of every act of the company; a copy of the lease and its covenant is conspicuously posted in their office; is translated into Russian, and is familiar to all the natives. The company directs its own labor, in accordance with the law, as it sees fit; selects its time of working, &c. The natives themselves work under the direction of their own chosen foremen, or "toyone." These chiefs call out the men at the break of every working-day, divide them into detachments according to the nature of the service, and order their doing. All communications with the laborers on the sealing-ground and the company passes through their hands; these chiefs having every day an understanding with the agent of the company as to his wishes, and they govern themselves thereby.

METHODS OF BUSINESS.—The company pays 40 cents for each skin that is taken. The natives take the skins on the ground; each man tallying his work and giving the result at the close of the day to his chief or foreman. When the skins are brought up and counted into the salt-houses, where the agent of the company receives them from the hands of the natives, the two tallies usually correspond very closely, if they are not entirely alike. When the quota of skins is taken, at the close of two or three or four weeks of labor, as the case may be, the total sum for the entire catch is paid over in a lump to the chiefs, and these men divide it among the laborers according to their standing as workmen, which they themselves have exhibited on their special tally-sticks. For instance, at the annual divisions, or "catch" settlement, made by the natives on Saint Paul Island among themselves, in 1872, when I was present, the proceeds of their work for that season in taking and skinning 75,000 seals, at 40 cents per skin, with extra work connected with it, making the sum of $30,637.37, was divided among them in this way: There were seventy-four shares made up, representing seventy-four men, though in fact only fifty-six men worked, but they wished to give a certain proportion to their church, a certain proportion to their priest, and a certain proportion to their widows; so they water their stock, commercially speaking. The seventy-four shares were proportioned as follows:

37 first-class shares, at	$451 22 each.
23 second-class shares, at	406 08 each.
4 third-class shares, at	360 97 each.
10 fourth-class shares, at	315 85 each.

These shares do not represent more than fifty-six able-bodied men.

In August, 1873, while on Saint George Island, I was present at a similar division, under similar circumstances, which caused them to divide among themselves the proceeds of their work in taking and skinning 25,000 seals, at 40 cents a skin, $10,000. They made the following subdivision:

	Per share.
17 shares each, 961 skins	$384 40
2 shares each, 935 skins	374 00
3 shares each, 821 skins	328 40
1 share each, 820 skins	328 00
3 shares each, 770 skins	308 00
3 shares each, 400 skins	160 00

These twenty-nine shares referred to as above, represent only twenty-five able-bodied men; two of them were women. This method of division as above given is the result of their own choice. It is an impossible thing for the company to decide their relative merits as workmen on the ground, so they have wisely turned its entire discussion over to them. Whatever they do they must agree

to—whatever the company might do they possibly and probably would never clearly understand, and hence dissatisfaction and suspicion would inevitably arise; as it is, the whole subject is most satisfactorily settled.

THE METHODS OF THE ALASKA COMMERCIAL COMPANY.—Living as the seal-islanders do, and doing what they do, the seal's life is naturally their great study and objective point. It nourishes and sustains them. Without it they say they could not live, and they tell the truth. Hence, their attention to the few simple requirements of the law, so wise in its provisions, is not forced or constrained, but is continuous. Self-interest in this respect appeals to them keenly and eloquently. They know everything that is done and everything that is said by anybody and by everybody in their little community. Every seal-drive that is made and every skin that is taken is recorded and accounted for by them to their chiefs and their church when they make up their tithing-roll at the close of each day's labor. Nothing can come to the islands by day or by night without being seen by them and spoken of. I regard the presence of these people on the island at the transfer, and their subsequent retention and entailment in connection with the seal business, as an exceedingly good piece of fortune, alike advantageous to the Government, to the company, and to themselves.

It will be remembered that at the time the question of leasing the islands was before Congress much opposition to the proposal was made on several grounds, by two classes, one of which argued against a "monopoly," the other urging that the Government itself would realize more by taking the whole management of the business into its own hands. At that time, far away from Washington, in the Rocky Mountains, I do not know what arguments were used in the committee rooms, or who made them; but since my careful and prolonged study of the subject on the ground itself, and of the trade and its conditions, I am now satisfied that the act of June, 1870, directing the Secretary of the Treasury to lease the seal-islands of Alaska to the highest bidder, under the existing conditions and qualifications, did the best and the only correct and profitable thing that could have been done in the matter, both with regard to the preservation of the seal life in its original integrity and the pecuniary advantage of the Treasury itself. To make this statement perfectly clear the following facts, by way of illustration, should be presented:

First. When the Government took possession of these interests, in 1868 and 1869, the gross value of a seal-skin laid down in the best market, at London, was then less in some instances and in others but slightly above the present tax and royalty paid upon it by the Alaska Commercial Company.

Second. Through the action of the intelligent business men who took the contract from the Government, in stimulating and encouraging the dressers of the raw material, and in taking sedulous care that nothing but good skins should leave the islands, and in combination with leaders of fashion abroad, the demand for the fur, by this manipulation and management, has been wonderfully increased.

Third. As matters now stand, the greatest and best interested of the lessees are identical with those of the Government; what injures one instantly injures the other. In other words, both strive to guard against anything that shall interfere with the preservation of the seal life in its original integrity, and both having it to their interest, if possible, to increase that life; if the lessees had it in their power, which they certainly have not, to ruin these interests by a few seasons of rapacity, they are so bonded and so environed that prudence prevents it.

Fourth. The frequent changes in the office of the Secretary of the Treasury, who has very properly the absolute control of the business as it stands, do not permit upon his part that close, careful scrutiny which is exercised by the lessees, who, unlike him, have but their one purpose to

carry out. The character of the leading men among them is enough to assure the public that the business is in responsible hands and in the care of persons who will use every effort for its preservation and its perpetuation, as it is so plainly their best end to serve. Another great obstacle to the success of the business, if controlled entirely by the Government, would be encountered in disposing of the skins after they had been brought down from the islands. It would not do to sell them up there to the highest bidder, since that would license the sailing of a thousand ships to be present at the sale. The rattling of their anchor-chains and the scraping of their keels on the beaches of the two little islands would alone drive every seal away and over to the Russian grounds in a remarkably short space of time. The Government would therefore need to offer them at public auction in this country, and it would be simply history repeating itself—the Government would be at the mercy of any well-organized combination of buyers. The agents conducting the sale could not counteract the effect of such a combination as can the agents of a private corporation, who may look after their interest in all the markets of the world in their own time, and in their own way, according to the exigencies of the season and the demand, and who are supplied with money which they can use, without public scandal, in the manipulation of the market. On this ground I feel confident in stating that the Treasury of the United States receives more money, net, under the system now in operation than it would by taking the exclusive control of the business. Were any capable Government officer supplied with, say, $100,000, to expend in "working the market," and intrusted with the disposal of 100,000 seal-skins wherever he could do so to the best advantage of the Government, and were this agent a man of first-class business ability and energy, I think it quite likely that the same success might attend his labor in the London market that distinguishes the management of the Alaska Commercial Company. But imagine the cry of fraud and embezzlement that would be raised against him, however honest he might be! This alone would bring the whole business into positive disrepute, and make it a national scandal. As matters are now conducted, there is no room for any scandal—not one single transaction on the islands but what is as clear to investigation and accountability as the light of the noon-day sun; what is done is known to everybody, and the tax now laid upon by the Government and paid into the Treasury every year by the Alaska Commercial Company yields alone a handsome rate of interest on the entire purchase money expended for the ownership of all Alaska.

It is frequently urged with great persistency, by misinformed or malicious authority, that the lessees can and do take thousands of skins in excess of the law, and this catch in excess is shipped *sub rosa* to Japan from the Pribylov Islands. To show the folly of such a move on the part of the company, if even it were possible, I will briefly recapitulate the conditions under which the skins are taken. The natives themselves of Saint Paul and Saint George do, in the manner I have indicated, all the driving and skinning of the seals for the company. No others are permitted or asked to land upon the islands to do this work, as long as the inhabitants of the islands are equal to it. They have been equal to it and they are more than equal to it. Every skin taken by the natives is counted by themselves, as they get 40 cents per pelt for that labor; and at the expiration of each day's work in the field, the natives know exactly how many skins have been taken by them, how many of these skins have been rejected by the company's agent, because they were carelessly cut and damaged in skinning—usually about three-fourths of 1 per cent. of the whole catch—and they have it recorded every evening by those among them who are charged with the duty. Thus, were 101,000 skins taken instead of 100,000 allowed by law, the natives would know it as quickly as it was done, and they would, on the strength of their record and their tally, demand the full amount of their compensation for the extra labor; and were any ship to approach the islands at any hour these people would know it at once, and would be aware of any shipment of skins that

might be attempted. It would then be the common talk among the 398 inhabitants of the two islands, and it would be a matter of record, open to any person who might come upon the ground charged with investigation.

Furthermore, these natives are constantly going to and from Oonalashka, visiting their relations in the Alentian settlements, hunting for wives, &c. On the mainland they have intimate intercourse with bitter enemies of the company, with whom they would not hesitate to talk over the whole state of affairs on the islands, as they always do; for they know nothing else and think of nothing else and dream of nothing else. Therefore, should anything be done contrary to the law, the act could and would be reported by these people. The Government, on its part, through its four agents stationed on these islands, counts these skins into the ship, and one of their number goes down to San Francisco upon her. There the collector of the port details experts of his own who again count them all out of the hold, and upon that record the tax is paid and the certificate signed by the Government.

It will, therefore, at once be seen, by examining the state of affairs on the islands, and the conditions upon which the lease is granted, that the most scrupulous care in fulfilling the terms of the contract is compassed, and that this strict fulfillment is the most profitable course for the lessees to pursue; and that it would be downright folly in them to deviate from the letter of the law, and thus lay themselves open at any day to discovery, the loss of their contract, and forfeiture of their bonds. Their action can be investigated at any time, any moment, by Congress; of which they are fully aware. They cannot bribe these 398 people on the islands to secrecy, any more successfully than they could conceal their action from them on the sealing fields; and any man of average ability could go, and can go, among these natives and inform himself as to the most minute details of the catch, from the time the lease was granted up to the present hour, should he have reason to suspect the honesty of the Treasury agents. The road to and from the island is not a difficult one, though it is traveled only once a year.

The subject of the method and direction of the business of sealing on these islands, involving as it does a discussion of the law and the action of the Alaska Commercial Company and the natives combined, is given below.

BY-LAWS OF THE ALASKA COMMERCIAL COMPANY, SAN FRANCISCO, CAL.

I. The corporate name of this company is the Alaska Commercial Company, and its affairs are under the control of five trustees, who shall hereafter be chosen by the stockholders of the company on the second Wednesday of June in each year, and who shall hold office until their successors are elected. The annual meetings of the stockholders shall be held at the office of the company. At all elections of trustees by the stockholders, each stockholder shall be entitled to one vote for every share of stock held by him on the books of the company. Stockholders may vote by proxy. All proxies shall be signed by the party owning the stock represented.

II. The principal place of business of the company is San Francisco, Cal.

III. The regular meetings of the board of trustees will be held at the office of the company on the first Wednesday in each month, at 12 o'clock m., and no notice of such meeting to any of the trustees shall be requisite. Other meetings of the board of trustees may be held upon the call of the president, by notice, signed by him, of the time and place of meeting, personally served on each trustee residing within this State, or published in a newspaper of general circulation in San Francisco for ten days successively next preceding the day of such meeting. Special meetings may be held upon notice, signed by three trustees, stating the time and place of meeting, and the purpose for which the meeting is called, having been duly served on each trustee, or published in a news-

paper of general circulation in San Francisco for ten days successively next preceding the day of meeting, and no business other than that specified in the notice shall be transacted at such special meeting. At all meetings of the board any three of the trustees being present shall constitute a quorum for the transaction of the business of the company. Adjourned meetings may be held in pursuance of a resolution of the board adopted at any regular or general meeting of the board. Any three trustees elected at any annual meeting of the stockholders of the company, and being present at the close of such stockholders' meeting may, on the same day, without notice to any of the trustees, meet and organize the board by the election of officers, and may transact such other business as may come before the board at such meeting.

IV. The officers of the company shall consist of a president, a vice-president, and a secretary, who shall be chosen by the board of trustees at their first meeting after the annual election of trustees; such officers to hold office one year, or until their successors are elected.

V. The president, or in his absence the vice-president, shall preside at the meetings of the board. In case neither is present, the board may appoint a president *pro tempore*.

VI. All vacancies in the board may be filled by the board at the next meeting after the existence of such vacancy, and it shall require the affirmative vote of three trustees to elect. In case of any vacancy occurring among the officers or agents of the company, the same may be filled at any meeting of the board.

VII. All certificates of the capital stock of the company shall be signed by the president and secretary, attested by the corporate seal of the company, and can be issued to the parties entitled thereto or their authorized agent. All transfers of stock shall be made on the books of the company by the secretary, upon surrender of the original certificate or certificates, properly indorsed by the party in whose favor the same was issued. No stock shall be transferred to any person not a stockholder of the company at the time of such transfer, unless the same shall have been offered for sale to the company, or stockholders of the company, and the purchase at the fair cash or market value refused, except by authority of a resolution of the board of trustees permitting such transfer.

VIII. The corporate seal of the company consists of a die of the following words: "Alaska Commercial Company, San Francisco, California."

IX. The corporate seal, and all property, securities, interests, and business of the company, shall be under the control and general management of the president, subject to the direction of the board of trustees. The funds of the company shall be deposited (from time to time as they are received) to the credit of the company, with a bank doing business in San Francisco, to be designated by the president, and the said funds can be drawn from such bank only by proper checks or drafts, signed by the president or vice-president of the company. The books of the company shall be kept by the secretary, who shall also keep a correct record of all the proceedings of the board of trustees had at their meetings, and perform such other duties as the board of trustees may require.

X. The pay and salaries of all officers of the company shall be determined, from time to time, by the board of trustees.

XI. The president of the company shall have power to appoint and employ such general business agents, factors, attorneys, clerks, and other employés as he may deem proper and requisite for conducting the business and affairs of the company; and he shall fix the pay, commissions, or salaries of all such agents, factors, attorneys, clerks, and other employés, from time to time, as circumstances shall require.

XII. All transfers of the capital stock of this company, made to persons not citizens of the United States, or made for the use or benefit of any citizen or citizens of any foreign Government, are absolutely void.

XIII. Dividends from the net profits of the company may be declared and paid by order of the board of trustees, in accordance with law.

XIV. These by-laws may be altered or amended by the board of trustees in the manner prescribed by law.

REGULATIONS FOR CONDUCT OF AFFAIRS ON THE SEAL ISLANDS.

OFFICE ALASKA COMMERCIAL COMPANY,
San Francisco, January, 1872.

The following regulations are prescribed for the guidance of all concerned:

1. The general management of the company's affairs on the islands of Saint Paul and Saint George is intrusted to one general agent, whose lawful orders and directions must be implicitly obeyed by all subordinate agents and employés.

*2. Seals can only be taken on the islands during the months of June, July, September, and October in each year, except those killed by the native inhabitants, for food and clothing, under regulations prescribed by the Secretary of the Treasury. Female seals and seals less than one year old will not be killed at any time, and the killing of seals in the waters surrounding the islands, or on or about the rookeries, beaches, cliffs, or rocks, where they haul up from the sea to remain, or by the use of fire-arms, or any other means tending to drive the seals away from the islands, is expressly forbidden.

3. The use of fire-arms on the islands, during the period from the first arrival of seals in the spring season until they disappear from the islands in autumn, is prohibited.

4. No dogs will be permitted on the islands.

5. No person will be permitted to kill seals for their skins on the islands, except under the supervision and authority of the agents of the company.

6. No vessels other than those employed by the company, or vessels of the United States, will be permitted to touch at the islands, or to land any persons or merchandise thereon, except in cases of shipwreck or vessels in distress.

*7. The number of seals which may be annually killed for their skins on Saint Paul Island is limited to seventy-five thousand, and the number which may be so killed on Saint George Island is limited to twenty-five thousand.

8. No persons other than American citizens, or the Aleutian inhabitants of said islands, will be employed by the company on the islands in any capacity.

9. The Aleutian people living on the islands will be employed by the company in taking seals for their skins, and they will be paid for the labor of taking each skin and delivering the same at the salt-house 40 cents, coin, until otherwise ordered by the Secretary of the Treasury. For other labor performed for the company, proper and remunerative wages will be paid, the amount to be agreed upon between the agents of the company and the persons employed. The working-parties will be under the immediate control of their own chiefs, and no compulsory means will ever be used to induce the people to labor. All shall be free to labor or not, as they may choose. The agents of the company will make selection of the seals to be killed, and are authorized to use all proper means to prevent the cutting of skins.

*Sections 2 and 7 of the above regulations were based upon the law of July 1, 1870; but since then Congress has given the Secretary of the Treasury the power to fix the ratio for each island upon a more intelligent understanding of the subject, and also to extend the time for taking from the 1st of June up to the 15th of August.

10. All provisions and merchandise required by the inhabitants for legitimate use will be furnished them from the company's stores, at prices not higher than ordinary retail prices at San Francisco, and in no case at prices above 25 per cent. advance on wholesale or invoice prices in San Francisco.

11. The necessary supplies of fuel, oil, and salmon will be furnished the people gratis.

12. All widows and orphan children on the islands will be supported by the company.

13. The landing or manufacture on the islands of spirituous or intoxicating liquors or wines will, under no circumstances, be permitted by the company, and the preparation and use of fermented liquors by the inhabitants must be discouraged in every legitimate manner.

14. Free transportation and subsistence on the company's vessels will be furnished all people who at any time desire to remove from the islands to any place in the Aleutian group of islands.

15. Free schools will be maintained by the company eight months in each year, four hours per day, Sundays and holidays excepted, and agents and teachers will endeavor to secure the attendance of all. The company will furnish the necessary books, stationery, and other appliances for the use of the schools, without cost to the people.

16. The physicians of the company are required to faithfully attend upon the sick, and both medical attendance and medicines shall be free to all persons on the islands; and the acceptance of gratuities from the people for such services is forbidden.

17. The dwelling-houses now being erected by the company will be occupied by the Aleutian families free of rent or other charges.

18. No interference on the part of the agents or employés of the company in the local government of the people on the islands, or in their social or domestic relations, or in their religious rites or ceremonies will be countenanced or tolerated.

19. It is strictly enjoined upon all agents and employés of the company to at all times treat the inhabitants of the islands with the utmost kindness, and endeavor to preserve amicable relations with them. Force is never to be used against them, except in defense of life, or to prevent the wanton destruction of valuable property. The agents and employés of the company are expected to instruct the native people in household economy, and, by precept and example, illustrate to them the principles and benefits of a higher civilization.

20. Faithful and strict compliance with all the provisions and obligations contained in the act of Congress entitled "An act to prevent the extermination of fur-bearing animals in Alaska", approved July 1, 1870, and the obligations contained in the lease to the company executed in pursuance of said act, and the regulations of the Secretary of the Treasury, prescribed under authority of said act, is especially enjoined upon all agents and employés of the company. The authority of the special agents of the Treasury appointed to reside upon the islands must be respected whenever lawfully exercised. The interest of the company in the management of the seal-fisheries being identical in character with that of the United States, there can be no conflict between the agents of the company and the agents of the Government, if all concerned faithfully perform their several duties and comply with the laws and regulations.

21. The general agent of the company will cause to be kept books of record on each island, in which shall be recorded the names and ages of all the inhabitants of the islands, and, from time to time, all births, marriages, and deaths which may occur on the islands, stating, in cases of death, the causes of the same. A full transcript of these records will be annually forwarded to the home office at San Francisco.

22. Copies of these regulations will be kept constantly posted in conspicuous places on both islands, and any willful violation of the same by the agents or employés of the company will be followed by the summary removal of the offending party.

JOHN F. MILLER,
President Alaska Commercial Company.

General Miller, in January, 1881, was elected, by the legislature of California, to the Senate of the United States. He is succeeded as president of the Alaska Commercial Company by Mr. Lewis Gerstle, who is one of the original stockholders and who has always been prominently identified with the business. The affairs of the company are now principally managed by Messrs. Gerstle, Sloss, Niebaum, and Neumann, on the Pacific coast; by Mr. Hutchinson, at Washington; and Sir Curtis Lampson in London.—H. W. E.

13. THE LAW PROTECTING THE SEAL-ISLANDS.

AN ACT to prevent the extermination of fur-bearing animals in Alaska.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be unlawful to kill any fur-seal upon the islands of Saint Paul and Saint George, or in the waters adjacent thereto, except during the months of June, July, September, and October, in each year; and it shall be unlawful to kill such seals at any time by the use of fire-arms, or use of other means tending to drive the seals away from said islands: *Provided*, That the natives of said islands shall have the privilege of killing such young seals as may be necessary for their own food and clothing during other months, and also such old seals as may be required for their own clothing and for the manufacture of boots for their own use, which killing shall be limited and controlled by such regulations as shall be prescribed by the Secretary of the Treasury.

SEC. 2. *And be it further enacted*, That it shall be unlawful to kill any female seal, or any seal less than one year old, at any season of the year, except as above provided; and it shall also be unlawful to kill any seal in the waters adjacent to said islands, or on the beaches, cliffs, or rocks where they haul up from the sea to remain; and any person who shall violate either of the provisions of this or the first section of this act, shall be punished on conviction thereof, for each offense, by a fine of not less than $200 nor more than $1,000, or by imprisonment not exceeding six months, or by both such fine and imprisonment, at the discretion of the court having jurisdiction and taking cognizance of the offenses; and all vessels, their tackle, apparel, and furniture, whose crew shall be found engaged in the violation of any of the provisions of this act, shall be forfeited to the United States.

SEC. 3. *And be it further enacted*, That for the period of twenty years from and after the passage of this act, the number of fur-seals which may be killed for their skins upon the island of Saint Paul is hereby limited and restricted to seventy-five thousand per annum; and the number of fur-seals which may be killed for their skins upon the island of Saint George is hereby limited and restricted to twenty-five thousand per annum: *Provided*, That the Secretary of the Treasury may restrict and limit the right of killing, if it shall become necessary for the preservation of such seals, with such proportionate reduction of the rents reserved to the Government as shall be right and proper; and if any person shall knowingly violate either of the provisions of this section, he shall, upon due conviction thereof, be punished in the same way as is provided herein for a violation of the provisions of the first and second sections of this act.

SEC. 4. *And be it further enacted*, That immediately after the passage of this act, the Secretary of the Treasury shall lease, for the rental mentioned in section 6 of this act, to proper and responsible parties, to the best advantage of the United States, having due regard to the interests of the Government, the native inhabitants, the parties heretofore engaged in the trade, and the protection of the seal-fisheries, for a term of twenty years from the 1st day of May, 1870, the right to engage in the business of taking fur-seals on the islands of Saint Paul and Saint George, and to send a vessel or vessels to said islands for the skins of such seals, giving to the lessee or lessees of said islands a lease duly executed, in duplicate, not transferable, and taking from the lessee or lessees of said islands a bond, with sufficient sureties, in a sum not less than $500,000, conditioned for the faithful observance of all the laws and requirements of Congress, and of the regulations of the Secretary of the Treasury touching the subject-matter of taking fur-seals and disposing of the same, and for the payment of all taxes and dues accruing to the United States connected therewith. And in making said lease the Secretary of the Treasury shall have due regard to the preservation of the seal-fur trade of said islands, and the comfort, maintenance, and education of the natives thereof. The said lessees shall furnish to the several masters of vessels employed by them certified copies of the lease held by them, respectively, which shall be presented to the Government revenue officer for the time being who may be in charge at the said islands, as the authority of the party for landing and taking skins.

SEC. 5. *And be it further enacted*, That at the expiration of said term of twenty years, or on surrender or forfeiture of any lease, other leases may be made in manner as aforesaid for other terms of twenty years; but no persons other than American citizens shall be permitted by lease, or otherwise, to occupy said islands, or either of them, for the purpose of taking the skins of fur-seals therefrom, nor shall any foreign vessel be engaged in taking such skins; and the Secretary of the Treasury shall vacate and declare any lease forfeited, if the same be held or operated for the use, benefit, or advantage, directly or indirectly, of any person or persons other than American citizens. Every lease shall contain a covenant on the part of the lessee that he will not keep, sell, furnish, give, or dispose of any distilled spirits or spirituous liquors on either of said islands to any of the natives thereof, such person not being a physician and furnishing the same for use as medicine; and any person who shall kill any fur-seal on either of said islands, or in the waters adjacent thereto (excepting natives as provided by this act), without authority of the lessees thereof, and any person who shall molest, disturb, or interfere with said lessees, or either of them, or their agents or employés, in the lawful prosecution of their business, under the provisions of this act, shall be deemed guilty of misdemeanor, and shall for each offense on conviction thereof, be punished in the same way and by like penalties as prescribed in the second section of this act; and all vessels, their tackle, apparel, appurtenances, and cargo, whose crews shall be found engaged in any violation of either of the provisions of this section, shall be forfeited to the United States; and if any person or company, under any lease, herein authorized, shall knowingly kill, or permit to be killed, any number of seals exceeding the number for each island in this act prescribed, such person or company shall, in addition to the penalties and forfeitures aforesaid, also forfeit the whole number of the skins of seals killed in that year, or, in case the same have been disposed of, then said person or company shall forfeit the value of the same. And it shall be the duty of any revenue officer, officially acting as such on either of said islands, to seize and destroy any distilled spirits or spirituous liquors found thereon: *Provided*, That such officer shall make detailed report of his doings to the collector of the port.

SEC. 6. *And be it further enacted*, That the annual rental to be reserved by said lease shall be not less than $50,000 dollars per annum, to be secured by deposit of United States bonds to that

amount, and in addition thereto a revenue tax or duty of $2 is hereby laid upon each fur-seal skin taken and shipped from said islands during the continuance of such lease, to be paid into the Treasury of the United States; and the Secretary of the Treasury is hereby empowered and authorized to make all needful rules and regulations for the collection and payment of the same; for the comfort, maintenance, education, and protection of the natives of said islands, and also for carrying into full effect all the provisions of this act: *Provided further*, That the Secretary of the Treasury may terminate any lease given to any person, company, or corporation, on full and satisfactory proof of the violation of any of the provisions of this act, or rules and regulations established by him: *Provided further*, That the Secretary of the Treasury is hereby authorized to deliver to the owners of the fur-seal skins now stored on the islands, on the payment of $1 for each of said skins taken and shipped away by said owners.

SEC. 7. *And be it further enacted*, That the provisions of the seventh and eighth sections of an act entitled "An act to extend the laws of the United States relating to customs, commerce, and navigation over the territory ceded to the United States by Russia, to establish a collection district therein, and for other purposes," approved July 27, 1868, shall be deemed to apply to this act; and all prosecution for offenses committed against the provisions of this act, and all other proceedings had because of the violations of the provisions of this act, and which are authorized by said act above mentioned, shall be in accordance with the provisions thereof, and all acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

SEC. 8. *And be it further enacted*, That the Congress may at any time hereafter alter, amend, or repeal this act.

Approved, July 1, 1870.

AMENDED MARCH 24, 1874.—*Be it enacted, &c.*, That the act entitled "An act to prevent the extermination of fur-bearing animals in Alaska," approved July 1, 1870, is hereby amended so as to authorize the Secretary of the Treasury, and he is hereby authorized, to designate the months in which the fur-seals may be taken for their skins on the islands of Saint Paul and Saint George, in Alaska, and in the waters adjacent thereto, and the number to be taken on or about each island respectively.

14. COMMENTS UPON THE LEGISLATION OF CONGRESS.

RATIO OF CATCH AT FIRST INCORRECTLY APPORTIONED.—The original text of the existing law for the protection of the seal-islands provides that the 100,000 seals which may be annually taken from them shall be proportioned by killing 75,000 on Saint Paul and 25,000 on Saint George. This ratio was based evidently upon the foregoing table of Veniaminov, which, if accurate, would clearly show that full one-third as many seals repaired to the smaller island as to the larger one, and until I made my surveys, 1872–1874, it was so considered by all parties interested. The fact, however, which I soon discovered, is that Saint George receives only one-eighteeth of the whole aggregate of fur-seal visitation peculiar to the Pribylov Islands, Saint Paul entertaining the other seventeen parts.

REASON FOR AMENDMENT OF 1874.—This amazing difference, in the light of prior knowledge and understanding, caused me, on returning to Washington in October, 1873, to lay the matter before the Treasury Department, and ask that the law be so modified that, in the event of abnormally warm killing seasons, a smaller number might be taken from Saint George with a corresponding increase at Saint Paul; for, unless this was done, it might become at any season a matter of great hardship to secure 25,000 killable seals on Saint George in the short period allotted by the

law of July 1, 1870. The Treasury Department, while fully concurring in my representations, seemed to doubt its power to do so; then, with its sanction, I carried the question before Congress, January, 1874, and secured from that body an amendment of the act of July 1, 1870, above quoted in full (act, &c., approved March 24, 1874), which gives the Secretary of the Treasury full discretion in the matter, and fixes the hitherto inflexible ratio of killing on each island upon a sliding scale, as it were, for adjustment from season to season, upon a more intelligent understanding of the subject; and, also, this amendatory act grants an extension of the legal limit of killing, by giving the Secretary of the Treasury the power to fix it annually.

LAW WORKS WELL.—As the law is now amended, the killing on the two islands can be sensibly adjusted each season, by the relative number of seals on the two islands, which will vary so markedly on Saint George according as it may be abnormally dry and warm when the period for driving the "holluschickie" is at hand.

SPECIAL AGENTS OF THE TREASURY DEPARTMENT.—Prior to March, 1872, the supervision of the Treasury Department over its interest, on the Pribylov Islands was directed by the detail of special agents by the Secretary, who paid them out of a contingent fund of $50,000, which Congress voted in 1868 for the "collection of customs" in Alaska; this appropriation running out, the secretary drew the following bill, which Congress adopted, and it was approved March 5, 1872:

SECTION I. *Be it enacted, &c.*, That the Secretary of the Treasury be, and he is hereby, authorized to appoint one agent and three assistant agents, who shall be charged with the management of the seal fisheries in Alaska, and the performance of such other duties as may be assigned to them by the Secretary of the Treasury; and the said agent shall receive the sum of $10 per diem; one assistant agent the sum of $8 per diem; and two assistant agents the sum of $6 each per diem while so employed; and they shall also be allowed their necessary traveling expenses in going to and returning from Alaska, such expenses not to exceed the sum of $300 in any one year.

SEC. II. *And be it further enacted*, That the Secretary of the Treasury be, and is hereby, authorized to erect a dwelling-house upon each of the islands of Saint Paul and Saint George for the use of said agents, the cost of both not exceed the sum of $6,000.

SEC. III. *And be it further enacted*, That the said agents be, and they are hereby, empowered to administer oaths in all cases relating to the service of the United States, and to take testimony in Alaska for the use of the Government in any manner concerning the public revenues.

Under this law the present force of Treasury officers is creditably maintained on the Pribylov Islands. Living there, as they do, in perfect isolation, so far from headquarters, it is necessary that, to insure the personal ability of the officers to be out on the killing grounds in the sealing season, two agents at least should be detailed upon each island, as they are; should one fall sick, then the other is on hand. The work every year of taking the seals, like the moving of the tides, cannot and will not wait for any man; it is literally "now or never!" with its conduct.

2.—THE FUR-SEAL INDUSTRY OF CAPE FLATTERY AND VICINITY.*

JAMES. G. SWAN.

1. HISTORY, PRESENT CONDITION, AND METHODS OF THE INDUSTRY.

The northern fur-seals (*Callorhinus ursinus* Gray) in their annual migration north, approach the coast between Point Grenville, Washington Territory, and the western shores of Vancouver

*According to Prof. D. S. Jordan, a few California vessels are employed in the capture of fur-seal. At San Diego he states the chase of the fur-seal is more important than the fisheries proper. They are sought for chiefly in the Guadalupe Islands. Most of them are killed by shooting, but sometimes they are dispatched with clubs. Their skins are sold in San Francisco at $4 to $6 each. The carcass is thrown away. About $10,000 worth of the skins of fur-seal from this region were sold in San Francisco in 1879

Island, British Columbia, in vast herds, and are taken by the Indians of Cape Flattery and the natives of Vancouver Island, on the ocean off the coast, and occasionally in the Strait of Fuca as far inland as the Dungeness Light.

The great body of these seals keep well out to sea, and during the present year (1880) have been reported by vessels bound in from China and the Sandwich Islands as having been seen from 100 to 300 miles off shore, covering the sea as far as the eye could reach, and looking like vast beds of kelp in the distance.

Meteorological causes seem to effect this vast collection, sometimes causing it to keep off from the shore at a great distance, with only a few scattering ones coming near enough to fall victims to the Indian's spear. At other times, and notably the present season, the great herd sways inward toward the land, following the same general movement as may be observed in a school of herring, the center of the school or herd being invariably the most numerous.

During the voyage of Captain Meares, in 1788–'89, as well as those of Portlock, Dixon, Manhand, and other early voyagers, but little mention is made of seals, as they were then of such small value that in the list of furs and skins which the captains were directed to procure no mention is made of them, the sea-otter then being the most plentiful, as it was and is at this time the most costly and beautiful of all the furs.

Black fox-skins were very valuable, as also sable, black beaver, and black martin; but river otter and seals were classed with inferior furs, which the captains were directed to purchase or not as they judged best, but to confine their work to the sea-otter.

From all the accounts given in the records of those early voyages, as well as from the traditions of the Indians, it seems that a hundred years ago the sea-otter were as numerous in this vicinity and as readily taken by the Indians as the fur-seal is at the present time. Sea-otters are but rarely taken now, and seem to have abandoned their ancient haunts on the American coast and to have migrated in a body to the northeastern shores of Asia and the islands off the Siberian coast and Japan, where they abound. Their places on the American shores are now taken by the fur-seal, which of late years seem to be steadily on the increase.

From 1857, the date of the first white settlement at Neah Bay, to 1866, but few seals were taken, they were in those years very scarce, and it is only since 1866 that they have been known to resort to the vicinity of Fuca Strait in such large numbers.

The majority of the seals killed by the Makahs, or Cape Flattery Indians, at the commencement of the season are females and yearling pups; the older males appear to keep well out to sea and are seldom taken near the shore until toward the close of the season.

The female seals killed by the Indians invariably have fœtuses in them in various stages of development, according to the month when taken.*

I procured of an Indian two fœtal seal pups on the 20th of May last, which I selected from a lot the Indian was skinning; they were far enough advanced to be skinned, although their pelts were worthless for trade. These two specimens I gave to Professor Jordan, who has them among the collection he made at Neah Bay.

The time the fur-seals make their appearance in the vicinity of Cape Flattery varies; generally they do not appear before the 1st of March, but this season the first were taken on the 18th day

* Mr. Swan thinks it possible that the seals bring forth their young in the ocean, and says that many of the sealers agree with that opinion. Mr. H. W. Elliott, however, feels certain that it would be impossible for the newborn seals to live in the ocean, and thinks that no seals at Cape Flattery are so far advanced in pregnancy as to be unable to reach the Pribylov Islands before the pups are born.—A. Howard Clark.

of January in Fuca Strait near Waadda Island at the entrance to Neah Bay. The Indians killed on that day forty-five. This is as early as I have any recollection of, although the old Indians tell me they have known them to make their appearance, but rarely, as early as the last of December. I think their appearance for an average period of ten years past would be about the 1st of March. They remain some seasons as late as July and August, but in 1880 the last catch was made about the 20th of June.

Until within a few years past the Indians have gone to sea boldly in their canoes, starting out by daybreak and returning at night. Three men usually go in a canoe at such times. Latterly they have put their canoes on board the sealing schooners which take them to the sealing grounds and lay by while the Indians went off in them and speared the seals. The canoes taken on board the schooner have but two Indians in each.

The outfit of each canoe consists of one and sometimes two spears, which are fitted in the following manner: A pole, 15 or 16 feet long, with a broad place at one end over which the fingers are clasped, and fitted with two prongs at the other end, which are inserted into the sockets of two barbed spear-heads, each attached to a stout line, either made fast to the pole near the middle or held in the hand of spearsman. A club is also provided for knocking the seal on the head after he is speared, and two buoys made of the skin of the hair-seal (*Phoca Pealii* Gill) taken off whole and blown up with the hair side in. These buoys are used either to bend on to the spear line if the animal is not easily killed, or in case of rough weather they are attached to each side of the canoe a little forward of the center, and render her steady and seaworthy.

After a strong wind and the accompanying heavy sea have subsided, the seals lie on their backs in the water and sleep. Then the Indians cautiously and quietly approach them, and selecting a victim, silently paddle near enough to thrust the spear deeply into its body, and at once withdrawing the pole, leave the barbs embedded in its flesh, sometimes killing it outright, but often only wounding it; the barbed spear-head, however, holds fast, the line is quickly hauled in, and the seal knocked on the head with the club. They smash in every seal's skull, whether it has been killed by the spear or not, and so universal is this practice that although I have repeatedly offered to pay Indians liberally for a perfect skull, I have been unable to procure a single specimen.

The Indians here never use fire-arms to kill seals. They say the report would scare them away, and they strongly object to white men using rifles on the sealing grounds.

After the day's hunting is over, the canoes which have put off from the shore return with the seals they have taken, which are then skinned by the women, either on the beach or in the lodges. The canoes belonging to the schooners take their catch on board the vessels, which at first brought them all on shore to be skinned, but this season they have been mostly skinned and salted on the schooner.

Each vessel takes as many canoes as she can carry, the number varying, according to the size of the vessel, from eight to fifteen being the average, although the largest vessels can take twenty, but very seldom exceed fifteen. The Indians pay one-third of their catch for having themselves and their canoes transported to the sealing grounds and back to Neah Bay.

These schooners have cabin accommodations for the officers and crews, and the Indians are assigned quarters in the hold among the salted skins, reeking carcasses and blubber of the seals, for the Indians wish to save the blubber to make oil and the carcasses to use for food until they are too plentiful, when they are thrown overboard, or, if skinned on shore, left on the beach for the tide to remove.

The largest of the schooners have forecastle accommodations for some of the Indians, but the most of them sleep in the hold, where the peculiar odor of the seal-skins and blubber seems to impart a healthy and invigorating influence on these savages, who appear to thrive and grow fat during the season.

The blubber taken from the seals is tried out by the women in the lodges. They cut it into small pieces, which they boil in iron pots and brass kettles. The oil, when cold, is put into various receptacles, generally into large pouches or bottles made from the paunches of seals, sea lions, or the killer (*Orca ater* Cope), which abounds in Fuca Strait. These paunches are first cleaned, then blown up full of wind, and rolled, and rubbed, and stretched, and again and again blown up till they attain their utmost tension, when they are left to dry, in which condition they retain their shape, and are serviceable in holding oil.

The cleanest and nicest oil is placed in these paunches, and is used with their food as white people use sweet oil or butter, and when fresh made is no more disagreeable than lard. Oil that gets scorched or dirty, or any surplus oil, is sold to the whites.

The quantity of seal oil produced this season can only be ascertained by estimate. I think, taking the yearlings, which yield scarcely any, and the very large ones, which yield 1½ gallons each, that the average may be set down at 1 quart to each seal, which numbered, as may be seen in the statistical tables, 6,268. These would make over 1,500 gallons, most of which is used for food.

Before the fur-seals became so plenty and the pursuit of them so profitable the Cape Flattery Indians killed many whales, using their oil for food; but the sealing business now absorbs all their energies, and, although whales are as plenty about the cape as in former years, the Indians have not killed any for some time. They do not appear to have the views of white men about engaging in different occupations at the same time, but when the season for any kind of work comes round they will devote themselves exclusively to that, leaving other things to come in their course.

In former years, before the demand for seal-skins became so great, they devoted themselves to capturing whales. Then the halibut season commenced, and after that the salmon. Now, instead of whales, it is seals, and at present (July), the sealing season being over, the whole tribe are busy with the halibut fishery, which in turn will be succeeded by the salmon.

There have been six schooners employed during the past season in the seal fishery, from Neah Bay, viz: Schooner Eudora, 73.36 tons, of San Francisco, Nelson T. Oliver, master; schooner Champion, 42.84 tons, of Port Townsend, E. H. McAlmond, master; schooner Teazer, 39 tons, of Port Townsend, James Dalgardno, master; schooner Lottie, 31 tons, of Port Townsend, John Oberg, master; schooner Letitia, 30.66 tons, of Port Townsend, John Cornish, master; schooner Mist, 16.99 tons, of Port Townsend, Albert Waite, master.

Sealing schooner Three Sisters, 65 tons, S. L. Beckwith, master, arrived from San Francisco on the 14th of April, but proceeded north without attempting to take any seals off the cape.

On the Vancouver Island side of the strait, and on the west coast of that island, an equal number of English vessels belonging to Victoria, British Columbia, have been engaged during the season in sealing, viz: Schooners Favourite, Onward, Thornton, Anna Beek, Wanderer, and Winnifred, having about the same aggregate tonnage as the American schooners.

In the report of Alexander C. Anderson, esq., inspector of fisheries for British Columbia, made to the minister of marine and fisheries, Ottawa, Canada, for 1879, the number of fur-seal skins taken on the coast of British Columbia during that season was 12,500, which averaged $8 each, making a total value of $100,000. The price of fur-seal skins having advanced, is estimated by the trader at this place at an average of $9 each for this season's catch.

The number of fur-seal skins taken by the Indians belonging to the Makah Indian Reservation, Cape Flattery, were reported to me as follows:

Total catch reported by the schooners		4,710
Total number purchased by the traders, independent of vessels		1,558
Total catch of 1880 reported at Neah Bay		6,268
The catch of British Columbia was probably larger than that of last year, but I will assume the number reported by Mr. Anderson as the basis of this year's estimate, say	12,500	
To this should be added the catch of English schooner Favourite, wrecked off Barclay Sound, British Columbia, and skins totally lost, reported amount	382	
Total number of skins taken on west coast of British Columbia		12,882
Total number taken this season		19,150
Total value at $9 each		$172,350

I am of the opinion that this amount is under the true estimate, as the catch on the American side of the strait, being greatly in excess of last year, it is but reasonable to infer that a corresponding increase has been made on the English side, and if the exact number could be ascertained at this time, I do not hesitate to give it as my opinion that twenty thousand seals have been killed during the season of 1880, ending with the 30th day of June.

Of the catch on the American side, that portion taken by Indians who went on the schooners, 4,710 skins, one-third were given by the Indians to the vessels to pay for transporting them and their canoes to the sealing-ground, amounting to 1,570 skins. The remainder, 3,140, added to the amount sold by the Indians to traders independent of the schooners, 1,558 skins, makes a total of 4,698 skins, for which they received from the traders, in cash and trade, an average of $9 per skin, equal to $42,282. This sum, divided among two hundred and thirty-two Indians, the whole number who were engaged in sealing during the season, gives a little over $182 to each Indian for his six months' work.

The total value of the fur-seal catch of 6,268 skins, reported at Neah Bay as taken by the Indians of the Makah Reservation, at $9 each, is $56,412.

This shows the value and importance of one of the interests of Washington Territory of which hitherto but little has been known, it being evidently for the pecuniary advantage of the very few persons who have engaged in it to keep the public in the dark as much as possible regarding its extent and value. This season, however, has shown an increase of the vessels employed, and it is more than probable that the number will be increased another season. The unprecedented number of seals which made their appearance, a number which seems to have steadily increased each season since 1866, will give employment to a larger fleet of vessels another year. One of the captains remarked to me, "If a hundred schooners could have obtained crews of Indians, there were more than enough seals to have satisfied them all."

This is a business which cannot be monopolized by one individual or one company any more than the codfish or whaling business can be monopolized. It is a fishery or pursuit upon the open ocean and on the high seas, free and open to all; but whether the assembling of a large fleet of vessels at Neah Bay, which is the only harbor of refuge to which they can repair, would be attended with any peculiar benefit to the Indians of a Government reservation, whose policy has always been to prohibit free intercourse of the whites and Indians in Indian country, and to prevent, under heavy penalties, the assembling of white persons on or near Indian reservations, either for purposes of settlement or trade, or whether such a collection of vessels with the confusion and irregularities incident to every fishing village would not be looked upon by the Government as a

positive injury to the welfare of the Indians, making it desirable to remove them altogether from Neah Bay to some other place on the coast south of Cape Flattery, are grave problems which the Government will, at no distant day, be called upon to solve.

The proximity of Neah Bay to the waters covered each season with innumerable swarms of fur-seals, its nearness to the banks where annually thousands of tons of halibut are taken by the Indians of Cape Flattery and the west coast of Vancouver's Island, the fact that it is 700 miles nearer the codfish banks of the North Pacific than San Francisco, and that it is the only safe harbor of refuge at the entrance to Fuca Strait, are commercial questions of great and increasing value. The near advent of commercial activity on Puget Sound will call the attention of capitalists to their importance, and show to the commercial world the necessity of utilizing the many advantages Neah Bay possesses, and eventuate in building up a thriving village of whites instead of the unsightly Indian wigwams of the present.

It is a well-ascertained fact that the seals come from the south, approaching the coast in the vicinity of Point Grenville and Destruction Island, then in the vicinity of Quilleute and Flattery Rocks, and later in the season along the west coast of Vancouver Island.

At the commencement of the sealing season all the sealing vessels, both American and English, cruise between Cape Flattery and Point Grenville, and as the great herd slowly moves northward the English vessels keep within their own waters, and are followed by our own vessels, which find the harbors of Barclay Sound and Clyoquot convenient places to run for shelter, just as the English schooners at the commencement of the season will visit Neah Bay as a harbor of refuge.

The general belief is that these seals go directly north after leaving the vicinity of Cape Flattery, and some of the English schooners follow them to the region about Queen Charlotte Islands and the southern coast of Alaska. This is undoubtedly true of a large portion of the herd or herds, for they do not appear to be in one body, but rather like the salmon in separate schools, although their time of appearance is the same. But the observations of some of the sealing captains this season lead them to the conclusion that the fur-seal seen off Cape Flattery do not go to Bering Sea at all, but "haul out," as it is termed, on some undiscovered island in the North Pacific or go direct to the Japanese or Siberian coasts.

Capt. E. H. McAlmond, of schooner Champion, and Capt. N. T. Oliver, of schooner Eudora, two of the largest vessels in the fleet, which proceeded farther out to sea than either of the others, both told me that the last of the season the seals appeared to be "striking off due west."

In a conversation I had in February last with Capt. William Spring, of schooner Favourite, and Capt. Hugh McKay, of schooner Onward, both vessels belonging to Victoria, British Columbia, which had put in here for a harbor, I found they held the same opinion, that the seals "hauled out on some undiscovered islands in the North Pacific and did not all go into Bering Sea." These two gentlemen, with whom I have been personally acquainted for nearly twenty years, are among the oldest and most experienced men in the seal and sea-otter business.

2. STATISTICS FOR 1880.

The following statements show the condition of the fur-seal fishery of Cape Flattery and vicinity as reported at Neah Bay, Clallam County, Washington Territory, for the season ending June 30, 1880:

(*a*) *The sealing fleet.*

Name of vessel.	Tons.	Master.	Where from.	Owner or employer.	White persons employed.	Average number of canoes carried.	Number of Indians in each canoe.	Average number of Indians each trip.	Season commenced.	Season ended.	Skins taken.	Value, averaged at $9 per skin	How preserved.
Champion	42.84	E. H. McAlmond	Port Townsend	W. Gallick	3	15	2	30	Feb. 6	June 30	1,562	$14,058	Skins salted
Eudora	73.36	N. T. Oliver	San Francisco	H. Leibes	4	15	2	30	Feb. 24	June 24	1,439	12,951	Do.
Lottie	31.00	John Oberg	Port Townsend	W. Gallick	3	10	2	20	Feb. 6	July 1	655	5,895	Do.
Letitia	30.66	John Cornish	do	Master	3	11	2	22	Mar. 16	June 25	516	4,644	Do.
Teazer	39.00	James Dalgardus	do	L. Baxter	3	12	2	24	Mar. 16	June 29	348	3,132	Do.
Mist	16.77	Albert Waite	do	Master	3	8	2	16	Apr. 3	June 19	190	1,710	Do.
	233.83				19	71	....	142			4,710	42,390	

(*b*) *The trips made by the sealing vessels.*

Schooner Champion.		Schooner Eudora.		Schooner Lottie.		Schooner Letitia.		Schooner Teazer.		Schooner Mist.	
	Seals.		*Seals.*		*Seals.*		*Seals.*		*Seals.*		*Seals.*
Feb. 6	116	Feb. 24	210	Feb. 6	55	Mar. 16	51	Mar. 16	16	Apr. 30	88
Feb. 10	31	Mar. 1	35	Feb. 10	36	Apr. 3	31	Mar. 22	8	Apr. 18	1
Feb. 24	128	Mar. 10	47	Feb. 24	98	Apr. 16	50	Apr. 16	38	Apr. 29	55
Mar. 1	86	Mar. 16	160	Feb. 29	15	Apr. 30	120	May 1	25	May 13	17
Mar. 16	116	Apr. 3	102	Mar. 1	60	May 18	183	May 16	153	May 20	12
Mar. 21	77	Apr. 16	119	Mar. 21	10	May 29	1	May 28	41	June 1	17
Apr. 3	59	Apr. 18	7	Apr. 3	12	June 1	40	June 10	67	6 trips	190
Apr. 16	113	May 1	220	Apr. 16	108	June 16	40	7 trips	348		
Apr. 26	131	May 19	312	Apr. 18	3	8 trips	516				
May 2	170	May 28	70	Apr. 29	51						
May 13	69	June 1	106	May 13	39						
May 19	121	June 5	13	May 20	121						
June 1	298	June 21	38	May 29	32						
June 9	47	13 trips	1,439	June 23	7						
14 trips	1,562			June 30	8						
				15 trips	655						

(*c*) *The number of skins procured by traders from Indians who went in their canoes independent of the schooners.*

Name of trading post.	Number of skins.	Number of canoes.	Number of Indians.
Neah Bay Village	747	..	..
Hosell Village	180	*10	30
Quillente Village	602	*20	60
Skins taken up-sound for sale	29	..	..
	1,558	30	90

* Three Indians each.

SUMMARY.

Number of vessels employed		6
Amount of tonnage		233.83
Number of whites on vessels	19	
Number of Indians on vessels	142	
Number of Indians from trading posts	90	
Number of Indians	232	
Total number of persons employed in catch		251
Number of seal-skins received by the schooners		4,710
Number of seal-skins received at trading posts		1,558
Total number of seal-skins taken during the season		6,268
Average value of skins as estimated by the trader at Neah Bay, $9 each, making the value of the season's catch, as estimated		$56,412

Of the amount of skins received by the vessels (4,710) one-third was given by the Indians to the schooners which conveyed them and their canoes to the sealing ground, amounting to 1,570 skins. The remainder, say 3,140 skins, belonging to the Indians, added to the number sold to the traders independent of the catch of the schooners, *i. e.*, 1,558 skins, makes 4,698 which the Indians sold to the traders for cash and trade. At an average of $9 per skin, these netted the handsome amount of $42,282, which, divided among 232 Indians who were engaged in the business, gives a little over $182 each for the season's work.

The success of the vessels engaged the past season will induce many others to embark in the business another season, and already preparations are making to secure vessels of a better class for the next season's work, which will commence late in December or early in January, 1881. The first seals taken this season were killed by Indians on the 18th day of January, 1880; during that month sixty-nine seals were taken. The schooners did not commence until February.

3.—THE ANTARCTIC FUR-SEAL AND SEA-ELEPHANT INDUSTRY.

By A. Howard Clark.

1. ORIGIN AND DEVELOPMENT OF THE ANTARCTIC SEAL FISHERIES.

The extent of the fishery in the last century.—American vessels first crossed the equator in search of whales about the year 1774. A few years later they cruised along the South American coast as far as Patagonia and in the vicinity of the Tristan and Falkland Islands. At both of these islands fur and hair seals and sea-elephants were then very numerous. The whalers occasionally killed some seals and brought home seal oil as part of their cargoes. Soon after the Revolutionary war a Boston lady named Haley was led to bear the expense of fitting out the ship States for a voyage to the Falklands for hair-seal skins and sea-elephant oil. This was the first vessel, so far as known, that ever sailed from an American port especially equipped for engaging in the seal fishery, and originated an industry that for thirty or forty years was of much importance to the New England fishing ports.

From the manuscript diary of Eben Townsend, supercargo of the ship Neptune, that made a very profitable fur-sealing voyage from 1797 to 1799, we gather some valuable information concerning the commencement of this seal fishery. The diary begins by narrating the particulars of the voyage from the date of leaving New York until arriving at the Falkland Islands, where they began the fur-seal hunt. They anchored in States Harbor, which Mr. Townsend says "derived its name from a ship of that name which lay here two years to obtain sea-elephant oil and hair-seal skins. She was a very large ship, towards 1,000 tons, from Boston, fitted from there soon after the Revolutionary war, and the first ship that we know of that took any fur-seal skins. She was owned by Lady Haley, living in Boston. They took about 13,000 fur-seal skins as an experiment, which were sold in New York at about half a dollar each, their value not being known, and were thought by some to be sea-otter skins. They were afterwards taken to Calcutta and sold there as sea-otters. From Calcutta they were taken to Canton by Captain Metcalf, from New York, who started from the United States about the same time that Captain Kendricks sailed from Boston. In Canton these skins were sold at about $5 each. Captain Metcalf carried out the first seal-skins; and he with Kendricks, from Boston, were the first adventurers from the United States to the northwest coast of America after sea-otter skins. Kendricks was killed in receiv-

ing a salute from another vessel, one of the guns being accidentally loaded with shot. This happened at Wahoo, one of the Sandwich Islands. Metcalf was killed on the northwest coast. Both of these men made several successful voyages from Canton to the coast, but the vessel owners were never benefited. They spent it as they went along. Neither was well calculated for such an enterprise. They were top-heavy with success.

"In the year 1790 Elijah Austin, a very enterprising merchant of New Haven, Conn., fitted out two vessels on a sealing voyage to the Falkland Islands, in consequence of the information derived from Lady Haley's ship. These were the first vessels that undertook the fur-seal skin voyages for the China market. One was commanded by Capt. Daniel Green, the other by Capt. Roswell Woodward, both men of uncommon enterprise. They were successful. They obtained part of their skins at South Georgia. Captain Green only proceeded to Canton; Captain Woodward returned to America. On this voyage Captain Green circumnavigated the globe, and was absent three years."*

Besides the New Haven vessels mentioned by Mr. Townsend there were other vessels sent out on fur-sealing voyages in 1790. Among these was one from Nantucket that cruised on the coast of Africa; another was the ship Industry, Captain Patten, of Philadelphia. Captain Patten with part of his crew, remained on one of the Tristan Islands from August, 1790, to April, 1791, for the purpose of collecting fur-seal skins. During this time he obtained fifty-six hundred for the Chinese market.

The fishery rapidly grew, and it was not long before a dozen or more vessels were engaged in carrying fur-seal skins to Canton from Falkland, South Georgia, Mas á-Fuera, and other islands where seals were very abundant. In 1792 a full cargo of these skins was obtained at the Falkland Islands by the brig Betsey, of 100 tons, commanded by Captain Steele. In 1792 or 1793 the ship Eliza, Capt. W. R. Stewart, secured a cargo of fur-seal skins at Mas-á-Fuera, and is reported by Captain Delano to have been the first vessel to take a cargo of skins to Canton from that island. From that date till about 1806 fur-seals were taken from Mas-á Fuera by the millions. One of the most successful voyages ever made in this business was that of the ship Neptune, previously mentioned, and the particulars of which are given on a subsequent page. The voyage was to the Falklands, and thence around Cape Horn to Mas-á-Fuera and China, where the skins were exchanged for Chinese products that yielded over $260,000 in the New York market. Another very profitable voyage was that of the brig Betsey, from 1797 to 1799, under Capt. Edmund Fanning, of Stonington. The Betsey's cargo, of one hundred thousand fur-seal skins, obtained principally at Mas-á-Fuera, was exchanged at Canton for goods that yielded a net profit of $52,300 to the owners in New York. Many other very successful voyages were made, and the fur-seal business was generally very prosperous for several years.

THE FISHERIES FROM 1800 TO 1881.—In the report of a congressional committee, communicated to the Congress of the United States March 12, 1804, to whom had been referred a memorial from citizens of New York and Hudson, in the State of New York, praying for alterations in the navigation laws, we find references as follows to the state of the seal fisheries of the country at that date: "The sea-elephant, like the seal, is understood to be amphibious. They are found at many of the uninhabited islands of the great Southern Ocean, in particular at Kerguelen Land, which, at certain seasons, they frequent in great numbers, and, as they make little resistance, are easily taken by the fishermen. Several American vessels are stated to have been engaged in this business, and the oil, being of an excellent quality, furnishes a valuable article of exportation from this country to Europe.

* Manuscript diary of Eben Townsend, lent to the author of this report by Mr. Charles Peterson, of New Haven, Conn.

"The American vessels employed in the [fur] seal voyages usually pass round Cape Horn, and visit the islands of Juan Fernandez and Mas-á-Fuera, at the last of which the seal are said most to abound. A few seal are also taken at the Falkland Islands, at Tris'an d'Acunha, at Saint Paul's, and Amsterdam; but of late years they have been found to have almost entirely abandoned these islands; and even at Mas-á-Fuera and the islands in its vicinity they are no longer to be found in that abundance they were met with when these voyages were first undertaken. For the last ten or twelve years, however, there have been many American vessels engaged in this business. In 1800 and 1801 not less than ten vessels, principally from New York, Connecticut, and Massachusetts, were thus employed. Some of the ships are represented to have been very successful in their voyages, and to have carried sixty thousand, and, in some instances, as far as one hundred thousand, seal-skins to the Canton market. The oil of the seal (though it is said to be equal to whale oil, and it would command a great price if brought to the United States) is not usually saved, as it will not sell at Canton, or, at least, would not afford a profitable sale. The skins, however (but few of which are brought to the United States, unless where a ship fails in her voyage, and is thence induced to return home), are sold at Canton, and the proceeds invested in teas, silks, nankeens, &c., which are brought to the United States, where they pay a higher or lower duty, according as they are imported in bona fide American vessels or those of a different description."*

After the extermination of the fur-seals at Mas-á-Fuera and other islands on the west coast of South America, vessels cruised throughout the southern seas in search of new grounds. Many large cargoes were obtained at South Georgia, at the Aucklands, Crozets, Border's Island, and other places. In 1819 the great rookeries at South Shetlands were discovered, and during the next three years there was an indiscriminate slaughter of the animals there.

From 1825 to 1845 a few vessels made good fur-seal voyages, but the attention of sealers was more especially given to the capture of sea-elephants, and these animals continued to be the chief object of sealing voyages until the year 1871, when the merchants of New London sent a fleet of three schooners to the South Shetlands for fur-seal. These vessels returned in 1872 with about eight thousand skins of the choicest and richest quality. Their success led to the fitting out of another fleet, and the next season eight vessels secured 15,000 skins. In 1874 six vessels arrived home with 10,000 skins. A very successful voyage was made to the Cape Horn region by Captain Athearn in the schooner Florence. He arrived home in 1876, having secured skins valued at over $100,000. From 1870 to 1880 the sealing fleet brought home 92,756 fur-seal skins, nearly all of them from the South Shetlands and the vicinity of Cape Horn and Terra del Fuego.

The sea-elephant hunting was prosperous from 1840 to 1870, but since the latter date it has decreased in importance. The quantity of sea-elephant oil brought home between 1850 and 1860 was 1,976,751 gallons; from 1860 to 1870, 1,536,664 gallons, and from 1870 to 1880, 1,071,472 gallons. In the season of 1880 the fleet engaged in the capture of fur seals and sea-elephants comprised one bark, one brig, and eight schooners, aggregating 1,277 tons. Three of these were owned at Stonington, Conn., six at New London, Conn., and one at New Bedford, Mass. During the season of 1881 the fleet secured 4,170 fur-seal skins and 1,320 barrels of oil, and during 1882, 5,100 skins, but no oil.

* American State Papers, vol. i, p. 574.

2. THE SEALING GROUNDS.

GENERAL DISTRIBUTION OF SEALS IN SOUTHERN OCEANS.

The Southern fur seal (*Arctocephalus australis*), which is hunted for its valuable skin, is found in but few localities in Antarctic waters or south of the equator. The principal grounds now visited by the sealing fleet are the lonely outlying rocks in the vicinity of Cape Horn. At the South Shetlands, a desolate group of islands south of Cape Horn, these animals were very abundant sixty years ago, and during the years from 1871 to 1876, some good cargoes of very superior skins were secured there, but since the latter date the number of fur seals killed at these islands has been very small. The other sealing grounds are at Kerguelen Land and Heard's Island, in the Southern Indian Ocean. But at these islands very few seals are now annually taken. At the mouth of the River Plate in South America is Lobos Island, where a few thousand fur seals annually congregate. This small rookery is protected by the Government of the Argentine Republic, which allows only a limited number of seals to be captured each year.

It is possible that on some undiscovered islands in the far south there may still be a considerable abundance of these animals. The adventurous sealers of New England occasionally go in search of new islands or revisit those where fur seals were once so plenty.

The sea-elephant, or elephant seal (*Macrorhinus leoninus*), yields an oil little inferior to sperm oil. It is found in abundance only in southern oceans, and generally in about the same localities as the fur seal. The place of its greatest abundance is at Heard's Island, in the Southern Indian Ocean, a small desolate pile of rocks and ice about 15 or 20 miles in extent. This place has from year to year been visited by the hardy sealers, who have, however, been poorly paid for their toil, since even here, where once the seal were found by thousands, they can now be taken in but small numbers, and these only on almost inaccessible beaches. At the island of South Georgia, in the Southern Atlantic, two or three vessels during the past ten years have secured fair cargoes of sea-elephant oil. One vessel, the Trinity, made some very successful voyages to South Georgia a few years ago, and then, in the hope of securing greater profit, made a voyage to Heard's Island, and was lost there in 1880, her crew being rescued from their lonely island home by a United States vessel sent to their relief.

At the beginning of the present century the fur seal was in great abundance on nearly all the islands off the west coast of South America, from Cape Horn to the equator, and was taken in great numbers from the islands of Juan Fernandez and Mas-á-Fuera, from St. Felix and St. Ambrose Islands, the Gallipagos and numerous other islands off that coast. It was captured also in 1820 to 1825 at the South Shetlands in great quantities. The islands of the Falkland Group, the South Georgia Islands, the Sandwich Group, and other places south and east of South America, were annually visited by fleets of vessels. Off the west coast of Africa they were taken as late as 1835 to 1840, when they became almost extinct. At Desolation or Kerguelen Land, at the Aucklands, the Antipodes, the Crozet Group, and everywhere on islands in those cold waters, the fur-seal was found and captured; but so eager were the sealers for gain that no regard was paid to the danger of exterminating the animals by an indiscriminate slaughter of young and old seals, so that it was but a comparatively short time before once famous sealing grounds could no longer be visited with profit to the hunter.

Almost the same story might be told in regard to sea-elephants, for wherever they were found they were slaughtered. This animal is still far more abundant than the fur-seal in southern seas, but is nowhere found in such great herds as were once seen on the Falkland and other islands. Thousands of barrels of elephant oil were taken fifty years ago by American and English vessels

and those belonging to other nationalities, especially at Desolation and the Falklands. These animals abounded on all the islands frequented by the fur-seal. They were specially numerous at Desolation or Kerguelen Land until 1850 or 1860. At Heard's Island, south of Desolation, they were found in great numbers when that island was first "worked" in 1854, and that place is still their principal hauling ground. From the Tristan Islands, South Georgia, South Shetlands, and the vicinity of Cape Horn; from the islands of Ichaboe and Mercury, and other places on the southwest coast of Africa; from the Crozet and Prince Edward Islands and numerous other islands in the Southern Atlantic and Southern Indian Oceans, large cargoes of sea-elephant oil were taken in the early history of this industry.

CAPE HORN REGION.

At the southern extremity of South America, south and southeast of the Straits of Magellan, is a large group of islands, known as Terra del Fuego, or "land of fire." The name was wisely given, for the entire group is of volcanic origin, and more desolate islands could hardly be found. The group extends north and south about 200 miles, and east and west some 380 miles. At its eastern extremity are the Straits of Le Maire and the western limit is Staten Island. South of the main cluster of Terra del Fuego are numerous small islands or rocks, and the most southern is known as Horn Island, whose southern extremity is the famous Cape Horn.

The few inhabitants of the larger islands of the Terra del Fuego Group are half-starved miserable beings who live on fish and seal's flesh. Captain Delano says that they eat the seals raw and nearly rotten. There are some good harbors among the islands, where the sealing vessels lie at anchor while the crews are ashore in search of their prey. The islands of Diego Ramirez form a small group some 50 miles southwest of Cape Horn, and extending for about 4 or 5 miles northwest and southeast. There are three principal islands and numerous rocks above water. Nowhere is there any vegetation, nothing but barren rocks upon which the fur-seals love to climb.

The dangers of sealing among the islands about Terra del Fuego are very great, and many vessels have been lost there in the history of the business. Only five or six years ago the schooner Charles Shearer, of Stonington, left a crew of sealers on Diego Ramirez and proceeded farther in search of new rookeries. The vessel never returned, but the crew were rescued by a passing merchant vessel bound to San Francisco. After the departure of their vessel from the island the crew secured several hundred skins that were left there and afterwards brought to Stonington by a vessel sent out after them. The owners of the Shearer supposed that their vessel had gone to South Shetlands, and the United States Government sent a vessel there in hopes of rescuing any men that might be left in those desolate isles, but no traces of vessel or men could be found.

Capt. George F. Athearn writes from West Tisbury, Mass., under date of April 11. 1881, concerning the danger of sealing in the Cape Horn region, as follows:

"The dangers of the sealing business are many. The southwest coast of Terra del Fuego and islands of Cape Horn are exposed to almost endless gales of wind, accompanied with thick rain, snow, or hail. The days of good weather are few. These westerly gales bring in a heavy swell on all this coast and Western Patagonia. This coast is composed of hundreds of islands, growing smaller and more barren as they approach the sea-coast, the whole line of which is fronted by outlying rocks and blind breakers. It is on these outlying rocks that the seal are found. The constantly prevailing swell may and does for months prevent boats from landing, and when it is possible to land it is done with great difficulty and danger. But the greatest danger is in approaching these outlying rocks from the outer belt of islands. In daylight and clear weather there is not much danger,

as with a good lookout at the masthead any rock that would take a vessel up would be seen; but to be caught by a sudden squall, terminating in a gale, and night coming on, while returning from the outer rocks, the navigation is as bad as it can well be. In the winter, in thick, blowing weather, the nights are eighteen hours long. During the forty months that I was constantly working that coast in the schooner Florence, a time extending over three winters and four summers, I of course passed through many bad times and tight places, and how I got clear I can't tell, and I don't think any one else can tell, even those who are in the business, but I got through it without any injury to the vessel or the loss of a man; still, other vessels have not been so fortunate, most all have lost more or less men. The report came a few days ago of two sealing vessels that had lost men this past season. I sailed in the Eliza Jane from New Bedford, October 24, 1861, and after some rather rough experience in the vicinity of Cape Horn, in the months of May and June, having lost an anchor and got out of several bad scrapes, I came up the east coast of Patagonia, and lost her on the 5th of August, 1862, 60 miles up the Gulf, west of Rio Negro, in a heavy gale from the south. We all suffered greatly for want of water before arriving at the river, which passage we made on foot without the loss of a man."

THE SOUTH SHETLAND ISLANDS.

The South Shetlands, or, as sometimes called, New South Shetlands, is an archipelago in the South Atlantic Ocean, about 300 miles south of Cape Horn, included between latitude 60° 32′ to 67° 15′ south, and longitude 44° 53′ to 68° 15′ west. There is no vegetation except a species of moss. The principal islands of the group are Adelaide, Bridgeman, Smith, Saddle, Coronation, Livingston, King George, and Elephant.

Capt. Edmund Fanning, of Stonington, who visited the South Shetlands more than fifty years ago, describes the group as "a chain of rough, rocky, and mountainous islands whose valleys or chasms are partially filled with everlasting ice, and during the greatest part of the year they are covered with snow. The chain consists of upwards of fifty islands, stretching in a southwest and northeast direction. The navigation among the group is dangerous on account of many sunken reefs. The weather is similar to that of South Georgia. There is very little earth or vegetation, except the winter moss, and not a tree or shrub to be found. Deception Island, the most southerly, is a curious phenomenon of nature, and is beyond doubt of volcanic origin. In form it is a mountain ridge, making the interior round the bay in appearance an immense bowl, while in the east side, as it were, is a piece broken out; this forms an opening or passage by which vessels enter the bay. At the northeast inner bay side is the harbor called Yankee Harbor, near to which, along the shore, is a stream of hot or boiling water; this keeps the water of the bay, for a little distance round, quite warm, and is much resorted to by disabled and wounded penguins, who appear fond of and anxious to remain in it. By scraping down a few inches into the sand of the beach, a few yards distant from the boiling fount, the heat is so great as to render it impossible to hold the hand in any length of time, notwithstanding very near by, in the cavity of the mountain, is an iceberg of solid flint ice several hundred feet in height."*

Sealing on the South Shetland Islands began in 1819, when the brig Hersilia, of Stonington, Conn., and an English vessel from Buenos Ayres visited the islands and obtained cargoes of very rich fur-seal skins. In the year 1818 Captain Smith, in the English brig William, bound from Montevideo to Valparaiso, discovered,† on the 15th of October, in latitude 62° 30′ south, and longitude 60° west, a new land where were fur-seal in abundance.

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*Fanning's Voyages, New York, 1833, pp. 433, 434.

†The islands were first discovered about the year 1600 by Captain Gherritz, a Dutch navigator.

In his journal Captain Smith thus mentions the discovery: "After taking our departure from Montevideo, nothing material occurred until I got into the latitude of Cape Horn, with a fair wind to go to the westward, and steering S.SE. with the intention to make the island again, and continuing this course for a few days, I, to my great satisfaction, discovered land on the 15th of October, at 6 p. m., in latitude 62° 30′ south, and longitude 60° west. Arrived at Valparaiso 24th of November, after a passage of sixty days from Montevideo."*

In 1819, according to Captain Davidson, of Stonington, a brig was fitted at Buenos Ayres for sealing in the new land. At this season the brig Hersilia, of Stonington, was cruising about in search of seals, and had left Capt. Nath. Palmer and others of her crew at the Falklands while the vessels went on a short trip about Cape Horn, to return to the Falklands for those left behind.

In the mean time the Buenos Ayres brig put into the Falklands, and Captain Palmer, always on the watch for information about new sealing grounds, was not slow in obtaining from the mate of the brig definite knowledge of a new land where fur-seals could be captured by the thousands. The brig went on her course, and Captain Palmer waited impatiently for the Hersilia, which at last made her appearance, and very quickly prepared for the four days' sail to South Shetlands. It so happened that they arrived at the new land at a time when the entire crew of the Buenos Ayres brig were busy in the hold salting and stowing seal-skins. The newcomers were nevertheless welcomed, and at once went to work to secure a share from the immense number of fur-seal on the shores. It was now February, 1820, the season far advanced, and the Hersilia's supply of salt was limited, so that only about eleven thousand of the choicest and richest skins could safely be taken, though with her crew of twenty-four men fifty thousand skins might have been secured in a short time.

As they were anxious to report the discovery at Stonington, the Hersilia hastened home, and from the sale of her cargo realized a large profit to her owners, though the skins were at this time valued at only about $2 each. At Stonington there was now great activity among vessel owners in preparation for the next season, and a fleet of nine sail was soon ready at this port, besides as many more from other ports. The names of the vessels as remembered by Captain Davidson, who was on the schooner Express, were the following:

Brigs Frederick, Hersilia, Catherine, Emmeline, and Clothier;† schooners Express and Free Gift, with sloops Hero and Essex as tenders to the fleet, all hailing from Stonington. From Nantucket there was the schooner Huntress; New Haven sent the ship Huron; the brigs Charity and Henry and schooners Wasp and Aurora sailed from New York, while Boston and Salem sent the ship General Knox, the schooner Esther O'Kane, and one other vessel. This fleet of eighteen vessels arrived at the South Shetlands late in the autumn of 1820. Besides the American fleet there arrived ten English and two Russian sealing vessels, making a total fleet of 30 sealers, each anxious to secure a large cargo. As at South Georgia, so here, there was an indiscriminate slaughter of the animals, and in a few weeks upwards of 250,000 skins were salted, of which number the American fleet secured 150,000, while thousands of seals were killed and lost. As a consequence, when vessels visited the same locality the next season not over 5,000 good skins were taken.

Weddell, in 1825, gives the following account of the South Shetland seal fishery: "The quantity of [fur] seals taken off these islands, by vessels from different parts, during the years 1821 and 1822 may be computed at 320,000, and the quantity of sea-elephant oil at 940 tons. This valuable animal, the fur-seal, might, by a law similar to that which restrains

* Weddell's Voyages, p. 130.

† The Clothier was wrecked on the Shetlands, and her "bones," says Captain Davidson, are still "bleaching on the rocks."

fishermen in the size of the mesh of their nets, have been spared to render annually 100,000 fur-seals for many years to come. This would have followed from not killing the mothers till the young were able to take the water; and even then, only those which appeared to be old, together with a proportion of the males, thereby diminishing their total number, but in slow progression. This system is practiced at the island of Lobos, mouth of river Plate, whence from 5,000 to 6,000 skins are annually taken under the direction of the Argentine Government. The system of extermination was practiced, however, at the South Shetlands; for whenever a seal reached the beach, of whatever denomination, he was immediately killed and his skin taken, and by this means at the end of the second year the animals became nearly extinct; the young, having lost their mothers when only three or four days old, of course died, which at the lowest calculation exceeded 100,000."*

While in search of new sealing grounds American vessels have cruised over many miles in the Antarctic seas. During the season of 1820–'21, when thirty vessels were at the South Shetlands, one of the more venturesome of the sealers hoped to discover other fur-seal rookeries still farther south. Captain Pendleton had reported that from an elevated station at South Shetlands he had on a clear day seen land to the southward. Accordingly Capt. N. B. Palmer was sent out from the Shetlands in the sloop Hero, of about 40 tons, to explore the new land. He found it very sterile and desolate, and covered with ice and snow. Plenty of sea-leopards were there, but no fur-seal. While returning to the Shetlands the Hero was becalmed in a fog. As the fog began to lift, what was the surprise of Captain Palmer to find his vessel between a frigate and a sloop of war. These strange vessels proved to be two Russian ships on an exploring expedition. The commodore of the ships supposed himself to be the discoverer of the lands to the south, and was greatly surprised to see such a little Yankee vessel in such a remote quarter of the globe. So forcibly was the commodore struck with the circumstances of the case that he named the coast Palmer's Land, in honor of Captain Palmer.

MAS-Á-FUERA, JUAN FERNANDEZ, AND OTHER ISLANDS ON WEST COAST OF SOUTH AMERICA.

Another very important sealing ground visited by both the English and Americans in the early history of this fishery was the island of Mas-á-Fuera, on the coast of Chili, from which place, between the years 1793 and 1807, upwards of 3,500,000 fur-seal skins were obtained, and most of them taken to China. The first American vessel to take a cargo from this island to China was the ship Eliza, of New York, Captain Stewart, which arrived at Canton in March, 1793, with 38,000 skins, that sold for $16,000. In 1798 Captain Fanning took 100,000 skins to China, partly from the same place, in the ship Betsey, of New York, and he estimated that there was still remaining on the island after his departure between 500,000 and 700,000 seals. He estimates that about a million of seal-skins were subsequently taken to Canton from this island. Captain Morrell states that in 1807 "the business was scarcely worth following at Mas-á-Fuera, and in 1824 the island, like its neighbor, Juan Fernandez, was almost entirely abandoned by these animals." †

Delano, in his "Voyages," written in 1817, says: "When the Americans came to Mas-á-Fuera about the year 1797, and began to make a business of killing seals, there is no doubt but there were two or three millions of them on the island. I have made an estimate of more than three millions that have been carried to Canton from thence in the space of seven years. I have carried more than one hundred thousand myself, and have been at the place when there were the people of fourteen ships or vessels on the island at one time, killing seals." ‡

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* Weddell's Voyage's pp. 141-142.

† Morrell's Voyages, New York, 1832, p. 130.

‡ AMASA DELANO: Narrative of Voyages and Travels; Boston, 1817; p. 306.

Concerning the voyage of the ship Eliza to China with skins from Mas-á-Fuera, Captain Delano says:

"The first ship that came to Mas-á-Fuera for the purpose of procuring seals for the Chinese market was the Eliza, Capt. William R. Stewart, which I took command of on her arrival at Canton, in the year 1793. She had been a long time on her voyage. Captain Palmer, who started from the United States with her, had left her previous to her arrival in China. Captain Stewart wished to find a market for his skins, and after I became acquainted with him we concluded to go to Canton together, leaving his ship in the harbor of Larksbay. I had come to Macao for the purpose of getting a passage home to America, and thought the Eliza would afford me one opportunely. It was in March when we were in Canton. * * * The price of seal-skins was very low at this time, and Stewart was not able to raise funds enough to load his ship on his own account, although she was small. He therefore took a freight of sugar for Ostend, in Flanders. * * * Having agreed for a freight, Captain Stewart ordered his ship to Canton. He sold his cargo of seal-skins, 38,000, for only $16,000, so reduced was the price of this article."

Concerning the abundance of fur-seals on the island of Juan Fernandez in 1683, Dampier thus writes in his work, entitled "A New Voyage Round the World," published in 1703: "Seals swarm as thick about this Island of John Fernando as if they had no other place in the World to live in; for there is not a Bay nor Rock that one can get ashoar on, but is full of them. * * * These at John Fernando's have fine thick short Furr; the like I have not taken notice of any where but in these Seas. Here are always thousands, I might say possibly millions of them, either sitting on the Bays, or going and coming in the Sea round the Island, which is covered with them (as they lie at the top of the Water playing and sunning themselves) for a mile or two from the shore. When they come out of the Sea they bleat like Sheep for their young, and though they pass through hundreds of other's young ones before they come to their own, yet they will not suffer any of them to suck. The young ones are like Puppies and lie much ashoar, but when beaten by any of us, they, as well as the old ones, will make towards the Sea and swim very swift and nimble; tho' on shoar they lie very sluggishly, and will not go out of our way unless we beat them, but snap at us. A blow on the Nose soon kills them. Large Ships might here load themselves with Seal Skins and Trayne oyl; for they are extraordinary fat."

Captain Scammon states that the sealing fleet off the coast of Chili in 1801 numbered thirty vessels, many of them ships of the larger class, and nearly all carried the American flag.

"The two islands discovered by Juan Fernandez in 1563," says Captain Morrell, "are about 110 leagues from the continent, bearing nearly west by south from Valparaiso. The largest of the two, or Robinson Crusoe's Island, is nearest to the main, and is therefore called by the Spaniards Mas-a-tierra, or 'near the land,' while the other, which lies 3 leagues farther west, is termed in the Spanish language Mas-á-Fuera, signifying 'farther off,' or more remote. Juan Fernandez, or Robinson Crusoe's island, is in latitude 33° 40′ south, longitude 78° 58′ west, being 90 miles eastward of Mas-á-Fuera, which is in latitude 33° 46′ south, longitude 30° 38′ west. The former island, which is of very irregular shape, about 10 miles long and 5 wide, was formerly frequented by fur and hair seals, but as early as 1824 these animals had found some other place of resort, though no cause has been assigned for the change. Mas-á-Fuera is of circular form, and about 20 miles in circumference. Its surface is well covered with wood, and is generally very fertile, although it has evidently suffered from frequent volcanic eruption. This island has been celebrated for the immense numbers of seals which have been found on its shores. From 1793 to 1807 there were constantly more or less ships' crews stationed here for the purpose of taking fur-seal skins, a part of which time there were from twelve to fifteen crews on shore at the same time, American and English."

The islands of Saint Felix, Saint Ambrose, and other small islands off the west coast of South America, were of greater or less importance in the early days of the fur-seal fishery. Even as far north as the Galapagos Islands, on the equator, fur-seals were found and captured by American sealers. All of those grounds have now been abandoned by the fur-seals.

In the letters of Eben Townsend, of ship Neptune, which are quoted at the close of this chapter, will be found an interesting description of Mas-á-Fuera and other seal islands along this coast.

PITCAIRN ISLAND.

Among the numerous islands that have been visited by American vessels in search of fur-seals is Pitcairn Island, in the South Pacific Ocean, in latitude 25° 2′ south, and longitude 133° 21′ west, about 3,000 miles west of South America. It was discovered in 1767 by Carteret, who describes it as not more than 5 miles in circumference, covered with trees, and apparently uninhabited. It received its name in honor of a son of Major Pitcairn, who accompanied the expedition.

Capt. Mayhew Folger, in the sealing-ship Topaz, of Boston, in February, 1808, visited the island in search of fur-seals. He found no seals, but did find one of the mutinous crew of the English ship Bounty, lost to England for twenty years.*

The Bounty left England in December, 1787, on an expedition to Otaheite to obtain the bread-fruit tree for the West Indies. There were on board forty-four men in all, under command of Lieutenant Bligh. They arrived at Otaheite in October, 1788, and remained there until April, 1789, when, having a sufficient quantity of plants, they set sail for the West Indies. On the 28th of April part of the crew mutinied and put Lieutenant Bligh with eighteen others in a boat and set them adrift, while the mutineers, twenty-five in number, took possession of the vessel. The lieutenant with eleven of his company reached England after a series of adventures. The vessel returned to Otaheite, when a part of the mutineers tarried at Otaheite, while nine of their number took the Bounty and sailed for a more remote place. They arrived at Pitcairn Island on the 21st of September, 1790, and finding some difficulty in landing they ran the vessel on the rocks and destroyed her. They had brought six Otaheitan men and some women with them.

After a few years' residence on this lonely isle, the Otaheitan men killed all but one of the Englishmen, when the women turned and killed the six Otaheitan men. There was now left a number of women and one man, who lived in peace and seclusion for many years.

November 19, 1790, the ship Pandora sailed from England in search of the Bounty and her mutinous crew. Ten of the mutineers were found at Otaheite and taken back to England, where they were tried and three were executed, the others being acquitted or pardoned. The party on Pitcairn Island saw no vessel, or at least none landed there until Captain Folger came there in 1808. Subsequent to that date many vessels have visited the island.

THE FALKLAND ISLANDS.

These islands, just prior to the beginning of the present century, were among the most important sealing-grounds in southern seas, but for many years past no seals have been taken there. They form a group of some two hundred islands about 250 miles northeast of Terra del Fuego, between latitude 51° to 53° south and longitude 57° to 62° west. Only two of them are of any size, East and West Falkland, separated by Falkland Sound. The former of these two islands is 85 miles long by 53 miles broad, and the latter 80 miles long by 40 miles broad. The number of inhabitants there in 1876 was 1,153, who are subjects of Great Britain. The islands were discovered in 1592 by

* For full details see Delano's Voyages and Travels, Boston, 1817, pp. 111-144.

Captain Davis, and in 1594 were visited by Sir Richard Hawkins. They were afterwards seen by the navigators Dampier, Strong, and others. Strong gave them their name in honor of Viscount Falkland. They were uninhabited when discovered by the English. In 1763, after losing Canada, the French made the first attempt to settle these islands, selecting them as a place of shelter for vessels bound to the south seas. The British took possession of the islands in 1765, but both attempts at settlements were unsuccessful The French ceded their settlement to the Spaniards in 1767, and the English abandoned theirs as useless in 1774.

Mr. Eben Townsend, who was sealing at the Falklands in 1797, writes in his diary as follows: "There are two principal islands, called English and Spanish Maloons, with a number of small islands. Each of the Maloon Islands is from 200 to 300 miles in length, and owned by the Spaniards, who, on the western part of the Spanish Maloon, keep a garrison. They have in several instances been troublesome to the Americans, but we saw nothing of them. The title to these islands has formerly been a subject of much controversy among the maritime powers. In 1790 the British took possession of Port Egmont. The Spaniards protested against it, to which no attention being given an expedition was fitted out from Buenos Ayres, which drove them off. The British Government demanded satisfaction for being dispossessed by force, and the imbecile Spanish Government, although in the right, acknowledged themselves in the wrong, disavowing their instructions to their officers, and ordered everything to be restored and placed as it was when they attacked it. The English, finding it of no importance, voluntarily evacuated it soon afterwards. In 1792 a cow was shot there that had been ranging the island alone for about twenty years. She was fat and in fine order. On that island there are plenty of hogs from the English stock, which are better than on the other islands. There is very little wood on any of the islands, but there is plenty of excellent water. The most convenient for a ship is West Point, or New Island. The latter place is in latitude 51° 40′ south, which is the most general for the whalemen. At Little West Point Harbor there is good water and plenty of hogs and some goats. All the islands produce plenty of wild fowl, geese, ducks, teal, rooks, curlews, &c., and plenty of eggs in October, November, and December, the albatross beginning to lay about the 1st to the 10th of October. Gulls, penguins, and other birds are taken. I have seen a dozen acres covered with the albatross nests, with just room to walk between them, built up with mud and straw about 2 feet in height. One of the eggs would about fill a tumbler. They were equal in flavor to hens' eggs. We took on board about twenty hogsheads for ships' stores, and we had them good for about four months. There are also plenty of gulls' and penguins' eggs; of the latter there are various kinds. The jackass penguins, making a noise like the bray of a jackass, burrow in the ground, where they lay their eggs. The gintoo penguins are in rookeries, like the albatross. As they have no wings and walk erect, whenever we walked among them they very gently opened to the right and left for us to pass. We found very few fish. We occasionally caught some alongside the ship. About the middle of December we took a few barrels of mullet in States Harbor with a seine. We also in that harbor found round clams, and among all the islands there are great plenty of mussels, which are very good; some winkles and limpets, which are small shell fish, that adhere to the rocks; a small blow suddenly given takes them off. They have but a single shell. We also found on these islands plenty of rats and some foxes, and in the earth the common angle-worm. On the whole these islands are bountiful. A man with a gun and ammunition might live very well. The climate is not pleasant, being subject to squalls of snow and hail, winter and summer; but it is never very warm nor very cold. I never saw ice there half an inch thick, and our sailors never put on stockings or wanted them during the winter. We had but little snow. There was no ice made in the harbor where we lay excepting a little on the edge of the shore.

"The soil of these islands is too cold and sour to be advantageously cultivated; but with the skill and industry of an English gardener many kinds of vegetables might be raised. We found very excellent celery on several of the islands, particularly at West Point, at the edge of the runs of water, very tender and well bleached, being protected from the sun by the surrounding grass. Cattle would find good grazing. The hogs support themselves, principally on what we call tussock grass. They are therefore not fat, but furnish good sweet meat. The tussock grass grows in bunches or clusters, of 5 or 6 feet in circumference and about 6 or 8 feet in height, so that we have free walk among them. The root and much of the stalk is what the hogs feed on. I was hunting among these tussock bogs one day when I suddenly came upon a wild hog, so near him that I stepped back one or two paces that the muzzle of my gun might not touch him. I snapped my gun twice; it missed fire. I then took out my knife and with it having sharpened my flint fired and killed him. During all this time the hog never moved, but looked directly at me. It is probable he had never seen a human being before. There is no fruit except berries of two or three kinds, all inferior, excepting what we called the tussock berry, which grew on a vine and had much the taste of our winter green. So variable is the atmosphere that I have frequently been picking berries in snow squalls."*

The following is related by Captain Morrell:

"In entering Falkland Sound from the south west there are three islands on the starboard side, one of which, called Eagle Island, has been the scene of a drama unparalleled in the annals of navigation for ingratitude, treachery, and perfidy. I allude to the treatment received by Capt. Charles H. Barnard, of New York, from the officers and crew of an English ship, whom he had previously rescued from all the horrors of shipwreck on a desolate island. In return for his kind offices they treacherously seized his vessel and made their escape, leaving him and part of his crew to endure all the privations and sufferings from which he had nobly preserved *them!* Captain Barnard's narrative of this horrible transaction is before the public, and ought to be in the hands of every reader. For nearly two years he was compelled to drag out a miserable existence on an uninhabitated island, in as high a south latitude as Kamtchatka is in the north.

"This unnatural act of perfidy was perpetrated in the year 1813, some time in the month of April, while Captain Barnard was engaged in a sealing voyage at the Falkland Islands, in a brig from New York, called the Nanina. On the 9th of February previous, the British ship Isabella, on her passage from Port Jackson, New South Wales, to London, had been wrecked on Eagle Island, a place where navigators seldom touch. From that time until they were relieved by the noble exertions of Captain Barnard, the officers, passengers, and crew of the Isabella remained on this uninhabited and inhospitable island, with no prospect before them but an uncertain period of precarious subsistence, to terminate in a fearful death from cold or famine, or both combined. There were several females among them to share the same fate.

"Captain Barnard had laid his brig up in Barnard's Harbor, and was in search of seal at Fox Bay, opposite Eagle Island, in a small shallop built for that purpose, when his attention was attracted by a rising smoke on the other side the strait. Suspecting the real cause of this unusual appearance, and prompted by his characteristic benevolence of heart, he immediately crossed Falkland Sound in his shallop for the purpose of relieving the sufferers, whoever they might prove to be. His errand of mercy was successful; and though they proved to be subjects of England, with whom our country was then at war, the benevolent purpose of Captain Barnard remained unchanged."†

* Manuscript Diary, 1797.

† Morrell's Voyages, p. 55.

SOUTH GEORGIA ISLAND.

Among the first places visited by American and English sealing vessels was the island of South Georgia, in the South Atlantic Ocean. It is in about latitude 54° 58′ south, a few hundred miles eastward of Cape Horn, and, with the adjacent Clerke's Rocks,* forms a group of desolate uninhabited islands, fit only for the home of hardy seals. This island was discovered by Monsieur La Roche in the year 1675, and was visited by a vessel called the Lyon in 1756, but was not brought to public notice until Captain Cook in the Resolution explored the island in 1771, and in his official report gave an account of the abundance of sea-elephants, or, as he termed them, "sea-lions," and fur-seals found upon the shores. Vessels were soon equipped by enterprising merchants for the purpose of taking these amphibious animals.

In the spring of 1800 Captain Fanning sailed from New York in the ship Aspasia, bound on an exploring and sealing voyage to the south seas. The ship was commissioned as a letter of marque, and was armed with twenty-two guns. After visiting the Tristan Islands without securing any seals, the Aspasia sailed for South Georgia, and during the sealing season secured 57,000 fur-seal skins. Owing to the severe gales of wind at these islands it was necessary to moor the Aspasia with three anchors ahead and two astern. As was usual on these voyages a shallop was built for cruising along shore among the islands while searching for seals. Captain Fanning states that when the summer season set in, in November, "seventeen sail of sealing vessels, mostly ships with their shallops, arrived at this island. We had rather the start, however, for our men having been previously placed at the different stations, and aided as they were by the fast sailing little vessel, were enabled, out of the 112,000 fur-seal skins taken by the crews of all vessels during the season, to secure 57,000 for our share."

Captain Weddell, writing about South Georgia in 1825, says that "since the year in which seals were known to be so abundant not less than 20,000 tons of the sea-elephant oil has been procured for the London market. A quantity of fur-seal skins were usually brought along with a cargo of oil; but formerly the furriers in England had not the method of dressing them, on which account they were of so little value as to be almost neglected. At the same time, however, the Americans were carrying from Georgia cargoes of these skins to China, where they frequently obtained a price of from $5 to $6 apiece. It is generally known that the English did not enjoy the same privilege, by which means the Americans took entirely out of our hands this valuable article of trade. The number of skins brought from off Georgia cannot be estimated at fewer than 1,200,000. I may here also remark that the island of Desolation, which Captain Cook likewise visited, and first made known, has been a source of scarcely less profit than the island of Georgia. Hence it may be presumed that during the time these two islands have been resorted to for the purpose of trade more than 2,000 tons of shipping and from two to three hundred seamen have been employed annually in this traffic.

"Having thus given," continues Weddell, "an idea of the value of what has already been discovered in the south seas, I shall say something of the island of Georgia, as to its extent and peculiarities. The island is about 96 miles long, and its mean breadth about 10 miles. It is so indented with bays that in several places, where they are on opposite sides, they are so deep as to make the distance from one side to the other very small. Near the middle is an iceberg, which seems to run from side to side. The tops of the mountains are lofty, and perpetually covered with snow; but in the valleys, during the summer season, vegetation is rather abundant. Almost the

*Named after Captain Clerke, second in command to Captain Cook.

only natural production of the soil is a strong-bladed grass, the length of which is in general about 2 feet. It grows in tufts on mounds 3 or 4 feet from the ground. No land quadrupeds are found here; birds and amphibious animals are the only inhabitants."*

The sealing business at South Georgia was most prosperous about the year 1800. In the season commencing November, 1800, and ending in February, 1801, sixteen American and English vessels took 112,000 fur-seal skins from this place.

The island was not visited by sealers for many years, and as a result, the seals being undisturbed, began to increase in numbers. Since the year 1870 several cargoes of sea-elephant oil and some fur-seal skins have been obtained there by American vessels. There seems no probability, however, that there will ever again be as many seals here as was found in the early part of the present century.

BOUVETTE'S ISLAND AND SANDWICH LAND.

Bouvette's Island is east of South Georgia, in latitude 54° 15′ south, longitude 6° 11′ east, about 1,200 miles south-southwest from Cape of Good Hope. It was first seen and named by Captain Bouvette in October, 1808. It is about 25 miles in circumference. The island is of volcanic origin, and rises in one part to a height of 3,000 feet. On the western shore is a large number of ice islands, some of them a mile or more in circumference. Captain Morrell secured a few hundred fur-seal skins here in 1822, and many other American sealers obtained partial cargoes.

Sandwich Land, a group of rocky islands, about 200 miles south of South Georgia, was frequented by American sealing vessels prior to 1830, and partial cargoes of fur-seal skins and sea-elephant oil obtained there. There is no large island in the group, but a series of volcanic rocks, the more important of which are Candlemas, Saunders, Montague, and Bristol Islands, and Southern Thule.

Captain Morrell visited Sandwich Land in 1823, and thus describes this region: "On Friday, the 28th of February, the cheering cry of 'land ho!' resounded from aloft. This proved to be Candlemas Isles, the most northerly islands of Sandwich Land; latitude 57° 10′ south, longitude 26° 59′ west (from Greenwich). These two islands are of no great extent, but one of them is of considerable height, both being burning volcanoes, and the most western having burnt down nearly to a level with the sea. We continued examining these islands towards the south, until we arrived at the Southern Thule, where, on the northeast side of the westernmost island, we found a good harbor. In this group we saw nine burning volcanoes—fire in abundance, but no fuel for the Wasp. Three of these islands had vomited out so much of their entrails that their surfaces were nearly even with the water. We looked on these islands in vain for wood, of which we were very much in want, as we had not made a fire on board the Wasp but once a week for the last fourteen days, having with that fire boiled meat sufficient to serve the officers and crew for seven days; and this economical regulation we were obliged to adhere to until we arrived at Staten Land, on the 24th of March. All the islands which constitute Sandwich Land are entirely barren. Those parts which have not been consumed by internal fires are very high and covered with perpetual snow; the rest is broken land. The westernmost of the Southern Thule is in latitude 59° 35′ 10″ south, longitude 27° 42′ 30″ west. After having examined the islands of Sandwich Land without discovering a single fur-seal and only about four hundred sea-elephants, together with about fifty sea-dogs, we again directed our attention towards the Antarctic Seas."†

TRISTAN D'ACUNHA.

Tristan d'Acunha is a group of three islands situated in mid-ocean, nearly on a line from Cape Horn to Cape of Good Hope, about 1,500 miles west by south of the latter, and 2,000 miles

* Weddell's Voyages, 1825, pp. 53–55.

† Morrell's Voyages, New York, 1832, p. 66.

from the former. Tristan, the largest of the group, is about 15 miles in circumference, and its highest peak, elevated some 8,326 feet above the sea, is visible for nearly 75 miles. The other two islands are called Inaccessible and Nightingale, the three, about 10 miles apart, forming a triangle, with Tristan as the northeast point. The group was discovered by the Portuguese in the sixteenth century, and was further explored by the Dutch in 1643 and by the French in 1767.

The islands were for many years a favorite resort of whaling and sealing vessels. Fur-seals were here very plenty at the close of the last and beginning of the present century. In the season of 1790, lasting from August in that year to April, 1791, the schooner Industry, of Philadelphia, under Captain Patten, obtained here 5,600 skins for the Chinese market. Captain Patten says he could have loaded a large ship with oil in three weeks, so abundant were the sea-elephants. September he reckoned to be the best month for making oil at these islands.

About the year 1810 three of the crew of an American sealing vessel then at the island determined to remain there a few years in order to prepare seal skins and oil and sell the same to vessels that might touch there. They were Yankees, and with Yankee pluck they cleared about 50 acres of land and planted coffee, sugar-cane, and seeds of other plants. Success crowned their efforts, and it seemed as if an important settlement might be the outgrowth of this little colony. One of the number, Jonathan Lambert, declared himself sovereign proprietor of these islands. The project was abandoned in a few years, and in 1817 the British Government took possession with a detachment of troops. After the withdrawal of the troops a corporal named Glass received permission to remain, and a small colony soon after sprung up, which has survived till the present time and numbered in 1873 about ninety persons.

The English exploring ship Challenger visited the place a few years ago, and Mr. Moseley, in his narative of the expedition, describes the Tristan group as follows: "It has a cold, barren appearance; a terrible climate; for nine months of the year constant storm and rain, with snow. It is only in the three summer months that the weather is at all fine. In October, the 'bad season,' as the islanders called it, was just beginning to pass away, but the weather was so uncertain that the ship might have had to leave her anchorage at a moment's notice, and only a steamer dared anchor at all.

"The cottages are built of huge blocks of a soft red stuff, fitted together with mortar, and are thatched with tussock-grass. They are all low one-storied structures, formed with low stone walls about them, in which a few vegetables are grown, and pigs and geese roam about. The potato fields are all walled for protection from the wind. * * *

"The sea-elephants (*Morunga elephanta*) have almost deserted the island. The last was seen two years before our visit on the beach just below the settlement. The islanders make yearly visits to Inaccessible and Nightingale Islands in pursuit of seals, but these are becoming scarcer every year."

At Inaccessible Island, which is about 23 miles distant from Tristan Island proper, and which has an area of about 4 square miles, Mr. Moseley found two Germans, who had been there two years, having been landed by a whaling vessel in hopes of their obtaining some fur-seals, but in this they were disappointed.

Nightingale Island is about 20 miles southwest of Tristan Island, and has an area of about one square mile. It is very rocky, and is covered with tussock-grass higher than a man's head. Numerous caves in the low cliffs along the shore are frequented by fur-seals. Mr. Mosely states that 1,400 were killed by one ship's crew in 1869 or 1870. The island is visited annually by the Tristan people, though but few seals are captured.

GOUGH'S ISLAND.

Gough's Island, or Diego Alvarez, as it was originally named by the Portuguese, who discovered it, is in latitude 40° 19′ south, 9° 44′ west longitude, a short distance to the southward of the Tristan Group. It was seen in 1713, by Capt. Charles Gough, in the Richmond, bound to China, and has since gone by his name. The highest part of the island rises some 4,000 feet above the sea. The island at one time abounded with fur-seals and sea-elephants, but is now about deserted by those animals. About 1825, a party of American sealers lived there, but met with such indifferent success that it was abandoned.

WEST COAST OF AFRICA.

The southwest coast of Africa, from Cape of Good Hope to about 16° south latitude, was frequented by American sealing vessels at the beginning of this century, and until about the year 1835, when fur-seals had become very scarce. As many as 500 to 700 skins were sometimes taken in a day by the crew of a small vessel; the fur of about the same value as of those captured at Falkland or at Cape Horn. It is impossible to estimate the total number of skins secured on the African coast by American vessels, but it certainly numbered several thousands.

Capt. Gurdon L. Allyn, of Gale's Ferry, Conn., gives us an account of his experience on this coast in 1830, and subsequent voyages until 1835. In 1830 he commanded the sealing schooner Spark, of New London, Conn. In describing this voyage, he says:

"We arrived on the barren coast of Africa, in the latitude of 26° south, on January 14, 1830. At that place is a small island, a mile or more from the coast, on the inside of which is a fair anchorage. This island, called Ichaboe, is the rendezvous of millions of sea-birds, which there lay their eggs and hatch their young, and we obtained at this time and afterwards quantities of eggs, many of which are excellent for food. The birds were so thick as to prevent our traveling on shore without first beating passage-way with our seal-clubs, and yet we endeavored not to hurt them, although they regarded us as intruders, and attacked us with ferocity, scratching and biting with such effect as to draw blood through the legs of our pantaloons. We were plentifully supplied with eggs during the fifteen months that we were on this coast, our men eating gulls' and penguins' eggs without much distinction, although the former are much superior. We had arrived at this island too late for the season, for an examination of the shore revealed about a thousand carcasses of seals which had been deprived of their skins by those who had arrived there on a similiar errand to ours.

"The coast was well sealed, and we could only glean a few from the roughest rocks. Six days passed, and our consort, the schooner General Putnam, of Newburyport, arrived; and as we were likely to fall short of water, this being a barren, sandy coast, without rain oftener than once a year, we put our water-casks and our mate on board of her and despatched her south to Saldaña Bay, while her captain came on board of our vessel and proceeded with us to seal along the coast. We found a few seals at each landing, * * * and by the 6th of September had taken 600 seal skins. On the 13th of September we obtained 175 fur-seal skins; * * * on November 21 we took 234 prime seal-skins; on December 29 230 seal-skins, and on the 31st 250 skins; January 1, 1831, took 500 skins; March 2 we took 740 skins, which was a good day's work, and attended with great labor and excitement. On March 21, we started for home."*

In the year 1834 Captain Allyn was on a sealing voyage on the African coast in the schooner Betsy, in company with the brig Tampico. They arrived on the coast October 5, and at Angra

* The Old Sailor's Story; Norwich, Conn.: 1879.

Pequeña Bay landed surplus provisions, shooks, and some other articles, and prepared for cruising. Captain Allyn says: "On the third or fourth day we started northward, examining rocks and islands on our way with little success. We proceeded to Ichaboe Island, where we found plenty of eggs and crawfish, a sort of lobster, with no large claws. We went to Mercury Island, thence to Bird Island, 70 miles farther, the farthest off-shore island on this part of the coast, where the anchorage is bad on account of rocky bottom, and the surf oftentimes renders landing difficult and dangerous. Here we procured a few seal, then skirted the coast back to Angra, where we set up casks and made general preparations for both whaling and sealing.

"The usual time of the seals coming on shore is from the 10th to the 25th of November, where they remain, if undisturbed, several months, or until the young, which are ushered into existence soon after the landing, are able to take care of themselves. They generally shed their coats of hair in February, and the pups become silver-gray and pass as yearlings at about eight months of age. During the season which now followed we found the seal scarce and shy, but by diligence we managed to secure some 800 skins, which was a slim season's work, as we had the whole coast to ourselves. It was now the 1st of June, 1835, and we consorted awhile with the whale ship Bingham, exchanging our first mate's with their boats' crews, and cruised up and down the coast seeking whales and finding none. After a month and a half, during which time the Bingham secured one whale and we one less, we concluded whaling was rather slim, so I started on a cruise to the southward, doubled the Cape of Good Hope and landed on Dyer's Island, where we procured 700 prime seal skins, which somewhat revived our drooping spirits. We returned to Angra, having procured wood at Cape Voltas on our way, and found the Tampico absent on a cruise to the northward, and a Boston sealing schooner, Captain Clark, in the harbor. It was September, and as no seals were to be taken, we overhauled and painted the brig, waiting for the seals to come up, occasionally examining the rocks, but with little success.

"The seals having been harassed so much the prospect was slim for the next season, but by putting men on the small rocks to shoot them, and by great diligence, we managed to secure about 1,000 skins to both vessels, which was a slim season's work."

The Betsy sailed for home in January and arrived in March, when, the sealing business having ceased to be remunerative, on account of a decline in the price of furs, the owners concluded to send the vessel on a West Indies voyage.

In 1828 Captain Morrell, in the schooner Antaretic, visited the west coast of Africa on a fur-seal voyage. At Possession Island, in latitude 26° 51′ south, he found evidence of a pestilence among the fur-seals. The whole island, which is about 3 miles long, he states was "covered with the carcasses of fur-seals with their skins still on them. They appeared to have been dead about five years, and it was evident that they had all met their fate about the same period. I should judge, from the immense multitude of bones and careasses, that not less than half a million had perished here at once, and that they had fallen victims to some mysterious disease or plague."

About 17 miles north of Possession Island are two small islands not over a mile in length, where Captain Morrell found still further evidence of a plague among the fur-seals. "These two islands," he says, "have once been the resort of immense numbers of fur-seals, which were doubtless destroyed by the same plague which made such a devastation among them on Possession Island, as their remains exhibited the same appearance in both cases."* Other parts of the coast were visited, and at Ichaboe and Mercury Islands several thousand skins were secured. The latter island is only about a mile in circumference, and is in latitude 25° 42′ south.

* Morrell's Voyages, New York, 1832, p. 291.

PRINCE EDWARD AND CROZET ISLANDS.

The Prince Edward group is in the Southern Indian Ocean, about 450 miles southeast of the Crozet Islands, and 960 miles distant from Algoa Bay, Africa. The group is composed of the two islands of Marion and Prince Edward, the center of the former being in about latitude 46° 52′ south and longitude 37° 45′ east, and the center of the latter island in about latitude 46° 36′ south and longitude 37° 57′ east. Marion, the larger of the islands, is about 11 miles long and 8 wide. Both the islands are volcanic. One peak, on Marion Island, rises to a height of 4,500 feet.

Fur-seals and sea-elephants once abounded here, and the islands were frequently visited by American sealers until within the last twenty or thirty years. Capt. Gurdon L. Allyn, of New London, Conn., who was sealing on the islands in 1842, says: "Marion Island is of a triangular shape, and has a coast line of about 50 miles. Running through the center, in a southeasterly direction from the north part, is a rise of high mountains whose peaks are thousands of feet in height, covered with perpetual snow. The margins and sides of these mountains are composed of volcanic cinders, called clampers, the walking upon which will thoroughly demoralize a new pair of boots in one day's time. In some places this island can be approached within a short distance; in other places dangerous reefs extend off shore. In several places are strips of beaches which are more or less frequented by sea-elephants; in other places large masses of irregular shaped rocks render walking along the shore impossible. There is one poor harbor, called Uxor, on account of a vessel by that name having been wrecked there by dragging ashore. The north island is considerably smaller and the best anchorage is in a small bay or roadstead at the extreme southeast point. Here we found the holding ground, and rode out several severe gales in safety. The land of both islands is similar. Probably both are of volcanic origin, and they are a sterile, desolate region, unfitted for the abode of humanity. Here we found the schooner Emmeline, of Mystic, on the same errand as ourselves, and we anchored near her. It being late in the season, the elephants were poor, yielding only a few gallons apiece. We consorted with the Emmeline and worked the beaches together. We also found a gang of men here from the Cape of Good Hope, taking oil for a schooner which they expected at a stated time. We worked the beaches of both islands, and obtained about 175 barrels of oil, and left on the 7th of January, 1853, for the Crozet Islands." *

The Crozet Islands comprise a group of four small uninhabited isles in the Southern Indian Ocean, between Kerguelen Land and the Prince Edward group. The most eastern island is in about latitude 46° 27′ south and longitude 52° 14′ east. They were discovered by Captain Crozet, who, however, did not land there. By the aid of a copy of the discoverer's manuscript, Capt. Henry Fanning, in the ship Catherine, of New York, was enabled, about the year 1805, to rediscover this group, and to obtain from there a valuable lot of fur-seal skins. The crew of the Catherine are believed to have been the first human beings that ever stepped upon the shores of these islands. They began the sealing business here which during the next forty years was of much importance. Besides an abundance of fur-seals, there were great herds of sea-elephants here, and these were the object of pursuit by numerous English and American oil ships, especially from 1830 to 1840. Whaling vessels spent part of the year here and took sea-elephants for their oil, making what were called "mixed voyages."

The most southern of this group of islands Captain Fanning named New York Island; the most western he called Fanning's Island, and the third one, which is very high and mountainous, he named Grand Crozet.

* The Old Sailor's Story; Norwich, Conn.: 1879.

There was much jealousy and rivalry among the sealers in early years, and whenever a new rookery was discovered every effort was made to keep the location a secret as long as possible. When Captain Fanning found the Crozets and saw abundance of seals there he returned to Prince Edward Land, where part of his crew had been left, and made preparations to return to the new land for a cargo of skins. Other sealing vessels were at Prince Edward Land, and that they might no suspect Captain Fanning's discovery he waited a few days before sailing. Before leaving home he had received instructions to deposit on Prince Edward Land a record of the location of the Crozets if he succeeded in rediscovering them. This record would be used by other sealing vessels sent out by the same firm. Captain Fanning therefore buried a record giving the desired information, and erected a pile of stones near the spot, though sufficiently distant to deceive strangers. He had been particularly instructed to erect this pile of stone 30 feet northeast of the spot where he planted the record. Vain efforts were made by the crews of the other sealing vessels at the island to find Captain Fanning's record. They removed the pile of stones and dug a great hole, but found nothing. Not long after this the ship for which the record was intended arrived there, and very easily found the papers and proceeded to the Crozets where Captain Fanning, after procuring a full cargo, had left a sealing crew to await the coming of this vessel.

DESOLATION ISLAND.

Kerguelen or Desolation Island and Heard's Island have been the principal hunting grounds for the sea-elephant. From these two islands during the last forty years American sealing vessels have brought home about 175,000 barrels of sea-elephant oil and a considerable number of fur-seal skins. The sea-elephant had been taken by whalers for a number of years before vessels specially fitted for this work were sent out. The headquarters for this business was New London, Conn., which place has continued until the present year to send vessels there.

The fishery at Desolation was begun in earnest by Americans in 1837. Prior to that date English vessels had taken quantities of the oil of that seal, but Americans had not taken an active part in the business.

At Heard's Island the fishing began in 1854. The two islands were usually worked together, Desolation in the colder months and Heard's Island for a brief period in the Antarctic summer.

The islands are about 300 miles apart, in the Southern Indian Ocean. Kerguelen Land extends from latitude 48° 39′ to 49° 44′ south and from longitude 70° 35′ to 68° 42′ east. Heard's Island lies to the south and east of Kerguelen, in latitude 53° 10′ south and longitude 73° 30′ east. Some 25 miles to the westward of Heard's Island lies McDonald Island, upon which seals are said to congregate in considerable numbers, but the shores are so precipitous that boats cannot land.

Kerguelen Land was discovered in 1772, by M. de Kerguelen, a French navigator. He mistook it for a southern continent, and so reported it to his Government. A further examination was made in 1773, and the mistake discovered. About 1776 Captain Cook visited the islands, but considered them of such little importance that he named the principal one of the group the "Island of Desolation." The safe and commodious harbors of the island were favorite resorts for whaling vessels cruising in that ocean in the early part of the present century. The greatest length of the island is 85 miles and the greatest breath 79 miles. Its area is about 2,050 square miles. There are numerous sharp mountain peaks, and Mount Ross, the principal peak, is 6,120 feet high. The coast is indented by many deep bays and inlets, making the shore much like that of Norway in general appearance. "The general aspect of the island," says Dr. Kidder, "is desolate in the extreme. Snow covers all of the higher hills, against which the abrupt outlines of their dark basaltic ridges

are most clearly defined. Only along the sea-shore is a narrow belt of herbage, of which the singular Kerguelen cabbage is at once the largest and most conspicuous component. The weather is also extremely inclement, there being scarcely a day without snow or rain. * * * In former years the Kerguelen group of islands was noted as a favorite breeding place for the sea-elephant. On this account it has been much frequented by sealers for the last forty years, and resorted to also by whalers as a wintering place, on account of the great security of Three Island Harbor. The sea-elephants have been so recklessly killed off year after year, no precautions having been taken to secure the preservation of the species, that now they have become very rare. Only a single small schooner, the Roswell King, of New London, Conn , was working the island during our visit (1874–75); two others and a bark working Heard's Island, some 300 miles to the south, where the elephants are still found in considerable numbers. Probably they would long since have abandoned the Kerguelen Island altogether but for a single inaccessible stretch of coast 'Bonfire Beach,' where they still 'haul up' every spring (October and November), and breed in considerable numbers. The beach is limited at each end by precipitous cliffs, across which it is quite impossible to transport oil in casks, nor can boats land from the sea or vessels lie in the offing, from the fact that the beach is on the west, or windward, coast, and exposed to the full violence of the wind. * * *

"The increasing scarcity of the sea-elephant, and consequent uncertainty in hunting it, together with the diminished demand for the oil since the introduction of coal-oil into general use, have caused a great falling off in the business of elephant-hunting. The Crozet Islands, for example, had not been worked for five years, and at Kerguelen there was only one small schooner engaged in this pursuit, two others making Three Island Harbor their headquarters, but spending the season at Heard's Island, 300 miles to the southward. It may therefore be reasonably hoped that these singular animals, but lately far on the way toward extinction, will have an opportunity to increase again in numbers, and that sealers may learn from past experience to carry on their hunting operations with more judgment, sparing breeding females and very young cubs. When the Monongahela visited the Crozet Islands, on December 1, they found the sea-elephant very numerous, although left undisturbed for only five seasons."*

HEARD'S ISLAND.†

One of the most desolate and at the same time most profitable hunting grounds for the sea-elephant is the pile of rocks and ice known to sealers as Heard's Island. It was discovered by Captain Heard or Herd, a Boston navigator, in 1853. Several years prior to that date New London sealers while cruising south of Desolation, reported that land could be seen from the mast-head, but none had gone near enough to be sure of a new land until Captain Heard's discovery. He did not land on the shores. The first landing was made in 1854 by Capt. E. D. Rogers, of New London, who was then on a whaling and sealing cruise in the ship Corinthian.

Captain Rogers gives the following account of this visit:

"In November, 1853, I left New London in the ship Corinthian, bound on a whaling voyage, and while cruising from Desolation Island in January, 1854, concluded to visit Heard's Island, that I learned had been recently discovered by Captain Heard in a Boston vessel. As soon as we reached the island men were sent ashore and reported a great abundance of sea-elephants, and in fact we could see great numbers of them lying on the beaches. We were the first men, so far as

* Contributions to the Natural History of Kerguelen Island, made in connection with the United States Transit-of-Venus Expedition, 1874–75. By J. H. KIDDER, M. D. Bull. U. S. Nat. Mus., No. 3, 1876.

†Also spelled Herd's Island, as on the accompanying sketch map, prepared by Capt. H. C. Chester, who spent several seasons there hunting the sea elephant.

known, that ever landed on this desolate island. As the summer season was fast drawing to a close we concluded to sail immediately to Desolation Island, and, with our tenders, the schooners Atlas and Mechanic, return to Heard's Island and secure some oil. It is only about 300 miles from one island to the other, so that by the first of February we had returned to the new land and anchored in a small bay that we called Corinthian Harbor. The next morning we found that our ship had dragged anchor and was almost aground. With much difficulty we got her into deeper water, and having made her as secure as possible with heavy riding anchors, sent ashore about thirty men to examine the place and kill the elephants. We remained at the island about a week, our men going ashore each morning and returning to the vessel at night. There were thousands of the animals upon the sandy beaches, so that there was little difficulty in getting all we wanted. After securing about 500 barrels of the blubber we sailed for Desolation Island and tried it out. As soon as possible we sent word of our good luck to our agents, Messrs. Perkins & Smith, at New London, Conn., and they purchased the ship Laurens, which was thoroughly equipped, and, under command of Capt. Frank Smith, sailed for this land in September, 1855. The island was fully explored by Captain Smith and his men, all the headlands and bays named, and a rough map drawn. A full cargo of elephant oil was obtained, and in May, 1857, the Laurens arrived home at New London with about 4,700 barrels of elephant oil and 500 barrels of whale oil, the entire cargo being valued at $130,000."

Heard's Island is about 300 miles to the southward of Desolation, and 2,500 miles southeast of the Cape of Good Hope, in about the same latitude as the Straits of Magellan. It stretches in a general direction about northwest and southeast. Its greatest length is about 20 miles, and greatest breadth about 6 miles. Its area is about 80 square miles. It is of irregular form, somewhat in the shape of a boot with the sole at the southeastern end.

Near the central part of the island a snow-clad peak, known as Big Ben, rises to the height of 5,800 feet, while a large part of the island is covered with ice, making it difficult to transport articles from one part to another. There are many sandy beaches, bluffs, and bays, appropriately named by the sealers, either from some peculiar characteristics of the place or in honor of vessels or sealing captains. At one extremity of the island is Cape Laurens, a perpendicular cliff of rocks named in honor of the sealing bark Laurens, of New London.

Along the northerly side of the island, commencing at the northwestern end, are Corinthian Bay, Whisky Bay, and Morgan's Bay. On the west side of Corinthian Bay are perpendicular cliffs. Near the extremity of these cliffs is Shanghai Beach, small in extent. On the easterly side of the bay are rough rocks, called Reef Rocks. This is the principal anchorage for the vessels, and, compared with the other bays, is well sheltered. A high headland, known as Rodger's Head, separates Corinthian from Whisky Bay. The latter bay is quite exposed to the sea, so that vessels must have very heavy riding gear. A few miles off shore from Whisky Bay is a small cluster of rocks, called Shag Rocks, where large numbers of penguins collect. In standing in toward Whisky Bay in a vessel the island appears to be divided into two parts until you pass Shag Rocks. This appearance is caused by the low land from the head of the bay across to the other side of the island.

Saddle Point forms the eastern side of Whisky Bay. Morgan's Point is on the western side of Morgan's Bay, a very slight indentation of the coast to the eastward of Whisky Bay. On the southerly side of the island there are no bays or good anchorage for vessels, nor is there a safe landing place for boats, the whole side being very much exposed to the wind and waves.

The hauling places for sea-elephants on the island are the sandy beaches. There are several of these on both sides of the island. The most important on the north side are Stony Beach

and Fairchild's Beach, both near the easterly end. At the former beach no landing can be made, but blubber must be rafted off. Fairchild's Beach has a good landing place. A long sandy point, sometimes called Southwest Beach, forms the "toe" of the island. In rough weather the breakers extend 6 miles off from this point. Next to Southwest Beach, as we pass along the "sole" of the island, we come to Little Beach, where elephants are killed and the blubber either rafted off in boats or carried across the intervening ice to Southwest Beach.

The "heel" of Heard's Island is a perpendicular bluff of rocks and ice. Near the "heel" on the southwest side of the island is Long Beach, which is generally covered with sea-elephants the year round. A sealer's hut is built at each end of this beach, for men to live in that are sent over from the other side of the island to drive off the elephants, in hopes that they may haul up on more accessible beaches, where they may be killed and the blubber secured. It is impossible to land here with boats, and vessels cannot get near on account of reefs and heavy breakers, that extend 5 or 6 miles seaward. Captain Chester, who was sealing on the island in 1860, estimated that the number of elephants on Long Beach any day throughout the year would make from 10,000 to 15,000 barrels of oil. The men have to travel over rough icebergs to reach this beach, and it is quite a dangerous task on account of the many chasms in the bergs that must be leaped over.

Next to Long Beach is a small stretch of sandy shore, where the elephants are crowded in large numbers, but the place is inaccessible to man, because of the fearful icebergs intervening. At Southwest Beach, on this side of the island, opposite Whisky Bay, sea-elephants are killed, and after being stripped, the blubber is with great difficulty carried over the icebergs to the huts, where it is tried out or carried aboard the vessels.

On several parts of the island, but chiefly on the northerly side, are small houses or huts in which the men live during the elephant season or when wintering here. At the time of Capt. H. C. Chester's visit there in 1860 there were no huts in Corinthian Bay, but at the head of Whisky Bay there were two, one of them the "Roman's" house and the other the "Colgate's," called so from the names of the vessels whose crews built them. At Saddle Point there was a house, and a little farther south another one, built by the Roman's crew. At Fairchild's Beach there was a house, and beyond that, just eastward of a great flat iceberg, were more houses. On Southwest Beach Point, at the "toe" of the island, there were three houses, and two previously mentioned at Long Beach.

The English exploring ship Challenger visited Heard's Island in 1874, and from Mr. Moseley's account of that visit we quote the following interesting description of that dreary place:

"Whisky Bay is near the northernmost extremity of the island. To the southeast of the ship, as she lay in the small bay, were seen a succession of glaciers descending right down to the beach, and separated by lateral moraines from one another; six of these glaciers were visible from the anchorage, forming by their terminations the coast-line eastward. They rose with a gentle slope, with the usual rounded, undulating surface, upward towards the interior of the island, but their origin was hid in the mist and cloud, and Big Ben, the great mountain of the island, said to be 7,000 feet in height, was not seen by us at all.

"One of the glaciers, that nearest the ship, instead of abutting on the sea-shore directly with its end as did the others, presented towards its lower extremity its side to the action of the waves, and ending somewhat inland, formed a well-marked but scanty moraine.

"To the sea-shore this glacier presented a vertical wall of ice, resting directly upon the black volcanic sand composing the beach. In this wall was exposed a very instructive longitudinal section of the glacier mass, in which the series of curved bands produced by differential motion were most plainly marked, and visible from the distance of the anchorage. The ice composing the wall or cliff was evidently being constantly bulged outwards by internal pressure, and masses were thus

being split off to fall on the beach, and be melted, or floated off by the tide. The ice splits off along the lines of the longitudinal crevasses and falls in slabs of the whole height of the cliff; a freshly fallen slab, a longitudinal slice of the glacier, was lying on the beach. The fallen ice floats off with the tide. Some stones, which were dredged in 150 fathoms between Kerguelen's Land and Heard's Island, were believed by Mr. Buchanan to have been recently dropped by floating ice from Heard's Island. The stones in question were as yet not penetrated by the water.

"The other glaciers in sight cut the shore-line at right angles, and thus had no terminal moraines, the stones brought down by them being washed away by the sea. Above, the glaciers were covered with snow, which, as one looked higher and higher, was seen to gradually obliterate the crevasses and assume the appearance of a névé. The extent of glacier free from snow was very small, the region in which thawing can take place to any considerable extent being confined to a range not far above sea-level. * * * The dirt and stones on the surface of the ice were, as usual, more abundant towards the termination of the glacier and the moraine, but they were not so abundant as usual, and there were no large stones amongst them, nor were such to be seen in the moraine.

"The harpooner of the Emma Jane, the whaling schooner with which we fell in at Kerguelen's Land, told me that he had always wondered where the stones on the ice came from at all, and no wonder, for Big Ben is usually hidden from view, and the glaciers seem to have nothing above from which the stones might come. Most of the stones, no doubt, reach the surface and see the light only when they are approaching the bottom of the glacier.

"The terminal moraine showed the usual irregular conical heaping, and marks of recent motion of the stones and earth composing it from the thawing of the ice supporting them, and a small stream running from the glacier-bed cuts its way to the sea through a short arched tunnel in the ice, as so commonly occurs elsewhere. A small cascade poured out of the ice-cliff on to the sea-shore from an aperture about half way up it. All the moraines showed evidence of the present shrinking of the glaciers.

"The view along the shore of the successive terminations of the glaciers was very fine. I had never before seen a coast-line composed of cliffs and headlands of ice. None of the glaciers came actually down into the sea. The bases of their cliffs rested on the sandy beach, and were only just washed by the waves at high water, or during gales of wind.

"The lateral moraines were of the usual form, with sharp-ridged crest and natural slopes on either side. They formed lines of separation between the contiguous glaciers. They were somewhat serpentine in course, and two of them were seen to occur immediately above points where the glaciers on either hand were separated by masses of rock *in situ*, which masses showed out between the ice-cliffs on the shore and had the ends of the moraines resting on them.

"A stretch of perfectly level black sand, about half a mile in width, forms the head of the bay and intervenes between the glaciers and a promontory of rocky, rising land stretching out northward and westward, and forming the other side of the bay. It was on the smooth, sandy beach bounding this plain that we landed. The surf was not heavy, but we had to drag the boat up at once. In this we were assisted by six wild-looking sealers, who had made their appearance on the rocks as soon as the ship entered the bay, with their rifles in their hands, and had gazed on us with astonishment. The boss said, as we landed, he guessed we were out of our reckoning. They evidently thought no one could have come to Heard's Island on purpose who was not in the sealing business.

"The sandy plain stretches back from the bay as a dreary waste to another small curved beach at the head of another inlet of the sea. Behind this inlet is an irregular rocky mountain

mass, forming the end of the island, on which are two large glaciers, very steeply inclined, and one of them terminating in a sheer ice-fall. At its back this mountain mass is bounded by precipices, with their bases washed by the sea. The plain is traversed by several streams of glacier water coming from the southern glaciers. These streams are constantly changing their course as the beach and plain are washed about by the surf in heavy weather. * * * The sandy plain seemed entirely of glacial origin; it was in places covered with glacial mud, and was yielding, and heavy to walk upon. * * *

"The plain was strewed with bones of sea-elephant and sea-leopard, those of the former being most abundant. There were remains of thousands of skeletons, and I gathered a good many tusks of old males. The bones lay in curved lines, looking like tide lines, on either side of the plain above the beaches, marking the rookeries of old times and tracks of slaughter of the sealers. Some bones occurred far up on the plain, the elephants having in times of security made their lairs far from the water's edge. A few whales' vertebræ were also seen lying about.

"On the opposite side of the plain from that bounded by the glacier is a stretch of low bare rock, with a peculiar smooth and rounded but irregular surface. This rock surface appears from a distance as if glaciated, but on closer examination it is seen to show very distinct ripple marks and lines of flow, and the rock-mass is evidently a comparatively recent lava flow from a small broken-down crater which stands on the shore close by.

* * * "Sir J. D. Hooker, in his latest memoir on the botany of Kerguelen Land, says: 'The three small archipelagoes of Kerguelen Island (including the Heard Islands), Marion and Prince Edward's Islands, and the Crozets, are individually and collectively the most barren tracts on the globe, whether in their own latitude or in a higher one, except such as lie within the Antarctic Circle itself; for no land, even within the North Polar area, presents so impoverished a vegetation.'

* * * "The sealers said that the climate of Heard's Island was far more rigorous than that of Kerguelen Land. In winter the whole of the ground is frozen, and the streams are stopped, so that snow has to be melted in order to obtain water. In December, at midsummer, there is plenty of sunshiny weather, and Big Ben is often to be seen. It is possible to land in whale boats, on the average of the whole year only once in three days, so surf-beaten is the shore, so stormy the weather.

"We saw six sealers; two were Americans and two Portuguese from the Cape Verde Islands. They were left on the island by the whaling vessels which we met with at Kerguelen Land, their duty being to hunt sea-elephants. The men engage to remain three years on the island, and see the whale ships only for a short time in the spring of each year.

"On the more exposed side of the island there is an extensive beach called Long Beach. This is covered over with thousands of sea-elephants in the breeding season, but it is only accessible by land, and then only by crossing two glaciers or icebergs, as the sealers call them. No boat can live to land on this shore, consequently men are stationed on the beach, and live there in huts; and their duty is constantly to drive the elephants from this beach into the sea, which they do with whips made of the hide of the elephants themselves. The beasts thus ousted swim off, and often 'haul up,' as the term is, upon the accessible beaches elsewhere, and there they are killed and their blubber is taken to be boiled down.

"In very stormy weather, when they are driven into the sea, they are forced to betake themselves to the sheltered side of the island; hence the men find that stormy weather pays them best. Two or three old males, termed 'beach masters,' hold a beach to themselves and cover it with cows, but allow no other males to haul up. The males fight furiously, and one man told me that

he had seen an old male take up a younger one in his teeth and throw him over, lifting him in the air. The males show fight when whipped, and are with great difficulty driven into the sea. They are sometimes treated with horrible brutality. The females gave birth to their young soon after our arrival. The new born young are almost black, unlike the adults, which are of a light slate brown, and the young of the northern bladder-nose, which are white. They are suckled by the female for some time, and then left to themselves lying on the beach, where they seem to grow fat without further feeding. They are always allowed by the sealers thus to lie, in order to make more oil. This account was corroborated by all the sealers I met with. I do not understand it; propably the cows visit their young from time to time unobserved. I believe similar stories are told of the fattening on nothing of the young of northern seals.

"Peron says that both parent elephant seals stay with the young without feeding at all, until the young are six or seven weeks old, and that then the old ones conduct the young to the water and keep them carefully in their company. The rapid increase in weight is in accordance with Peron's account.

"Charles Goodrich gives a somewhat different account, namely, that after the females leave their young the old males and young proceed inland, as far as two miles sometimes, and stop without food for more than a month, and during this time lose fat. The male elephants come on shore on the Crozets for the breeding season about the middle of August, the females a little later.

"There are said to be forty men in all upon Heard's Island. Men occasionally get lost upon the glaciers. Sometimes a man gets desperate from being in so miserable a place, and one of the crew of a whaler that we met at Kerguelen Land said, after he had had some rum, that occasionally men had to be shot; a statement which may be true or false, but which expresses at all events the feeling of the men on the matter.

"The men that we saw seemed contented with their lot. The 'boss' said, in answer to our inquiries, that he had only one fur-seal skin, which he would sell if he was paid for it, but he guessed he'd sell it anyhow when he got back to the States. He had been engaged in sealing about the island since 1854, having landed with the first sealing party which visited the island. For his present engagement his time was up next year, but he guessed he'd stay two years more. He'd make $500 or so before he went home, but would probably spend half of that when he touched at Cape of Good Hope on the way.

"The men had good clothing, and did not look particularly dirty. They lived in wooden huts, or rather under roofs built over holes in the ground, thus reverting to the condition of the ancient British. Around their huts were oil casks and tanks, and a hand-barrow for wheeling blubber about. There were also casks marked molasses, flour, and coal. The men said they had as much biscuit as they wanted, and also beans and pork, and a little molasses and flour. Their principal food was penguins, and they used penguin skins with the fat for fuel. Capt. Sir G. S. Nares saw five such skins piled on the fire one after the other in one of the huts."*

THE AUCKLANDS, BOUNTY ISLES, ANTIPODES, AND STEWART'S ISLAND.

About the year 1800 Vancouver reported that fur-seals could be found in abundance on the southwest coast of Australia. It was not long before vessels started in search of them. The brig Union, of New York, Captain Pendleton, went there in 1802, but being unsuccesful in finding seals

* Notes by a naturalist on the Challenger, being an account of various observations made during the voyage of H. M. S. Challenger around the world, in the years 1872–1876, under the command of Capt. Sir G. S. Nares, R. N., K. C. B., F. R. S., and Capt. F. T. Thompson, R. N., by H. N. Moseley, M. A., F. R. S., Fellow of Exeter College, &c., with a map, two colored plates, and numerous wood-cuts. London: MacMillan & Co., 1879. 8 vo., pp. i–xvi, 1–620.

abundant the vessel proceeded to Border's Island, where some 14,000 skins were taken and sold at Sydney. In a further search for seals the Union visited the Antipodes and left a crew of men there to take seals and await the return of the vessel, but she was lost on a southern cruise and the men on the island were rescued by an English vessel. They had taken some 60,000 skins, which were carried to China by a vessel chartered at Sydney. (See p. 446.)

"Auekland's Group" says Captain Morrell, "as it is called in the charts, is a cluster of islands, only one of which is large enough to deserve the name, and that is 25 miles in length from north to south, and 15 in width from east to west. It is situated about 250 miles south of New Zealand, and as many leagues southeast of Van Dieman's Land, being in the South Pacific Ocean, in latitude 51° south, longitude 166° 20′ east. It was discovered with its surrounding islets by Capt. A. Bristow, in 1806. It is moderately elevated, the highest points being about 1,500 feet above the level of the sea.

* * * "In the year 1823 Capt. Robert Johnson, in the schooner Henry, of New York, took from this island (Auckland) and the snrrounding islets about 13,000 of as good fur-seal skins as were ever brought to the New York market. He was then in the employment of Messrs. Byers, Rogers, McIntyre & Nixon, who fitted him out on his second voyage in the Henry, in the most complete and liberal manner, in the year 1824. From this voyage he never returned. He was last seen at the south cape of New Zealand in the following year, having lost three men, who were drowned at Chatham Island. Captain Johnson and the remainder of his crew were then in good health, and had 1,700 hundred prime fur-seal skins on board the Henry. My informants further stated that the Henry left New Zealand on a cruise to the south and east in search of new lands between the sixtieth and sixty-fifth degree of south latitude, and as he had never been heard of since leaving New Zealand it is very probable that he made discovery of some new islands near the parallel of sixty, on which the Henry was shipwrecked.

"Although the Auckland Isles once abounded with numerous herds of fur and hair seal, the American and English seamen engaged in this business have made such clean work of it as scarcely to leave a breed; at all events, there was not one fur-seal to be found on the 4th of January, 1830. We therefore got under way on the morning of Tuesday, the 5th, at 6 o'clock, and steered for another cluster of islands, or rather rocks, called 'The Snares,' 180 miles north of Auckland's group, and about 60 miles south of New Zealand.

"This cluster of craggy rocks is in latitude 48° 4′ south, longitude 166° 18′ east; extending 5 miles in the direction of east-northeast and west-southwest. They were first discovered by Vancouver, who gave them a name expressive of their character as being very likely to draw the unwary mariner into alarming difficulties. We searched them in vain for fur-seal, with which they formerly abounded. The population was extinct, cut off root and branch by the sealers of Van Diemen's Land, Sydney, &c."*

The Bounty Isles were discovered by Lieut. William Bligh, in the English vessel Bounty, September 19, 1788, in latitude 47° 44′ south, and longitude 179° 7′ east. They are thirteen in number; are 145 leagues east of the Traps, which are near the south end of New Zealand. Capt. George F. Athearn states that no seal skins have been taken from these islands in recent years. Captain Biscor, in the brig Tula, in 1832, visited them for the purpose of taking seals, but it is said with very indifferent success. Lieutenant Bligh describes these isles as of small extent being only 3½ miles from east to west, and about half a league from north to south. Their number, including the smaller ones, is thirteen. The most western of the isles is the largest. They are sufficiently

* Morrell's Voyages, p. 363.

elevated in some parts to be seen from a vessel's deck at a distance of 21 miles. They cannot afford any kind of vegetable production. A few birds and seals are all these desolate rocks can support.

The Antipodes is a small group of uninhabited isles southeast of New Zealand, and are so called from being nearly opposite to Great Britain. Their latitude is 49° 42′ south, and longitude 178° 43′ east. Besides the 60,000 fur-seal skins taken at these islands in about 1804 by a crew of the American brig Union, it is probable that many other cargoes of which we have no record were also obtained here.

Stewart's Island, just south of New Zealand, Chatham Island to the east, Campbell's Island southeast of the Aucklands, and the Royal Company's Island in the same latitude as the Aucklands, but farther west, have all been visited by vessels in search of fur-seals and from them more or less skins have been secured.

3. SEALING VESSELS AND CREWS.

Sealing vessels and their outfit.—The Antarctic seal fishery is an exceedingly dangerous pursuit, and requires vessels of strong build and thoroughly equipped with heavy anchors and chains and necessary apparatus for battling with storms and ice. They are frequently employed in whaling as well as sealing, so that in addition to the equipment for sealing they are provided with try-works and whaling implements.

A typical sealing vessel of the present day is a schooner of from 60 to 150 tons, well coppered and thoroughly caulked. The spars are shorter and stouter than those of an ordinary fishing schooner, and the rigging and sails are of the strongest materials. The outfit consists of from three to five 28-foot boats, camps and equipage for the location of men on seal islands, clubs, guns, ammunition, lances, knives, two suits of sails, extra clothing for the crew, supplies of salt for preserving the skins and provisions for one or two years. The salt is either taken from the home port or obtained at Cape Verde Islands, and is stowed either in casks or bins. It must be of moderate fineness, for if too coarse it will not sufficiently cover the fleshy part of the skins. Neither Liverpool nor Turk's Island salt have been found suitable for preserving seal skins. In small vessels it is customary to carry the salt in bins, which are afterwards used for packing a portion of the skins, while the remainder of the skins are stowed in casks. There are usually two salt-bins, one on each side of the hold, of a total capacity of 500 to 600 bushels. Large vessels take their salt and pack their skins in casks. About 300 bushels of salt are needed to preserve 5,000 skins. In the hair-seal fishery, on the coast of Newfoundland, the vessel's hold is "pounded off" into bins only a little larger than the skins, which are spread out flat and plentifully sprinkled with salt.

The provisions consist of barrels of beef, pork, bread, and vegetables, canned goods and cabin stores enough for about two years. The ground-tier of casks is filled at home with a three months' supply of water and refilled as opportunity affords.

Boats employed in this fishery are about the same as the ordinary 28-foot whale-boat. They are made a little stouter and more burdensome than the whale-boat, but of the same general style, and are used in transporting men, skins, and apparatus between the vessel and shore.

The outfit for a sea-elephant voyage is the same as for fur-sealing, with the addition of extra casks for the oil. These vessels, however, carry no salt unless they expect to find fur-seals on their voyage.

In the early days of the fur-seal and sea-elephant fisheries, many of the vessels were of large size, sometimes ships of 300 tons, and accompanied by small schooners or sloops that served as tenders. This custom is still practiced in the sea-elephant fishery, but in fur sealing the scarcity

of seals has led to the employment of ordinary schooners. It was formerly customary for materials to be taken by the larger craft for the construction of small vessels of 20 or 30 tons, which were built at the islands and employed in cruising along shore, and men were landed at suitable points for the capture of seals.

At Heard's Island, in the sea-elephant fishery, the ships were securely anchored in the harbors and partially unrigged, and a few men left aboard as ship-keepers. The balance of the crew, and the furnaces, try-pots, and sealing implements, also casks for the oil, and camp equipage, were transferred to the tenders that landed men and apparatus at convenient points. The tenders then anchored until a supply of oil was secured, or continued cruising about transferring gangs of men from one point to another or searching off shore for whales.

Several of the sealing schooners were formerly regular fishing vessels. Among vessels of this class were the Charles Shearer, Thomas Hunt, and Florence, which were bought from Gloucester, where they had been employed in the cod and mackerel fisheries. The Florence was refitted at New London, Conn., in 1872, and sailed for the Cape Horn region, where, after a series of hardships, she finally succeeded in securing a very valuable cargo of skins and returned home in 1876. She sailed again the same year, and arrived home April 6, 1877, when she was sold to take part in Captain Howgate's Arctic Expedition to Cumberland Inlet. The Charles Shearer was refitted as a sealing schooner in 1874, and sailed for Cape Horn and South Shetlands. She arrived home in 1875, having taken 1,600 fur-seal skins, worth about $16,000. On this voyage she lost her entire ground tackling on two occassions near Cape Horn. This vessel sailed on a second voyage in 1875 and returned in 1876 with 2,700 skins, worth $16,000. Five men were lost by drowning and two were massacred by Indians. The vessel was with difficulty saved from capture. In 1876 the Charles Shearer sailed again, and returned in 1877 with 400 seal skins and 50 barrels of sea-elephant oil. She sailed on her last voyage in 1877 and never returned. She was valued, with outfit, at $16,000, and carried 22 men. In July she left Stonington, and in October left a sealing crew of seven men, under charge of the second mate, on the island of Diego Ramirez, with camp equipage, apparatus, and provisions for sealing. The vessel took her departure for the South Shetlands, but was never heard from. In 1878 the United States Government sent a vessel in search of her, but she could not be found. In 1879 the schooners Express and Thomas Hunt were at South Shetlands, but found no trace of the Charles Shearer. The men left on Diego Ramirez were taken off in March, 1879, by the ship Jabez Howes, jr., and landed at San Francisco. They had secured 800 skins, that were brought to Stonington by the Thomas Hunt.

The schooner Thomas Hunt was brought from Gloucester in 1872 and fitted for sealing at Stonington, Conn. This vessel has made several successful voyages and is still employed in sealing about Cape Horn. Another sealing vessel, formerly a Gloucester fishing schooner, was the Flying Fish. This vessel sailed from New London, Conn., in 1870, and after making several sealing voyages, on some of them as tender to the bark Trinity, was abandoned off Cape Horn in 1878. Since the year 1870 two ships, two barks, one brig, and nineteen schooners have been engaged in the fur-seal and sea-elephant fisheries. One of the barks was withdrawn from the business in 1874; the other was lost in 1881. The ship Roman was refitted for whaling in 1876, and the other ship, the Nile, is "hauled up to die" at New London. The brig is still employed in the fishery.

The bark Trinity sailed from New London, Conn., on June 1, 1880, on a sea-elephant voyage to Desolation and Heard's Islands. Up to November, 1881, no news had been received from her, and as she was expected home in the spring of 1880 it was feared that the vessel had been wrecked at Heard's Island, though perhaps the crew might survive. Accordingly, the United States steamer

Marion was ordered to visit the island. The Trinity was found to have been wrecked, but the crew, with two exceptions, were alive and in good health. They returned home to New London in the spring of 1882.

THE CREWS OF SEALING VESSELS; SETTLEMENT OF A VOYAGE.—The number of men required to man the vessels varies from twenty-four to thirty-five according to the number of boats taken. Most of the crew are shipped at the home ports, but a limited number of green hands are taken at Cape Verde Islands, the natives of this place being adepts at both whaling and sealing.

In the fitting out of the vessel the owners furnish all the apparatus and everything needed for the voyage, charging advances in cash or clothing to the officers and crew, awaiting the result of the cruise for payment. All the crew receive shares in the net proceeds after deducting advances, interest, and insurance, and extra expenses incurred on the voyage.

The proportionate shares vary on different vessels according to the number and experience of the men in sealing. At times a superior master gains a percentage above his share and the crew sometimes receive deserving shares besides their regular allowance. The captain is usually allowed from one-eleventh to one-fifteenth of the net proceeds, first mate one-twentieth to one-thirtieth, second mate one-thirtieth to one-fiftieth, third mate one-fortieth to one-sixty-fifth, sealers one-eightieth to one one-hundred-and-twenty-fifth, and green hands one one-hundred-and-seventy-fifth to one two-hundredth.

The following statement shows the method of settling a voyage at one of the New England sealing ports:

Account of settlement of an Antarctic fur-seal voyage.

One thousand four hundred fur-seal skins sold in London		$32,091 89
Less packing, freight, and insurance	$583 74	
Commission on sales	830 90	
Cartage in New York and traveling expenses	77 25	
		1,491 89
Net proceeds		30,600 00

Crew's share.

One-fifteenth net proceeds	$2,040 00
One-twentieth net proceeds	1,530 00
One-thirty-fifth net proceeds	874 28
One-fifty-fifth net proceeds	556 36
One-sixtieth net proceeds	510 50
One-seventy-fifth net proceeds	408 00
One one-hundredth net proceeds	306 00
One one-hundred-and-fortieth net proceeds	218 57
Twenty one-hundred-and-eighty-fifths net proceeds (twenty men at $165.40)	3,308 00
	9,751 71

DR. *Peter McEuen in account with schooner ——— and owners.* CR.

To paid advances, hoard, clothing, and cash	$58 50	By $\frac{1}{185}$ pay in net proceeds, sale of cargo	$165 40
To schooner's bills on voyage	15 15		
To interest and insurance on advance	11 68		
To pay, day's fitting, and discharge	15 00		
To cash to balance	65 07		
	165 40		165 40

Received ———, of ——— ·———, managing owner, sixty-five and $\frac{7}{185}$ dollars, in full of all demands against schooner ———, her owners, officers, and agent, of whatsoever nature, in above voyage.

(Signed) ——— ———.

4. METHODS OF CAPTURE AND OF TAKING THE SKINS AND OIL.

THE FUR-SEAL HUNT.

Fur-seals, according to their sex and age, are known to the sealers as wigs, or adult males; bulls, or those not quite as old; clapmatches, or adult females; yearlings, or the half grown of both sexes; gray or silver pups, which are the young of nearly a year old; and the black pups, or the very young before their coats are changed to gray.

In size there is a great difference between the male and female, the former, when full grown, being about 7 feet in length, while the latter never exceeds 4 feet. The large males are not the most numerous, but are very powerful.

Having reached the seal islands measures are at once taken to effect a landing and search for the animals. This is often the most difficult part of the sealer's work. It may be several weeks before it is possible to get ashore, so dangerous is the boiling surf. Having at last made a landing the men proceed to erect rude huts or set up their tents, in which to pass perhaps months before the vessel shall return to take them off. At the island of Diego Ramirez, off Cape Horn, the vessels usually land two boat crews, with salt and tents and provisions for two months, during which time the men are expected to take and salt as many skins as possible, to be ready when their schooner returns, which may be at the appointed time or they may be left for an entire year, misfortune having overtaken their comrades. At Staten Land, also off Cape Horn, the custom is for vessels to anchor in harbors on the north side of the island, and the men in boats go round to the south side and gather the skins, hauling their boats upon the beach and using them as shelter at night. Each man takes with him a water-tight bag of provisions. In a few days they will return to their vessel with the skins they have taken, and after receiving a fresh supply of provisions return to the shore for more seals.

In the South Shetland seal fishery the vessels are anchored in the safest harbors, and crews sent out in boats to cruise along the shores and to capture seals wherever they can be found.

The common implement of capture is an oak or hickory club about 5 feet long, with which the animal is stunned, and if need be is stabbed with the sealing knife. At the present day the animals have become so scarce and shy at the once favorite resorts that the hunter often has to watch and wait for them singly, and it is frequently difficult to approach near enough to dispatch them with the club, so that a rifle must be used. Where new rookeries are found the seals are quite tame and are easily approached and clubbed. The rifle is never used unless absolutely necessary, for it makes holes in the skin that greatly reduce their value.

"In former times," says Scammon, "when fur-seals abounded, they were captured in large numbers by the ordinary seal-club in the hands of the sealer, who would slay the animals right and left by one or two blows upon the head. A large party would cautiously land to leeward of the rookery, if possible; then, when in readiness, at a given signal all hands would approach them shouting and using their clubs to the best advantage in the conflict. Many hundreds were frequently taken in one of these 'knock-downs,' as they were called. As soon as the killing was over the flaying commenced. Some sealers became great experts in skinning the animals, and the number of skins one would take off in the course of an hour would be a decidedly fishy story to tell. However, to flay fifty seals in a day would be regarded as good work. It will readily be seen that a sealing-ship's crew, numbering twenty or more, would make great havoc among a seal rookery in very short time, and it is no matter of surprise that these valuable fur-bearing animals soon became comparatively scarce."*

*Marine Mammalia, p. 153.

As soon as possible after the animal is killed it is skinned. This work is done on shore, and the method now employed in stripping the seal is to make a cut with a sharp knife through the skin around the throat just above the ears, leaving those appendages on the pelt, then down the chest and belly to the extreme lower part, then cut around the flippers. The skin is now cut free from the body and is prepared for salting or drying, while the carcass is left on the rocks to be devoured by birds.

Prior to 1815, about the only market for the sale of the skins was China, where they were exchanged for tea and other commodities. They were mostly dressed in the same manner as hair seal, for the hide. The fur was cut off clean and thrown away as useless, and the hides were used in the manufacture of trunks, valises, &c.

From 1820 to 1840 the fur-seal skin was taken from the animal in the same manner as a calf or sheep is skinned, leaving the pelt with about one-fourth of an inch of blubber still adhering to it. Since 1840 they have been skinned so as to leave nearly all the blubber on, but when deposited at camp or on board the vessel they are placed upon a board about 16 inches wide, or upon an empty barrel, and beamed by cutting all the blubber from the pelt. They are then washed or soaked from blood and dirt, and are pressed for a day or two by putting in piles, thus removing the water. They are then freely salted and tied up in bundles in book form; sometimes booked snug with salt and tied; sometimes loosely booked and put in bins or packed; and sometimes packed in bench after having been resalted, skins to fur, with salt between, in casks. After this has been done they will require resalting within four months and looking after before passing the warm latitude. Slack salting and want of proper care will bring ruin to the fur or pelt by heating and causing the fur to come out wherever the skin is not completely cured or salted. It is not considered safe, even after a pelt is no longer capable of absorbing salt, to have them packed in piles for over four months without overhauling, as they are liable to become heated.

The skins were invariably dried before the year 1815, since which time they have always been salted, except in exceptional cases, when a few have been taken by natives, or where the stock of salt on the vessel has been exhausted. The proportion dried under these circumstances would not be more than 1 per cent. of the number of skins brought to market.

Sealers now beam down close and clean. At the same time if one-fourth of an inch of meat is left on the pelt it is safer, for the meat takes the salt better than the pelt, and the skin is thus "cured to greater safety."

The skins are ready to pass into the hold of the vessel as soon as washed and drained of water, when they may be salted and packed, as before described.

CAPTAIN ATHEARN'S ACCOUNT OF FUR-SEAL HUNTING.

The following letter of advice was written a few years ago by Capt. George F. Athearn, of West Tisbury, Mass., to Capt. Thomas Warren, who was about to start on a fur-seal voyage to the Bounty Rocks.

Through the kindness of Captain Athearn we are permitted to publish this letter which contains very valuable information concerning the habits of the Antarctic fur seal, the methods employed for its capture, and the care of the skins:

"I will now write what I should do if I was going on a sealing voyage such as you are now about to start on. First, I should use every reasonable means of making the best of my way to the seal islands. I have always found it best to be on hand and in season, so as to have some leeway for bad weather. The great trouble in working fur-seal islands and rocks is in landing the salt and provisions. There is not much trouble in taking off skins, for they can be taken off with ease when you could not land a thing.

"HABITS OF THE SEALS.—Now I will state the habits of the fur-seals of Cape Horn: About the first of November the old wigs (which are the old male seals) come on shore to form the rookeries for the pupping season which is soon to follow. When the old wigs come on shore all the clapmatches (or female seals) that reared pups in the year past are still on the rookeries with their young, which are now yearlings, and prime skins. The old wigs when they arrive make it their business to drive all the yearlings off the rocks, and as soon as they accomplish this the clapmatches leave and take to the water, leaving the rocks in charge of the old and young wigs.

"About the 25th of November the young clapmatches of four or five years, that are to have their first pups, come on shore, and I have seen a pup as early as the 20th of November, but the main herd of the old clapmatches do not begin to haul in any great number before the 5th of December, and from that to the 25th of December they come in fast. I don't think it is a good plan to commence killing until they get well into pupping. Don't kill any of the old wigs until you have worked off most of the clapmatches, or near the end of the pupping season, as they hold the other seals and will not let them go off the rocks if they can prevent it. If you should want all the seals that are on the rocks to make up your cargo, you can all through the pupping season be working off the young wigs, which are always hauled in small rookeries near the pupping seal, driven there by the old wigs.

"Great care should be taken, if the men are landed when the wigs begin to haul, to make as little show as possible for a few days, until they get well settled, and when the wind blows from the house direct to the rookeries it is best at that season to make as little smoke as possible, for the seals have a scent equal to any dog.

"You will bear in mind that the full grown clapmatches, or young wigs that are larger, are the most valuable. The next in value are the two and three year old seals, that haul at different times on the rocks. The yearlings that are driven off in November are prime skins, and taking into account how much less work it is to skin them, and how much less salt, and room they take, they are worth striving for. The large old wigs are of the least value, taking more work, salt, and room. Still they are better than nothing.

"You must try and get to the island in time to get all of last years pups with the clapmatches. If you can get there thus early it will give you a great start and make everything smooth for you; but if you cannot get there in time to take the young seal season, get there as soon as possible, and be sure that you examine the islands and rocks thoroughly.

"What I have written about the habits of the fur-seal applies to the region of Cape Horn. It may be possible that where you are going their habits may be different, for at the South Shetlands there are no seal on shore from March to the middle of November. Also at South Georgia, with a lower latitude than Cape Horn, the seal, after shedding the last of February, take to the water and do not return till the following November. If they should work the same where you are going you see that if you arrive there in September, or up to the middle of October, there may be very few if any seal hauled, so of course you will have to land and examine the rocks, and it will be easy for you to tell if there has been any number of seal in the habit of hauling there, although the frequent rains of that latitude will wash away much of the evidence of the past season, so you will have to use your own judgment. Don't condemn in haste. Make sure you are right.

"THE SEAL HUNT.—If you get to the islands early in the season, and find the seals hauled in such numbers that you think there is a good chance to use up all your salt and more besides, I will tell you what I should do. Land all the men that could work to advantage, with the best man I had to head them, with provisions to last all the season, and all the salt except enough to result what skins they could take in the time that I could wait and still have time to get back

with the salt in time for the pupping season. You know when the pupping season comes on, and can calculate the time it will take you, but be sure and make plenty of allowance for bad weather.

"I should first go to Port Chalmers. I have been informed that a vessel leaves there for England once a month. If such is the case it would be the best place for many reasons for you to go to ship your skins and get salt. First, it is so near your work that there will be plenty of time for you to write the owners so they can get the skins insured here or in England.

"If I got out there early and saw a great show of seals, I should get as many on board as I could without running any risk of not getting back in time. I would leave on the rocks all the men that I thought would blab; go to the most convenient port, ship my skins, get what I needed and go back to the rocks, and finish up the season and go to Valparaiso without touching at New Zealand, and I should expect to have another season without company.

"You will remember that you cannot get all the seal from a rookery in one season. If you get 3,000 the first season you may expect to get 1,000 or more the next, and in the same proportion for a large or smaller number. If I went to Valparaiso I should write the agent in London, which the owners had directed me to ship to on their account, one steamer before I sent the skins, so that they could insure them, and then I should write them that I had shipped so many prime skins, all in good order, taken in a high southern latitude, of course not mentioning the place. They class skins differently from what we do, calling clapmatches 'middlings', three-year old seal 'large pups', two years old 'smalls', and yearlings 'small pups', which is all set forth in their catalogue, one of which I will furnish you for future use.

"I have been in the habit of landing a boat with the men if there was any outstanding rocks with seal on them, so that the men in good weather could go and work them off. I think you will find on the Bounty Rocks seal on more than one of them; also, you will find the Western Rock the largest, as in most cases the groups of small islands and rocks in high southern latitudes are found so. If the weather rocks have the best show of seals of course you will land your men on them, and if the smaller rocks to leeward have any seal, they will be more easy to work by boats in good weather, from being somewhat protected by the rocks to the westward. I think dories will be the best boats to use at the Bounties, they are so easy to launch or haul up. I shall favor your having at least two dories, but the men must be careful to haul them high up above any marks of the sea, and turn and lash them in the most sheltered place or they will lose them.

"Be sure and warn the men to pitch their tents in as high and sheltered a place as possible; also to store the salt, and salt the skins higher up than seems really necessary. I make these remarks because I once worked a rock two seasons. The first season we stored the salt and salted the skins in a cave high up, and, as we thought, safe from the sea. All through that season the weather was as bad as we had in any season, but no sea came near the place. In the short time that the men were away there came a sea just right to wash over that part of the rock, and washed the cave out clean, loose rocks and all, so we took the hint the next season and salted higher up.

"I should make and have on hand, besides the tent coverings, a good lot of tarpaulins, large enough to make a tent for two or three men and their traps. They will never come amiss, for they are handy to cover up salt and skins on the rocks. I think you will find it necessary at the Bounties to land two or three men at a time on the outlying rocks to work them off. Great care should be taken in approaching an unknown island or group of rocks. During a strong wind and extra heavy swell is a good time to go for them. In such a time, by keeping a good lookout the hidden dangers will be very apt to be seen.

"After having men landed through several spells of bad weather from different quarters, if they are at all observing they will see and take the bearings of all the shoal places, and by so doing they will make it easier for the vessel to work afterward.

"FOOD FOR SEALERS.—I will advise you, as a very necessary thing, to see that your men, at least those who are landed, eat plenty of seal meat, for it is necessary for their health. There is no danger of any man getting the scurvy if he will use seal meat freely, and as soon as they have used it a few days they will use no other meat, for it is first-class, and the pups that are three or four months old are as good as any pig. Take and clean a young seal, cut off all the fat, stuff and roast it as you would a pig, and you have a delicious dish. You may think this needless advice, but I will give you my reasons for it.

"I was working seal in Terra del Fuego for forty months, without coming away from there, three winters and four summers, and by using plenty of seal meat, as I claim, I preserved the health of my crew, for I did not have a sick man during the entire time.

"The first three seasons no other vessel accompanied us; the fourth season there were several other vessels. They landed their men and every one of them lost men by scurvy, and even the crews of the vessels were taken down by it, and this all in one season. One schooner came and anchored in the same place with me. When I went on board the captain told me that he had lost three out of six men that he had landed, and that he had one on board so bad that he could live but a short time, as he was unable to move. I asked him if his men used seal meat. He said he had told them to use it but they thought the meat was not good and would not use it. I told him I had the same trouble with my men during the first part of the voyage, and had to make the men eat it. The last three seasons they would not use any other meat. If one of your men should get the scurvy give him raw seal meat soaked in vinegar.

"October is the laying season in high southern latitudes. If you get there by that time you will be able to get any quantity of eggs of different kinds. There are some kinds of penguin that are almost always found on or near seal rocks. By clearing off the rookeries and collecting the eggs as soon as laid these penguins can be kept laying up to February. All the different kinds of young birds are good eating.

"CARE OF THE SKINS.—You will have men with you that have been in the business before. Still I will write you how to take care of skins. The way to skin a seal is to cut around the flippers; then rip the belly open from tail to throat; then cut around the head forward of the ears, leaving the ears on the skin. Take the blubber off with the skin. Be sure and soak the blood well out, for on this depends in great measure the curing of the skin. After being well soaked pile them in small heaps to drain. Then flinch them by cutting the blubber smoothly off, leaving from one-eighth to one-fourth inch of blubber on the skin. Be sure to caution the men to hold their knives flat in flinching if they will cut down to and into the skin in steps the whole length. A skin so flinched, although there may be no holes clean through it, will go 'damaged in dressing,' and of course they will make a damaged skin of it. Every defect will be seen in London.

"A flinching-board should be about 6 feet long and from 1½ to 2 feet wide, with legs long enough for a man to work without bending too much. The legs can be made to unship, so as to save room. Brace up the board the right slant, take the skin by the neck, swing it over the board with the flipper holes on the board, draw the knife across the blubber where it hangs straight on the board, and cut it off smoothly to the tail, leaving the tail on the skin. Then turn the skin around and flinch the neck. In salting care should be taken to rub the salt well into the edges and the neck of the skin, for in kenching or booking them up the edges are very apt to roll up and if not well rubbed with salt will get pink and damaged.

"I think the best way to salt skins on the rocks is to build up a place with rocks high enough to let the rain water run under them. Take the largest skins and form a circle with the tails in the center, each skin laid down blubber side up. After rubbing well with salt and leaving enough on to cure it, which will depend, of course, on the size and thickness of the skin, take and fold in the sides far enough to take in the flipper holes. Then fold over the neck far enough so that it will not turn back. By so doing the outer edges of the circle will be kept the highest and will keep in all the pickle. If the edges get too high the small skins can be salted spread out flat in the center.

"When taken on board the vessel the skins should be examined, and if there are any places that are clear of salt and feel soft and look pinky, and a little thicker than the rest of the skin, care should be taken to rub salt well into those parts. On board the vessel they can be salted anywhere that there is room to form a kench clear of water underneath, or they can be booked up and stowed away.

"To book a skin, fold the sides just as in kenching, then fold neck and tail in until they meet equal, and then fold again. A large skin would have to be folded more times than a small one.

"There are a few things that are handy for the men to have on the rocks, such as a small hook like a cotton hook, for each man; also a hook or two for each rock, like a chain-hook, only shorter, shanked with an eye large enough to bend a rope in. These are very useful to haul seal out of caves, gulches, and cracks in the rocks. Almost always in killing a large number of seals at one time a good many will tumble down in gulches in heaps. These should be hauled out as soon as possible and laid separate on the rocks so as not to heat. If there are a great many and the day is warm it would be well to rip them open and let the heat out.

"In resalting skins for shipment I just cover the lower head of the cask with salt, book up the skins, stow in a course as tight as possible, stamp them down, sprinkle salt on them, and so on with successive layers until the cask is full."

FUR-SEAL HUNTING IN 1797.

In the unpublished diary of Eben Townsend, before alluded to, we find the following interesting account of the manner of taking the fur-seals and the care of their skins in the early days of the fishery.

Under date of States Harbor, Falkland Islands, December 25, 1797, Mr. Townsend says:

"In the middle of winter we left James Ellis on one of the islands to take care of skins. He carelessly got out of fire, and was without it fifteen days. The principal inconvenience was that he could not cook, was obliged to eat his limpets and pork raw. He did not suffer from the cold. The fuel used by a sealing crew among these islands is the blubber or fat of the seal. This makes the men nearly as black as negroes. They cook the haslet with the fat of the seal both for fuel and fat, and it tastes very much like a hog's haslet. A sealing crew want a good stock of bread, molasses, and peas for coffee, and they can get along with little beef and pork, but to be out of bread or molasses for sweetening their coffee is very uncomfortable. They get very much attached to what they call slops, which is tea and coffee, in this cold uncheerful country. We now have on board about 30,000 fur-seal skins, which we have got by great exertion. I believe every island where there was any prospect for seals has been thoroughly examined. We calculated on getting our cargo at these islands and are much disappointed at not having any more. There are some few hair-seals and sea-elephants among these islands, but they are now pretty well cleared of everything but birds and hogs.

"The fur-seal which we take have been by travelers distinguished by the name of sea-dogs and the ursine seal. We call the male 'old wigs' and the female 'elapmatches.' The hair-seal males are called sea-lions and the females 'clapmatches' also. The young seals are called 'pups' until they are old enough to be called yearlings. The hair-seals and the fur-seals never associate. The former always take a sandy beach and the latter always take a rocky one. They generally lay in rookeries of from three hundred to several thousand. We take them by getting between them and the water, and being frightened they huddle together when they are easily killed by a blow over the nose with a walnut stick about 3 feet long. They sometimes break through for the water and it is almost impossible to stop them. The old wigs take the lead and the others follow like sheep. They are sometimes on very high ground, but they will go off a precipice 50 feet, falling on their breast without apparent injury. Two or three years ago a man was knocked off by them from a high rock and dashed to pieces. They are not dangerous if a good lookout is kept, for they move slowly. Our men sometimes get bit by them, but it is through carelessness. After they are killed the next thing is to skin them. The blubber is generally taken off with the skin, as it is less labor than to skin close. The skins are then laid on a slab or tanner's beam, and the blubber all taken off very clean, close to the skin, with what the tanners call a beaming knife. After this they are all to be washed clean, the flipper holes sewed up, and carried to the pegging ground, which is frequently a considerable distance, and sometimes on another island. The pegging ground must be good clean ground, where it is clean and free enough from stones or rocks to get the pegs down easily with the hand. They are pegged out with ten pegs each, and one good long clear summer day will make them fit to come out of the pegs, but in this country we frequently leave them down a week, and sometimes three weeks. After they are out of the pegs, they are to be stacked and allowed to sweat a little, and in this way they are to be spread and stacked several times before they are sufficiently cured to take on board the ship. During the whole time they are in the pegs we are trimming them where they may curl so as not to receive the sun, and scraping them with our knives to remove whatever blubber may be left on them. While aboard ship they must be frequently shifted and beat to keep the worms out. The skins taken in the winter must be salted and freshened in the spring. This requires considerable labor, as they must be carried on board the ship to be salted, and then taken ashore to be dried. From West Point we had to carry the skins about 4 miles to the pegging ground, but it was by water. They were then carried up hill on our backs. There is a great deal of labor in getting a cargo of skins, but we would not mind that if we could find them. The seal produce young yearly, generally two pups; those among the islands appear to lay on the rocks most of the time. During the last two spring months they are off the rocks most of the time, probably to wean their pups, as the pups remain on the rocks. They remain off till near the pupping time again, which is early in the summer. The old wigs are very much scarred from their battles for the females. * * * Our shoes were not expensive here, as we generally wore moccasins. Taking a green seal skin, we put a foot on it and cut around it, sew up the heel, and run a string round the toe, which draws it up, and tie it on the instep. By walking it becomes leathered and soft to the foot. Hats got to be a very scarce article. Some made seal skin hats. I did my own washing and ironing, and did it well. Perhaps you would have laughed to see me ironing, but we have no idlers and boys. Steward and all go sealing."

CAPTURE OF SEA-ELEPHANTS AND CARE OF THE OIL.

The bulls or full-aged male sea-elephants are enormous animals, varying from 12 to 24 feet in length and from 10 to 15 feet in circumference. The females are scarcely one-third the size.

Males alone have an elongated snout or proboscis, which has given this species of seals the name of sea-elephants. When the bulls first land they are very fat, some of them yielding about 4 barrels of oil, but after remaining on shore for months and abstaining from food they are very lean and emaciated, and yield scarcely more than 30 gallons.

"The teeth of sea-elephants," says Lanman, "are short and deeply rooted, the molars small and pointed, and the caverns very large, and the power of their jaws so great that an angry bull has been known to seize a dead comrade, weighing a ton, and toss him a considerable distance, as a dog would a mouse.

"When quite young they are called silver-gray pups, from their color, but as they mature they become brown, the males inclining to a dark blue, and the females to a yellow shade; their home is the sea, but they have a fashion of spending much of their time upon the shore, occasionally going inland 2 or 3 miles, and luxuriating in fresh-water marshes." *

The sea-elephants annually haul up in herds upon the sandy beaches of barren islands. Their habits are in many respects similiar to the fur-seal, and the periods spent on land are divided into the bull, pupping-cow, brown cow, bull and cow, and March bull seasons. In the early part of September the bulls approach the shore and are soon followed by the cows, when the pupping season begins. About the middle if December, the young being old enough to take the water, the whole breeding herd leaves the shore. By the 1st of January, the yearlings, accompanied by a few females, called brown cows, come on shore to renew their coats. In February the full-grown males and females do the same, and by the 1st of May all, both young and old, have disappeared.

This animal produces nothing of commercial importance but the oil. The hide is porous, like pig skin, and is not utilized except by the sealers for coverings to their huts. The sealers often use the meat for food. The season for taking the sea-elephant at Heard's Island commences about the middle of October. They are then quite numerous, and will not leave the beaches. When the season begins, casks and camp equipage are transferred from the larger vessel to the tender. The tender then cruises along shore and on favorable beaches, where the surf will permit their landings, boat crews of seven men each are set ashore, furnished with implements of capture. At a place near the shore try-works are set up and a hut built for the accomodation of the men. One set of try-works is usually enough for all the boat crews who bring the blubber to the rendezvous. The huts are often of the rudest sort, being made of stone and covered with sea-elephant hides. Sticks are taken for hut poles. At Desolation the blubber is taken off to the vessel to be tried out, but at Heard's Island this work is more frequently done on shore.

In the capture of sea-elephants it is the custom of the sealers to go in the midst of a herd of the animals as they lie sleeping upon the sandy shores, and with a stout oak club strike the young animals upon the head, stunning them so that they are easily killed by thrusting a lance in their side. The young ones are thus easily dispatched and the larger animals are generally docile and killed without difficulty with the lance, though the great bulls must be killed with a rifle. The sealer advancing in front of an animal to within a few paces, it will rise on the fore flippers and at the same time open the mouth widely to send forth a loud roar; this is the moment to discharge the ball through the roof of the upper jaw into the brains, whereupon the creature falls forward, either killed or so much stunned as to give the sealer sufficient time to complete the destruction with the lance.

Having killed as many as can be conveniently cared for at the time, the men proceed to skin the animals and take the blubber. For this work they use a ripping knife with 10-inch blade. The skin is first removed and then the blubber is stripped from the meat, in what are called "horse

* CHARLES LANMAN, in Forest and Stream, January 2, 1879.

pieces," that are usually from 1½ to 2 feet long, and about 15 inches wide; in thickness they vary from 1 to 4 inches, according to the fatness of the animal. The blubber is now strung upon back poles or piled in wheel-barrows and taken to a running stream, where the sand and blood are washed off, and the pieces cut into strips about 2 inches wide which can be dropped into the bung-hole of casks that have been rolled to the spot. If, after stripping the animals, the blubber cannot be immediately cared for, it is buried in the snow or sand beyond the reach of birds, which are continually hovering about, and which devour the carcasses of the slain seals.

When convenient, as at Heard's Island, it is customary to erect try-works near the shore or running stream, where the blubber can be turned into oil and made ready for transportation to the vessel. It is often a work of extreme difficulty to get the blubber to the try-works, for it is sometimes carried several miles over slippery icebergs and rocky shores.

To prepare the blubber for the try-pot the strips that are now about 2 feet long, and 1 to 2 inches in width, are partially cut through at intervals of about an inch, and these strings of small pieces are ready for boiling.

The blubber of the sea-elephant is harder to boil than whale blubber. From try-works of 100 gallons capacity about 900 gallons of oil can be turned out daily.

Scraps remaining in the try-works are passed through a press to extract any oil that may be left after the boiling process; after coming from the press the scraps are used for fuel.

If the blubber is tried out on shore it is often a difficult task to get the casks of oil off to the vessel. To prepare a cask for rafting the quarter hoops are lifted and some beckets put on and the hoops are then replaced. The casks, sometimes to the number of fifteen or twenty, are bent on to the raft line at some distance apart, so that they will not strike one another, and are thus pulled to the side of the tender, which is anchored near the shore. Sometimes the raft-line is over 300 fathoms long.

Frequently the blubber is tried out on board the vessel, in which case the horse pieces from the animal are transferred from the beach to the tender by means of a raft rope, which is about 3 fathoms long, with an eye splice in one end, to which pieces of blubber are made fast and taken to the edge of the surf. The end of the rope is thrown to a boat just outside the breakers, and the raft of blubber is towed to the tender or vessel. This rafting process is called by the sealers "rock hopping."

Captain Scammon gives some account of the manner of hunting the sea-elephant at Heard's and Desolation Islands. He says:

"When parties from different vessels are located on the same beach the custom is for all to work together when killing the animals, as well as when skinning and cutting the blubber from the bodies into 'horse pieces.' These are thrown into one or more piles, after which the men of each party are ranged in squads, and each one, in turn, draws a piece from the heap, until all is disposed of. These divisions are made whenever the animals are found and killed in any considerable numbers; and if far from the rendezvous the blubber is 'backed' or rolled in casks to the main depot. 'Backing' is the stringing of eight or ten pieces on a pole, which is carried on the shoulders of two men; but if a cask is used, three men are allotted to each one of six or eight barrel's capacity, to roll which the distance of 2 miles is allowed to be a day's work. * * *

"While the ship is away, homeward bound, or returning to Heard's Island for another cargo, the tender may be at Desolation Island, picking up what scattering elephants can be found upon shores that once swarmed with millions of those huge beasts; or a short whaling cruise is made, until the time comes for commencing operations at the island.

"Hunting for the scattering animals about the shores of Desolation Island, between seasons,

is the most exposed and solitary pursuit either in the whale or seal fishery. The tender takes a detachment of the crew, and plies along the island coast, landing one or two men on each of the best beaches, with a supply of water and provisions; a tent or shanty is erected, partly of wood, partly of canvas; and the skins of the elephants furnish the floor, couch, and covering of the temporary habitation. Here the banished hunter or hunters rest at night after the fatigues of ranging along the shore, killing and flaying the animals met with, and transporting the blubber to a place of deposit, where it is buried, to prevent the gulls from devouring it, until taken aboard. As the season returns at Heard's Island, the vessels are usually 'on the ground'; the treacherous surf is again passed and repassed in the light, frail whale-boats, landing the fresh crew from home, who relieve those who have thus literally 'seen the elephant.' The time passes quickly away in the excitement of killing and flensing and again the floating fragment of the world departs for the land of civilization, leaving her last crew from home to pass an Antarctic winter amid the solitude of ice bergs and the snow-covered peaks of the mountain land. No passing sail is seen to break the monotony of their voluntary exile; even many varieties of sea-birds found at Desolation Island do not deign to visit them. Multitudes of penguins, however, periodically resort to the island, and their eggs, together with the tongues of the sea elephants, and one or two kinds of fish, furnish a welcome repast for all hands, by way of change from that substantial fare called 'salt-horse' and 'hard-tack.' Beside the close stoves in their apartments, which are heated with coal from the ship or the fat of the elephant pups, and the flickerings of a murky oil-lamp, the long winter evenings are passed in smoking and playing amusing games, 'old sledge' and 'seven up' being favorites, and the reckless joking that circulates among adventurers who make light of ill-luck and turn reverses into ridicule."*

The heavy surf about Heard's Island and the rocky shores make the place very dangerous to vessels, and many disasters have occurred there. Against the perpendicular cliffs at the north-westerly end of the island the schooner Frank was dashed to pieces. The crew was rescued by the noble efforts of one of their number, who with great difficulty climbed the rough cliffs and helped his comrades off. In 1860 the schooner Exile was driven ashore at Whisky Bay. The schooner R. B. Sawyer was lost at Stoney Beach, and the schooner Mary Powell was wrecked at a great flat iceberg south of Fairchild's Beach. On a reef of rocks near the long sandy point at the southerly end of the island the Alfred, of Fairhaven, and the R. B. Coleman were driven ashore and wrecked.

Capt. Alfred Turner was at Heard's Island in February, 1863, in the schooner Pacific. No other vessels were there at the time. Three men were left on board as ship-keepers while the crew were ashore hunting elephants. The anchor chains parted in a gale at night. The foresail was set but they could not succeed in getting the vessel off shore, so they drove her on a sandy beach, and in two hours she went to pieces. The men jumped in the surf and swam ashore. Some provisions drifted ashore, and these, added to what had been landed for the hunters, sufficed to keep the entire crew alive till the following October, when another sealing vessel came to the island and rescued them. During their residence there the men kept at work killing elephants and trying out the blubber, so that they managed to accummulate considerable oil.

The experience of the crew of the bark Trinity in 1881, mentioned on a preceding page, was similar that of the Pacific's crew.

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* SCAMMON: Marine Mammalia, pp. 123, 113.

5. STATISTICAL REVIEW OF THE FISHERIES.

EXTENT OF THE FISHERIES IN 1880.—In 1880 the Antarctic sealing fleet numbered ten vessels, aggregating 1,277 tons, valued with outfits at $103,000. The crews numbered two hundred and seventy-two men. The products for the same year were 9,275 fur-seal skins, valued at $90,431, and 42,000 gallons of sea-elephant oil, valued at $21,420. The skins were mostly exported to London to be dyed. The oil was refined and used for illuminating purposes, and mixed with sperm oil for lubrication of machinery. The manner of dressing and dyeing the skins and the preparation of the oil will be discussed in another section of this report.

The total number of fur-seal skins taken by the Antarctic fleet from 1870 to 1880 was 92,756, and the quantity of sea-elephant oil brought home during the same period was 1,071,472 gallons. Earlier statistics of this fishery are given in the review at the beginning of this chapter, and also in the list of sealing voyages below.

The following tables show the total number and class of vessels in the Antarctic fleet during each year from 1840 to 1880, and also the number of vessels from the various New England ports during the same period. The number of individual vessels in the fleet from 1840 to 1880 was 76.

The number and class of Antarctic sealing vessels and their aggregate tonnage from 1840 to 1880.

Year.	Ships and barks.	Brigs.	Schooners.	Total number vessels.	Total tonnage.	Year.	Ships and barks.	Brigs.	Schooners.	Total number vessels.	Total tonnage.	Year.	Ships and barks.	Brigs.	Schooners.	Total number vessels.	Total tonnage.
1840	.....	2	.....	2	195	1854	8	.....	8	16	3,495	1868	1	.....	5	6	1,124
1841	2	2	3	7	1,194	1855	4	.....	3	7	1,833	1869	1	.....	4	5	964
1842	2	1	4	7	1,390	1856	6	1	3	10	2,685	1870	1	.....	4	5	964
1843	4	1	4	9	1,765	1857	6	1	6	13	3,432	1871	2	.....	6	8	1,463
1844	6	1	6	13	2,180	1858	9	1	8	18	4,527	1872	2	.....	6	8	1,449
1845	3	.....	9	12	1,532	1859	7	1	12	20	4,461	1873	2	.....	10	12	1,766
1846	2	.....	5	7	1,070	1860	5	.....	6	11	2,600	1874	1	.....	10	11	1,473
1847	3	.....	5	8	1,411	1861	3	.....	7	10	2,167	1875	1	.....	11	12	1,573
1848	4	.....	3	7	1,670	1862	1	.....	5	6	1,230	1876	2	.....	10	12	1,771
1849	4	.....	2	6	1,733	1863	1	.....	2	3	563	1877	1	.....	10	11	1,422
1850	3	.....	3	6	1,379	1864	1	.....	2	3	652	1878	1	.....	8	9	1,291
1851	4	.....	3	7	1,767	1865	2	.....	3	5	1,137	1879	1	.....	8	9	1,281
1852	4	.....	4	8	1,895	1866	1	.....	4	5	930	1880	1	1	8	10	1,277
1853	7	.....	6	13	2,853	1867	1	.....	4	5	1,038						

The number of Antarctic sealing vessels belonging to each port from 1840 to 1881.

Year.	Bristol, R. I.	Fairhaven, Mass.	Mystic, Conn.	Nantucket, Mass.	New Bedford, Mass.	New London, Conn.	Newport, R. I.	New York, N. Y.	Provincetown, Mass.	Stonington, Conn.	Warren, R. I.	Total.
1840	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	2
1841	1	.....	1	.....	.....	4	.....	.....	.....	1	.....	7
1842	1	.....	.....	.....	.....	5	.....	.....	.....	1	.....	7
1843	1	.....	.....	.....	.....	6	.....	.....	.....	2	.....	9
1844	1	.....	1	.....	.....	10	.....	.....	.....	1	.....	13
1845	.....	.....	.....	.....	.....	7	.....	.....	.....	5	.....	12
1846	.....	.....	.....	.....	.....	6	1	.....	.....	.....	.....	7
1847	.....	.....	.....	.....	.....	7	1	.....	.....	.....	.....	8
1848	.....	.....	.....	.....	.....	6	.....	.....	.....	1	.....	7
1849	.....	.....	.....	.....	.....	5	.....	.....	.....	1	.....	6

The number of Antarctic sealing vessels belonging to each port from 1840 *to* 1881—Continued.

Year.	Bristol, R. I.	Fairhaven, Mass.	Mystic, Conn.	Nantucket, Mass.	New Bedford, Mass.	New London, Conn.	Newport, R. I.	New York, N. Y.	Provincetown, Mass.	Stonington, Conn.	Warren, R. I.	Total.
1850						5				1		6
1851						6				1		7
1852						7				1		8
1853			2			8				3		13
1854			3			9				4		16
1855						7						7
1856						10						10
1857		2				11						13
1858		2	1	2		12					1	18
1859		1	3	3		11					2	20
1860		1	2			7					1	11
1861			1			9						10
1862			1			5						6
1863						3						3
1864						3						3
1865						5						5
1866						5						5
1867						4			1			5
1868						5			1			6
1869						5						5
1870						5						5
1871						8						8
1872						8						8
1873						10		1		1		12
1874						9		1		1		11
1875						9		1		2		12
1876						10				2		12
1877						9				2		11
1878						6		1		2		9
1879						7				2		9
1880						7				3		10
1881					1	6				3		10

6. LIST OF ANTARCTIC SEALING VOYAGES FROM 1783 TO 1880.

VOYAGES FROM 1783 TO 1839.

1783 to 1790.

Prior to the Revolutionary war it is probable that no fur-seal voyages were made from the United States. Shortly after the war the ship States sailed from Boston for the Falkland Islands and secured a cargo of hair-seal skins and sea-elephant oil. This vessel brought home a few thousand fur-seal skins as an experiment. She was probably the first vessel regularly fitted from this country for sealing. Whaling vessels occasionally brought home a small quantity of sea-elephant oil, obtained while on their regular whaling voyages. In the year 1786 a few vessels were sent out from Hudson, N. Y., on whaling and sealing voyages.

1790.

From Macy's History of Nantucket we learn the following: "During several years previous to 1790 many profitable sealing voyages were made from England and other places. This induced the people of Nantucket to turn their attention to that business, with a view to prosecute it if it

presented a good prospect of advantage. Sealing was in many respects nearly allied with whaling. Seals and whales were generally met with on the same coast; it required as large vessels and as many men to engage in taking the former as the latter; the outfits were nearly the same, and the voyages were of like duration. In 1790 one vessel was fitted out for the coast of Africa, on a sealing expedition, but the original plan of the voyage was not adhered to, and the cruise was unsuccessful; but it had some good effect, for some useful knowledge was acquired respecting the different parts of the business, which was afterwards prosecuted to a considerable profit."

Two vessels sailed from New Haven, Conn., in 1790 on a fur-seal voyage to Falkland Islands and South Georgia. One of these, commanded by Capt. Roswell Woodward, brought a cargo to the United States. The other vessel, commanded by Capt. Daniel Green, proceeded to Canton, China, where the skins were exchanged for merchandise. Captain Green on this voyage circumnavigated the globe.

Captain Patten, of the ship Industry, of Philadelphia, with a part of his crew, remained on one of the Tristan d'Acunha group of islands from August, 1790 to April, 1791, for the purpose of collecting fur-seal skins, during which time he obtained 5,600 for the Chinese market, and could, he says, have loaded a large ship with oil in three weeks, so abundant were the fur-seals, sea-lions, and sea-elephants.

1792.

A ship sailed from Boston, Mass., in 1792, under Captain Lee, for the Falkland Islands and Pacific Ocean, whaling and sealing. Betsey, brig, 100 tons, Captain Steele, sailed from New York May 2, 1792; arrived at the Falkland Islands in September. "A full cargo of fur-seal skins was procured for the brig by the month of January," and the vessel arrived home in June, 1793. Edmund Fanning, who in 1797 sailed again on the Betsey, was one of the crew on this voyage.*

1793.

Eliza, ship, Capt. W. R. Stewart, of New York, arrived at Canton in March, 1793, with 38,000 fur-seal skins from Mas-á-Fuera. The cargo was sold for $16,000. She had been a long time on her voyage. This was the first vessel that went to Mas-á-Fuera for the purpose of procuring seal skins for the Chinese market. Captain Palmer was in command when she left New York, but he left her before she arrived in China. Capt. Amasa Delano, of Boston, took command at Canton and returned with her to the United States, via Cape of Good Hope.†

Schooner Swallow, Capt. Latham Gardner, of Nantucket, sailed for the Falkland Islands in 1793, whaling and sealing; arrived home May 17, 1794.

Capt. William Howell, of New Haven, wrote to his father from the South Sea seal islands, in 1793, that they found plenty of seals, but not knowing how to preserve them they lost one season.‡

1796.

Neptune, ship, Capt. D. F. Green, sailed from New Haven, Conn., November 29, 1796, and arrived at New York February 17, 1799, having taken 50,000 fur-seal skins from Mas-á-Fuera to China, where they were exchanged for goods that yielded over $260,000 in New York. (See subsequent pages for further details of this voyage.)

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* Fanning's Voyages. † Delano's Voyages.

‡ Letter from Charles Peterson, of New Haven. I am indebted to Mr. Peterson for details of several early voyages.

Mr. Charles Peterson of New Haven, in a letter to Mr. H. W. Hubbell says:

"I have before me the Connecticut Journal, dated at New Haven, July 17, 1799, which announces the arrival here of the ship Neptune, Capt. Daniel Green, six months from Canton—sailed October, 1796. The Neptune had been gone two years and eight months. Her voyage was around Cape Horn to Mas-á-Fuera, where she caught a load of seal skins and took them to Canton and loaded there for New Haven. She left a part of her crew on Mas-á-Fuera under Dr. Forbes, who caught another cargo of skins, and the ship immediately returned for them and the skins and went on to China, making the same voyage as her first one, and the richest voyage ever made out of this port. The log-book of the second voyage is now at our historical society."

1797.

Barclay, ship, Capt. Griffen Barney, sailed from New Bedford, Mass., August 25, 1797, for Pacific Ocean, whaling and sealing; arrived home June 26, 1799, with 700 barrels sperm and 500 barrels whale oil; had also taken 21,000 fur-seal skins and sold them in Canton. Mr. F. C. Sanford, of Nantucket, says: "The Barclay was built at New Bedford by William Rotch, of Nantucket, in 1793. When Mr. Rotch returned from London to Nantucket, in 1795, this vessel brought him to Boston. She had a remarkable career, and was broken up in New Bedford in 1864. She was once taken by the Spaniards and retaken by Porter (see Farragut's Life by his son)."

Betsey, brig, 100 tons, Capt. Edmund Fanning, of New York, sailed from Stonington, Conn., June 13, 1797, on a sealing voyage to coast of Chili. A full cargo of 100,000 fur-seal skins were procured on the island of Mas-á-Fuera and taken to China, where they were exchanged for teas and other commodities, with which the vessel, now altered to a ship, arrived in New York April 26, 1799. The owners realized from the voyage a net profit of $52,300.

Maryland, ship, Captain Liscomb, sailed from New Bedford August 25, 1797, for the Pacific Ocean. The captain, mate, and boat's crew were captured and abused by Spaniards at Saint Mary's, but were released. The vessel when homeward bound was captured by a French privateer but released after losing 2,000 seal skins. Arrived home 1799, with 20,000 seal skins and 800 barrels sperm oil.

A ship, from Hudson, New York, was sealing at Falkland Islands in 1797, in command of Capt. David Bunker, also a North River sloop as tender, commanded by Capt. Prince Bunker.

Garland, brig, Capt. Bazilla North, was at the Falkland Islands in 1797, on a sealing voyage.

1798.

Hetty, brig, of New York, Captain Robertson, was on a sealing voyage at Patagonia in 1798.

1799.

Concord, ship, 171 tons, owned by Dudley L. Richardson and others, sailed from Salem, Mass., in August, 1799, on a sealing voyage to Mas-á-Fuera and other islands. She proceeded to China, exchanged her cargo of fur-seal skins for Chinese goods, and arrived home July 17, 1802, one hundred and forty-five days from Canton. The account of the voyage was as follows:

Ship cost $7,500, outfits $6,180	$13,680
Expenses of voyage and crew	11,462
Total expenses	25,142

Vessel and cargo sold at auction at Salem, July 28, 1802, net $67,794.56.

Minerva, ship, Capt. Mayhew Folger, of Nantucket, sailed from Salem in October, 1799, and arrived home May 3, 1802, one hundred and fifty-three days from Canton. Felt's Annals of Salem, under date of May 10, 1802, says: "The ship Minerva, belonging to Clifford Crowinshield and

Nathaniel West, has lately returned from China. She sailed round Cape Horn under Capt. Folger from Nantucket. Stopped one degree south of Chiloe, went to island of Mas-á-Fuera; here she took seal, wintered at South Lima, and proceeded to China. She came back round Cape of Good Hope. She was the first Salem vessel that circumnavigated the globe." The Salem Gazette of May 4, 1802, says: "Arrived 3d, ship Minerva, Captain Folger, one hundred and fifty-three days from Canton, and sailed from this port October, 1799, on sealing voyage and has been successful."

Neptune, ship, Captain Howell, sailed from New Haven in 1799 on a sealing voyage to Mas-á-Fuera and China. Captain Green, who commanded the Neptune on her previous very successful voyage, had left a crew of men on the island of Mas-á-Fuera. The skins secured by this crew, with additional ones taken by Captain Howell, were sold in China, and a profitable voyage made.

Oneida, ship, Captain Brintnall, of Nantucket, sailed from New York in 1799 for Mas-a-Fuera and made a splendid voyage. The Oneida arrived home with a valuable cargo of goods from China.

Perseverance, ship, Capt. Amasa Delano, sailed from Boston, Mass., November 10, 1799, on a sealing voyage to coast of Chili; got a cargo of fur-seal skins and exchanged them at Canton, China, for teas, sugars, &c., with which the vessel arrived home November, 1802.

Prudence, sloop, Capt. Jonathan Paddock, sailed in 1799 from Nantucket, Mass., for Patagonia on a whaling and sealing voyage. Arrived home July 17, 1802; no report.

Regulator, of New York, lost at South Georgia in 1799. Her cargo of 14,000 fur-seal skins, together with sails, cables, and other articles saved from the wreck, were sold to an English sealing ship.

Captain Hubbell, of New Haven, went on a sealing voyage in 1799 and returned in 1802, sailing round the world.

1800.

Alexander, ship, Captain Dodge, of Boston, bound on a fur-trading voyage to northwest coast of America, in the spring of 1800, left a boat crew on St. Ambrose Island to kill fur-seals, intending to return for them in the fall of that year. Made a ruinous voyage.*

Aspasia, armed Corvette, sailed from New York under Capt. Edmund Fanning May 11, 1800, on a sealing and exploring voyage to the South Seas. At South Georgia 57,000 fur-seal skins were secured and taken to China. Captain Fanning reported that at South Georgia sixteen other American and English vessels procured 65,000 fur-seal skins from November, 1800, to February, 1801. On his way to China he stopped on the coast of Chili, where it was learned that there were upwards of thirty American sealing vessels, whose cargoes were destined for the China market.

Miantonomah, ship, Capt. Valentine Swain, sailed from Norwich, Conn., September 5, 1800, bound for the coast of Chili on a sealing voyage. The vessel was seized by the Spanish and condemned at Valparaiso, 1801; had taken 50,000 seal skins that spoiled after the seizure but were subsequently paid for by the Spanish Government.

Little Sarah, schooner, arrived at Norwich, Conn., in 1800, with 7,000 fur-seal skins and 6,000 hair-seal skins from southern oceans.

Sally, ship, Capt. Nathaniel Storer, sailed from New Haven May 22, 1800, arrived home June 2, 1803. Concerning this voyage Capt. Peter Storer, aged ninety years, in a letter to the author dated, Westville, Conn. March 15, 1882, says:

"My father, Nathaniel Storer, commanded the ship Sally on a sealing voyage in 1800, and took me along with him. I was then nine years and nine months old. We sailed from New Haven

* Manuscript notes of Capt. Caleb Brintnall.

the 22d day of May, 1800, for the coast of Patagonia, where we built our shallop, a schooner of 28 tons, and went to the Falkland Islands in December, 1800, where we took a few skins. From there we went to South Georgia, and at that island took the greater part of our cargo of fur-seal skins. We sealed two seasons at South Georgia, 1801 and 1802. We dried the skins at Hurl Gate Harbor, on the Patagonian coast, and left there early in 1803. Sailing round Cape Horn, we stopped at all the seal islands on the Pacific coast but got only a few skins. We then sailed for the Sandwich Islands, where we stopped two or three days and then left for Canton, China, about the middle of 1802. We arrived at Canton in November with about 45,000 fur-seal skins, all cured and dried, but had to sell them for 87½ cents apiece, which was bad news for all hands. We left Canton for home the last of January, 1803, by the way of the Cape of Good Hope, with a cargo of tea, silk, nankeens, &c., and arrived at New Haven on the 2d of June, 1803, after a voyage of three years and ten days. Three men died on the voyage.

"The ship Sally was built on the Connecticut River, opposite Middletown, and was 230 or 240 tons burthen. She was a 20-gun ship, with a crew of officers and men numbering 45. She had 16 waist guns, 4 pounders, and 4 swivels; also small arms, boarding pikes, &c., and was what you may call a letter of marque, ready to fight her way if necessary. I was powder-monkey for the two guns aft on the starboard side, and was much pleased when the drum beat to quarters.

"Eben H. Mix was supercargo of the Sally, and Joseph Driggs was doctor; both these men lived in Middletown, Conn. The Cowles, of Farmington, Conn., were owners in the ship. I don't think there is one of the crew living that was in the ship with me. When I look back and think of that voyage I can hardly realize that it is so. Only think, eighty-two years ago last January I was running on sea-elephants' backs on the island of South Georgia, where these animals lay in rows on the beach."

Mr. Charles Peterson writes that Capt. N. Storer went on another sealing voyage in the ship Huntress, but was never heard from.

Trial, ship, Capt. Thomas Coffin, of Nantucket, sailed in 1800 on a sealing voyage on the Chilian coast. She was seized by the Spaniards and condemned at Valparaiso in 1801.

1801.

Brothers, ship, Captain Kidder, of Nantucket, and ship Favorite, Captain Jonathan Paddock, went on a sealing voyage to Chili about the year 1801, and so on to China, and returned to Nantucket with cargoes of silks and other Chinese products.

Mars, ship, Capt. Uriah Swain, sailed from Nantucket in 1800 or 1801, and returned August 12, 1802. She secured a load of fur-seal skins at Mas-á-Fuera and other islands, and took them to China, and made a good voyage. Mr. F. C. Sanford says: "This vessel wound up at Baltimore in 1813, being one of those that was sunk in the harbor to prevent the English attack upon that city. Captain Swain, of the ship Mars, consorted at Mas-á-Fuera with ship Pagassus, of New York, which was subsequently lost on that island. They buried $40,000, and Swain took it up by agreement, and accounted for it in New York on his return home."

The schooner Grace Greenwood, of New Haven, made a successful sealing voyage to Mas-á-Fuera and other Pacific islands, and returned to the United States in 1802.

Oneida, ship, Capt. Caleb Brintnall, sailed from New York in 1801 on a sealing voyage to the Pacific Ocean.

Captain Scannon, in his History of the American Whale Fishery, states that the sealing fleet off the coast of Chili in 1801 numbered thirty sail of vessels, most of which were under the American flag.

1802.

Eliza, ship, Captain Bunker, sailed from Nantucket in July, 1802, bound for southern seas on a sealing voyage.

Ship Huron, Captain Moulthorp, of New Haven, sailed September 2 on sealing voyage to coast of Chili. Brought home 19,000 hair-seal skins obtained on the islands of Moeea, St. Marys, and Lobos. Returned to Chili, and from the island of Mas-á-Fuera, in March, 1805, took on board about 15,000 fur-seal skins taken or purchased by the men left there on the previous voyage. Proceeded to Canton, where the skins were sold at 95 cents each, and a cargo of articles taken for Hamburg. The Huron sailed thence to St. Petersburg and arrived home October 30, 1806.

Lady Adams, ship, 230 tons, Captain Fitch, sailed from Nantucket August 24, 1802, on a sealing voyage to southern seas. Was last reported bound to China with 32,000 fur-seal skins.

Mr. F. C. Sanford, of Nantucket, says:

"The ship Lady Adams made a sealing voyage in 1801. I have the journal of this voyage that was made to Chili and thence to Canton, where she exchanged the seal skins for teas, silks, &c., and came home in company with the ships Essex, of Salem, and Gossimer, of Philadelphia. The Lady Adams went whaling from here after that, making splendid voyages, and burned up in Japan in 1823. None saved from her. She was a very pretty ship. Obed Fitch was her commander, and was in the same line of Dr. Franklin, from a famous stock. He came in the ship Mars from a voyage to Europe, when she was sunk at Baltimore as before stated. When the Essex arrived at Salem our folks here purchased her in 1804. She made many whaling voyages, and was stove by a whale between Marquesas and Tahita in 1820. Her men were in boats over ninety days, and suffered terribly, being obliged to eat some of their own number."

Minerva, ship, 200 tons, Capt. Jones, sailed from Nantucket in 1802 for the Pacific Ocean, whaling and sealing. Procured 23,000 seals skins and took them to China. Vessel arrived home in August, 1804.

1803.

Alliance, ship, Captain Gardner, sailed from Nantucket for Patagonia in 1803. Arrived home April 14, 1804, full of sea-elephant oil. Arrived from another voyage in April, 1805, full of sea-elephant oil.

Dispatch, ship, Captain Howard, of Hartford, was sealing on the coast of Chili in 1803. In four months took 8,000 hair-seal skins.

Draper, ship. Captain Howell, of New Haven, was sealing at St. Mary's Island, coast of Chili, in 1803.

Perseverance, ship, Capt. Amasa Delano, sailed from Boston September 25, 1803, for the coast of Chili on a sealing voyage. Secured a cargo of fur-seal skins and took them to China. Arrived at Boston July 26, 1807.

Pilgrim, schooner, 62 tons, Capt. Samuel Delano, sailed from Boston September 25, 1803, as tender to the Perseverance, on a sealing voyage to coast of Chili. Took a cargo of 13,000 fur-seal skins to China, where the vessel and cargo were sold.

Rachael, ship, Captain Bunker, of Salem, was at Mas-á-Feura in 1803.

Mr. Joel Root says that several other American sealing vessels and about one hundred and fifty men reported on Mas-á-Fuera in this year.

Rebecca, ship, Captain Pitts, of New York, landed a sealing gang on the island of Mocca in 1803.

Union, brig, Capt. Isaac Pendleton, sailed from New York in 1803 on a sealing voyage on the

Australian coast. Discovered Border's Island in latitude 34° 47′ south, longitude east of Paris 136° 41′. A small schooner was here built for further exploration. Fourteen thousand fur-seal skins were secured at Border's Island and landed at Sydney, Australia. The island of South Antipodes was rediscovered and a sealing gang of twelve men left there. The Union sailed from Sydney on a voyage to the Feejee Islands and was lost. The crew left on the Antipodes secured 60,000 prime fur-seal skins, which were taken to China in an English vessel chartered by Mr. Lord at Sydney. The schooner sailed from Sydney on a southern cruise in search of new seal islands, and was never heard from.*

Volunteer, brig, Captain Jenkins, sailed from Hudson, N. Y., for Patagonia in 1803; last reported with 300 barrels whale oil and some seal skins.

Mr. F. C. Sanford, of Nantucket, writes:

"After 1800 we had many ships in the sealing trade. The ship Rose, Capt. James Cary, made three voyages between 1803 and 1813, when she was taken by the English and went to England with a load of tea. This vessel was built at Nantucket. The ship Criterion, Capt. Peter Chase, sailed on a sealing voyage from Boston for Mr. Samuel Parkman."

1804.

Commerce, ship, Captain Eldrige, sailed from Nantucket in 1804 for the Pacific Ocean. Returned February 15, 1806, full of sea-elephant oil. Captain Eldridge died on the voyage in 1804.

Catherine, ship, Capt. Henry Fanning, sailed from New York in 1804 or 1805 on a sealing voyage to the Australian coast and Crozet Islands. An officer and sealing crew were left at Prince Edward Island, and the vessel, after visiting Cape of Good Hope for the winter, proceeded in search of the Crozet Islands. Captain Fanning, after considerable search, was fortunate in rediscovering these islands, and he, with his men, were the first human beings to land there. Abundance of fur-seal were found, and a gang of men left there who would remain until the next season, when another vessel, to be sent out under Mr. Fanning's agency, would visit these islands. The Catherine proceeded to China with her cargo of skins. Two other sealing vessels obtained cargoes at these islands at the same time as the Catherine, one a ship from Boston, under Captain Percival, the other from Hudson.*

1805.

Vancouver, ship, Captain Brown, was at Mas-á-Fuera in January, 1805, and supplied the sealers there with food. The Vancouver was either on a sealing voyage or was bound on a trading voyage to the northwest coast.

A vessel in command of Captain Delano, of Boston, was fur sealing on the island of St. Ambrose, near Mas-á-Fuera in the spring of 1805.

1806.

Catherine, ship, Capt. H. Fanning, made a sealing voyage about the year 1806 to Crozet and Prince Edward Islands, southeast of Cape of Good Hope. Secured a cargo on the latter islands, where other vessels the same year obtained full cargoes.

1807.

Union, brig, Captain Hussey, sailed from Nantucket for Patagonia in 1807, and arrived home March 12, 1808, with oil and seal skins.

Triumph, ship, Capt. Caleb Brintnall, of New Haven, January 9, 1807, to August, 1809, on a fur-sealing voyage to Falkland, Mas-á-Fuera, and other seal islands; sailed thence to China with 50,000 fur-seal skins.

*Fanning's Voyages.

1808.

Topaz, ship, Captain Folger, of Boston, was on a sealing voyage in 1808, and rediscovered Pitcairn Island.

1811.

Manilla, ship, Captain McCleave, sailed from Nantucket for Patagonia in 1811, and was captured within five days' sail of Nantucket by the English letter of marque Tiger, in 1812, full of sea-elephant oil.

1812.

Nanina, brig, Capt. Valentine Barnard, of Hudson, sailed from New York April 4, 1812, for the Falkland Islands on a whaling and sealing voyage. Arrived there, the English brig Isabella, with a number of passengers, was found wrecked. The English officers offered Captain Barnard all of the Isabella's cargo which could be saved if he would rescue them, to which he replied that his sense of duty commanded him to relieve them without reference to compensation; nevertheless, if they so desired, he would take the remnant of the wrecked cargo as some repayment for a spoiled voyage. Captain Barnard received the officers, crew, and passengers of the Isabella on board his vessel, and to reward him for his exertions and loss his vessel and crew were infamously betrayed into the hands of English authorities, and he and his crew brutally treated. Tidings of the affair coming to the ears of the English naval commander in those waters, he dispatched a vessel to release the American captives. Captain Barnard's protest appears in the Hudson Bee in 1814.*

1815.

Belvidere, brig, Captain Baxton, sailed from Nantucket for Patagonia May 18, 1815, and arrived home March 6, 1816, with 840 barrels sea-elephant oil.

General Scott, ship, whaling and sealing from Hudson, N. Y., in 1815. Made a poor voyage because of inexperience.

Lydia, ship, 160 tons, Captain McCleave, sailed from Nantucket for Patagonia May 16, 1815, and arrived home March 10, 1816, with 1,012 barrels sea-elephant oil.

Maria, schooner, Captain Worth, sailed from Nantucket for Patagonia in 1815, and arrived home April 2, 1816, with 700 barrels sea-elephant oil.

Volunteer, ship, sailed from New York in 1815 on a sealing voyage. Left a boat's crew on Falkland Islands to gather seal skins, and proceeded to Mas-á-Fuera, where 2,000 fur-seal skins and 2,000 hair-seal skins were obtained; arrived home in 1817.

Zephyr, ship, Capt. Caleb Brintnall, of New Haven, made a sealing voyage to the South Seas in 1815.

1816.

Indus, brig, 262 tons, Captain Joy, sailed from Nantucket for Patagonia May 17, 1816, and arrived home July 1, 1817, with 1,430 barrels sea elephant oil.

Triumph, ship, Capt. Caleb Brintnall, of New Haven, made a sealing voyage in 1816 or 1817 to the Chilian coast and China. Mr. Mix, the supercargo, was poisoned at the Sandwich Islands.

1817.

Mary, brig, Captain Howland, sailed from New Bedford for Patagonia in May 1817, and arrived home February 17, 1818, with 1,300 barrels sea-elephant oil.

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* STARBUCK: Report on the American Whale Fishery, 1876.

Sea Fox, ship, sailed from New York for Falkland Islands in 1817, and arrived home in 1818 with 5,000 fur-seal skins and 1,000 barrels sea-elephant oil.

William Thacher, ship Captain Tucker, sailed from New Bedford for Patagonia in May, 1817, and arrived home February 7, 1818, full of sea-elephant oil.

1818.

Frederick, brig, sailed from Stonington in 1818, on a sealing voyage to Pacific Ocean; got a cargo of 25,000 hair-seal skins on St. Mary's Island.

Gleaner, brig, Captain Leslie, sailed from New Bedford for Patagonia in May, 1818, and arrived home January 10, 1819, with 1,030 barrels sea-elephant oil.

Governor Hawkins, ship, Captain Coffin, sailed from Philadelphia in 1818 on a sealing voyage and arrived home in 1819 with 4,000 fur-seal skins and 350 barrels sea-elephant oil. Captain Coffin died on the voyage.

1819.

Gleaner, brig, Captain Leslie, sailed from New Bedford for Patagonia in May, 1819, and returned March 19, 1820, with a cargo of sea-elephant oil.

Hersilia, brig, Capt. James P. Sheffield, sailed from Stonington, Conn., in July, 1819, bound on an exploring and sealing voyage, and arrived home in the spring of 1820 with 11,000 choice fur-seal skins from New South Shetlands, the first cargo brought from those islands.

1820.

Diana, brig, Captain Bunker, sailed from Nantucket in 1820 on a sealing voyage to South Atlantic Ocean.

Esther O'Kane, schooner, of Boston, was at the South Shetlands on a sealing voyage in 1820.

General Knox, ship, Captain Orne, sailed from Salem, Mass., in 1820, for South Shetlands, and arrived home June 6, 1821, with 5,000 fur-seal skins and 600 barrels sea-elephant oil.

Brig Henry and schooner Aurora sailed from New York in 1820, on a sealing voyage to South Shetlands, and arrived home in 1821 with cargoes of fur-seal skins.

Schooner Huntress, Capt. Chris. Burdick, and brig William and Naney, Capt. Tristram Folger, sailed from Nantucket in 1820, on sealing voyages to South Shetlands, and arrived home in 1821.

Naney, brig, Captain Upton, sailed from Salem, Mass., in 1820, for Falkland and South Shetland Islands on a sealing voyage, and arrived home May 27, 1822, with 1,800 fur-seal skins and 100 barrels sea-elephant oil.

A fleet of vessels sailed from Stonington, Conn., in fall of 1820 on sealing voyages to South Shetlands. This was the first fleet fitted for sealing at these islands. Most of the vessels arrived home in 1821, with an aggregate of 88,000 fur-seal skins and 1,007 barrels sea-elephant oil. The brig Clothier was wrecked on the rocky shores of South Shetlands, and sealers tell me that portions of the vessel may still be seen there. The names of the vessels were as follows: Sloop Hero, Capt. Nath. Palmer; schooners Express, Captain Williams, and Free Gift, Captain Dunbar; brigs Catherine, Clothier, Emmeline, Frederick, and Hersilia.

1821.

Charity, brig, Captain Barnard, sailed from New York in 1821 for South Shetlands, and arrived home in May, 1822, with 8,000 fur-seal skins and some oil.

Essex, sloop, Captain Chester, sailed from Stonington in 1821 for South Shetlands, and arrived

home in April, 1822, with 200 barrels sea-elephant oil and some fur-seal skins; was tender to the Stonington fleet.

General Scott, brig, sailed from New London, Conn., for South Shetlands on 1821, and arrived home in May, 1822, with 1,200 fur-seal skins and 300 barrels sea-elephant oil.

Harmony, schooner, Captain Hodges, sailed from Nantucket in 1821, on a sealing voyage to South Shetlands and returned June 10, 1822, with 1,000 fur-seal skins, and 250 barrels sea-elephant oil.

Huron, ship, Captain Davis, sailed from New Haven, Conn., in 1821 for South Shetlands, and secured a cargo of 12,000 fur-seal skins, 700 barrels sea-elephant oil.

James Munroe, sloop, Captain Palmer, sailed from Newport, R. I., in 1821 for South Shetlands, and arrived home April 20, 1822, full of oil and furs.

Wasp, schooner, arrived at New York in 1821 with 700 barrels sea-elephant oil; arrived again in May, 1822, with cargo of hair-seal skins, and sailed June 30, 1822, under Capt. Benjamin Morrell, on a sealing voyage to South Pacific Ocean. The vessel was sold at Valparaiso in 1824, and her cargo of 7,000 fur-seal skins was shipped home in ship Endeavor, of Salem, Mass.

Six vessels sailed from Stonington, Conn., in fall of 1821, and returned in 1822, of which no record has been found; one of these vessels returned from South Shetlands with 404 fur-seal skins. The entire fleet in season of 1821–'22 got only 1,500 fur-seal skins at South Shetlands.

1822.

Jane Maria, brig, arrived at New York April 26, 1822, with cargo of fur-seal skins from Falkland Islands.

Hersilia, brig, of Stonington, Conn., while on a sealing voyage in 1823 was captured on coast of Chili by the Spanish. Had sent home 18,000 hair-seal skins.

Henry, schooner, Capt. Robert Johnson, sailed from New York, June 30, 1822, in company with schooner Wasp, on a sealing voyage to southern seas. Arrived home in 1824 with 13,000 fur-seal skins from Auckland Islands, and sailed again the same year for the Aucklands; but after securing a partial cargo the vessel was lost with all on board while on an exploring cruise.

1823.

Dragon, brig, arrived at New Bedford May 30, 1823, with cargo of sea-elephant oil.

Only Son, sloop, arrived at Stonington in 1823, with 7,500 fur-seal skins from South Atlantic Ocean.

1824.

Dove, of Nantucket, arrived at Philadelphia August 27, 1824, with sperm oil and two live sea-elephants.

Tartar, schooner, Capt. Benjamin Morrell, sailed from New York July 19, 1824, on a sealing voyage to southern oceans, and arrived home May 8, 1826, with 6,000 fur-seal skins.

1825.

Eliza Ann, schooner, arrived at Stonington, Conn., in 1825 with 3,000 fur-seal skins.

1827.

Sarah Atkins, ship, Captain Kenny, sailed from Portsmouth, R. I., in March, 1827, for Falkland Islands, and returned in June, 1828, with 4,000 fur-seal skins, some other skins, and oil.

Washington, schooner, 84 tons, Capt. John Dickenson, arrived at Boston November 10, 1827, from south seas, whaling and sealing. No report of cargo.

1828.

Alabama, brig, of Stonington, made three sealing voyages from 1823 to 1828, and brought home 30,000 hair-seal skins from southern seas.

Antarctic, schooner, 172 tons, Capt. Benjamin Morrell, sailed from New York in 1828 on a sealing voyage to coast of Africa, and arrived home July 14, 1829, with 4,000 fur-seal skins.

Penguin, schooner, arrived, at Stonington in 1828 with 3,000 fur-seal skins from South Atlantic Ocean.

1829.

Alabama, brig, arrived at Stonington in 1829 from south seas with 8,000 fur-seal skins and 15,000 hair-seal skins.

Bogota, brig, arrived at Stonington in 1829 with 3,000 fur-seal skins and 15,000 hair-seal skins from southern oceans.

General Putnam, schooner, of Newburyport, Mass., took 1,500 fur seal-skins on coast of Africa in 1828 or 1829. Vessel condemned at Rio Janeiro, March 31, 1829 or 1830.

Pacific schooner, Capt. Jas. Brown sailed from Portsmouth, R. I., October 1, 1829, on a sealing voyage to South Seas, and left South Georgia March 5, 1830, having taken up to that time 256 skins and 1,800 gallons of sea-elephant oil.

Penguin, schooner, arrived at Stonington in 1829 with 3,000 fur-seal skins from South Atlantic Ocean.

Seraph, brig, arrived at Stonington in 1829 with 1,000 fur-seal skins and 25,000 hair-seal skins from southern oceans, and sailed again in 1829 in company with brig Anawan on an exploring and sealing voyage in Antarctic seas.

Spark, schooner, Captain Allyn, sailed from New London, Conn., October 25, 1829, for coast of Africa, and arrived home May 10, 1831, with 3,700 fur-seal skins.

1830.

Free Gift, schooner, arrived at Stonington in 1830 with 5,200 fur-seal skins from southern seas.

1831.

Alonzo, schooner, arrived at Stonington in 1831 with 2,200 fur-seal skins from the coast of Africa, &c. Arrived again in 1832 with about the same number of fur-seal skins.

Charles Adams, ship, Capt. Alex. Palmer, sailed from Stonington September 1, 1831, for South Shetlands, and arrived home September 2, 1833, with 1,000 fur-seal skins, 2,100 barrels sea-elephant oil, and 100 barrels sperm oil. Had schooner Courier, Captain Barnard, as tender.

Penguin, schooner, arrived at Stonington in 1831 from southern oceans with 1,400 fur-seal skins. Arrived again in 1832 with 3,000 fur-seal skins.

Spark, schooner, arrived at New London in 1831 with 3,700 fur-seal skins from southern seas.

Telegraph, schooner, Captain Bray, sailed from Bristol, R. I., in 1831.

Captain Bray sailed from Newburyport in a schooner prior to 1830 on a sealing voyage to Falkland Islands and vicinity of Cape Horn.. Had shipped home about 3,000 fur-seal skins, but finally lost his vessel on Terra del Fuego. Part of the crew being out on various seal islands gathered 1,000 to 1.500 fur-seal skins. After about a year Captain Bray returned to them in a vessel built out of stuff saved from the wreck. Captained Bray returned to America and sailed as above in the Telegraph from Bristol and made two successful voyages, arriving home in 1832 with about 3,500 fur-seal skins, and in 1833 with about 2,000 fur-seal skins. He sailed again in 1833 and lost his vessel on Hope Island, southwest coast of Terra del Fuego, in January, 1834.

1832.

Betsey, schooner, Captain Fuller, arrived at New London in 1832 from the coast of Africa with 1,300 prime fur-seal skins, 500 pup fur-seal skins, and 74 bullock hides.

Montgomery, arrived at Mystic, Conn., with 2,000 fur-seal skins from southern seas.

Superior, schooner, of Stonington, made three voyages to southern seas prior to 1833 and brought home about 8,000 fur-seal skins.

Talma, schooner, Capt. G. L. Allyn, sailed from New London in July, 1832, for Patagonia and vicinity, and arrived home in May, 1834, with 2,700 fur-seal skins that sold for $12.50 each.

1833.

Courier, schooner, arrived at Stonington in 1833 with 2,000 fur-seal skins from southern seas.

Hamilton, ship, Captain Pendleton, sailed from New York January 9, 1833, for Falkland Islands, and returned October 9, 1834, with 1,150 fur-seal skins, also whale oil and bone.

Monticello, schooner, arrived at Baltimore, Md., in 1833, with 2,500 fur-seal skins and 3,000 hair-seal skins from Cape Horn and coast of Chili. Sailed again in July, 1833, under Captain Lindell, but did poorly.

Montgomery, schooner, Captain Cliff, sailed from New London in 1833 on a South Atlantic whaling and sealing voyage, and arrived home September 1, 1834, with 700 fur-seal skins and some whale oil and bone. Sailed again in 1834, and returned in 1835 with 1,000 fur-seal skins and 200 other skins.

Only Son, sloop, of Stonington, Captain Cutler, was sealing at Terra del Fuego in 1833.

Sun, schooner, Captain Trott, sailed from New London in 1833 and arrived home from Falkland Islands September 27, 1833, with 1,000 fur-seal skins and some oil.

1834.

Betsey, schooner, Captain Elliot, arrived at New London May 7, 1834, with 1,390 fur-seal skins, 500 pup seal-skins, 74 bullock hides, and some whale oil from the South Atlantic. Sailed again under Capt. G. L. Allyn July 28, 1834, with a crew of twenty-one men on a whaling and sealing voyage to coast of Africa, and arrived home in March, 1836, with 1,800 fur-seal skins and 100 barrels of oil.

Elizabeth Jane, schooner, of New York, arrived home in 1834 from southern seas with 800 fur-seal skins.

Emily, schooner, arrived at New London in 1834 with 40 fur-seal skins from southern seas. Arrived again in 1835 with 800 fur-seal skins and 200 barrels of sea-elephant oil.

Henrietta, schooner, of Norwich, Conn., arrived home in 1834 from southern seas with 423 fur seal, 2,946 hair seal, 182 otter, and 102 goat skins.

Ospray, schooner, arrived at New London in 1834 with 74 fur-seal skins from southern seas; had sent home about 2,000 fur-seal skins.

Talma, schooner, arrived at Stonington in 1834 with 1,220 fur-seal skins from the coast of Africa.

Tampico, brig, Captain Holmes, of Mystic, was on a sealing voyage on the coast of Africa and at the Crozets in 1834 and 1835. Was reported in spring of 1835 with 160 fur-seal skins.

1835.

Aaron Howard, schooner, arrived at New London in 1835 from southern seas with 1,000 fur-seal skins.

Atlas, ship, arrived at Stonington in 1835, from South Atlantic, with 1,500 fur-seal skins, 600 hair-seal skins, and 71 bullocks' hides on freight.

Betsey, schooner, Capt. William Noyes, sailed from New London in July, 1835, for the South Atlantic, &c., and returned in May, 1837, with 500 fur-seal skins, 15,000 hair-seal skins, and 600 otter skins.

Colossus, schooner, arrived at Stonington in 1835 with 430 fur-seal skins and 1,000 hair-seal skins from southern seas.

Eveline, schooner, from South Atlantic Ocean, arrived at Stonington May 3, 1835, with 622 fur-seal skins, 890 hair-seal skins, and 34 barrels of sea-elephant oil.

Harriet, schooner, arrived at Stonington in 1835 with about 5,000 fur-seal skins from southern seas.

Hancox, schooner, arrived at Stonington in 1835 with 450 fur-seal and 25 otter skins from South Seas.

Maria Jane, schooner, arrived at New York in 1835 from South Atlantic with 1,500 fur-seals skins.

McDonough, schooner, arrived at New London in 1835 with 654 fur-seal skins from South Seas.

Penguin, schooner, arrived at Stonington in 1835 from South Seas with cargo of 2,015 fur-seal skins and 350 hair-seal skins; also on freight from schooners Talma, Betsey, and Aaron Howard, 890 fur-seal skins and 350 hair-seal skins.

Swift, schooner, arrived at Stonington in 1835 from the South Atlantic with 1,500 fur-seal skins.

Talma, schooner, arrived at Stonington in 1835 from Cape Horn with 1,200 fur-seal skins.

William, schooner, of Stonington, sold at Chili in 1835; had sent home 6,000 hair-seal skins,

1836.

Atlas, ship, 261 tons, Captain Barnum, sailed from New London for South Atlantic May 17, 1835 or 1836, and returned April 9, 1837, with 1,650 barrels of sea-elephant oil.

Charles Adams, ship, 268 tons, sailed from Stonington October 15, 1836, under command of Captain Carew, bound on a sealing voyage, but was burned at the Falkland Islands in 1837.

Corvo, ship, 349 tons, Captain Beck, sailed from Stonington in October, 1836, for Falkland Islands, and arrived home November 13, 1837, with 1,400 barrels sea-elephant oil and 1,300 barrels whale oil. Had for tenders the schooners La Grange and Bolton.

1837.

Atlas, ship, 261 tons, Captain Bailey, sailed from Mystic, Conn., June 14, 1837, for Crozet Islands, and was lost with her tender, schooner Colossus, on the Crozets in 1837 or 1838.

Bolton, schooner, sailed from Stonington in December, 1837, for Falkland Islands, and arrived home September 1, 1838, full of sea-elephant and whale oil.

Corvo, ship, 349 tons, Captain Beck, sailed from Stonington for Falkland Islands December 27, 1837, and arrived home October 13, 1839, with 1,200 barrels sea-elephant oil and 2,400 barrels whale oil.

Penguin, schooner, arrived at Stonington in 1837, with 1,500 fur-seal skins from southern seas.

Plutarch, schooner, 81 tons, of Stonington, made two sealing voyages to the southern seas in 1835 and 1837, and brought home 3,500 fur-seal skins.

1838.

Antarctic, schooner, arrived at Stonington in 1838 with 3,000 fur-seal skins from southern seas.

Columbia, ship, 492 tons, Captain Smith, sailed from New London for Desolation Island July 25, 1838, and arrived home May 1, 1839, with 3,700 barrels of sea-elephant oil.

Governor Endicott, ship, 298 tons, Captain Holmes, sailed from Mystic, Conn., July 11, 1838, for South Seas, and arrived home September 5, 1839, with 1,300 barrels sea-elephant oil. Had for tender the schooner Plutarch, 81 tons, Captain Stevens. Sailed again December 1, 1839, under Captain McKinstry, and wrecked on New Holland, July 8, 1840.

Tampico, brig, 99 tons, Captain Bailey, sailed from Mystic, Conn., for Crozet Islands in June, 1838, and arrived home April 8, 1839, with 100 barrels sea-elephant oil.

Uxor, brig, 96 tons, Captain McKinster, sailed from Mystic, Conn., for South Atlantic Ocean, May 15, 1838, and arrived home March 9, 1839, with 300 barrels sea-elephant oil.

1839.

Aaron Howard, schooner, arrived at New London in 1837 and 1839, with a total of 4,500 fur-seal skins from southern seas.

Benjamin D'Wolf, schooner, 66 tons, Captain Smiley, sailed from Newport, R. I., March 30, 1839, on a sealing voyage to Cape Horn and vicinity. Captain Smiley made two voyages in this vessel, and secured each time about 2,000 fur-seal skins. He also made two other sealing voyages prior to 1844 in another vessel, one a good voyage and the other a failure, and the vessel lost.

Henry, brig, 98 tons, Captain Pendleton, sailed from Stonington, Conn., for Crozet Islands, July 16, 1839, and arrived home May 8, 1840, with 300 barrels sea-elephant oil.

Penguin, schooner, sailed from Stonington in 1839, and arrived home in 1840 with 800 fur-seal skins from southern seas.

Philctus, ship, 278 tons, Captain Brewster, sailed from Stonington for Crozet Islands July 10, 1839, and arrived home February 28, 1841, with 1,800 barrels sea-elephant oil.

Rebecca Groves, brig, 129 tons, Captain Barnum, sailed from Stonington for Indian Ocean July 15, 1839, and arrived home June 7, 1840, with 650 barrels sea-elephant oil.

Somerset, brig, Captain Barnum, sailed from Stonington for Crozet Islands in 1839 and arrived home in 1840, with 800 barrels sea-elephant oil.

An unknown schooner belonging to Newburyport, Mass., made two sealing voyages to southern seas prior to 1840, and brought home about 5,000 fur-seal skins.

Tampico, brig, Captain Pendleton, sailed on a sea-elephant voyage from Mystic, Conn., June 22, 1839, and arrived home March 6, 1840, with 550 barrels oil.

Uxor, brig, Captain Mitchell, sailed from Mystic, Conn., July 10, 1839, on a sea-elephant voyage, and arrived home in 1840, with 600 barrels oil.

1840 TO 1880.

The following record of voyages from 1840 to 1880, as well as for preceding years, is compiled from the files of New London and New Bedford papers, from custom-house records, and from information obtained from merchants, retired sealers, and others, at the various sealing ports:

ANTARCTIC SEALING VOYAGES 1840 TO 1850.

[Arranged alphabetically by vessel's name.]

Name and home port.	Rig.	Tons.	Sealing ground.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
Stonington, Conn.								
Alice & William	Schooner	79	South Atlantic	Aug. 10, 1844	June 15, 1845	800	.....	
Bristol, R. I.								
America	Bark	257	South Pacific	Oct. 7, 1840	July 22, 1844	4,000	1,200	Also sperm and whale oil and bone.
Newport, R. I.								
America	Bark	217	South Atlantic	Aug. 31, 1845	Sept. 9, 1847	.....	1,200	Also 400 barrels whale oil.
New London, Conn.								
Atlas	Schooner	81	Desolation Island	Aug. 11, 1847	May 2, 1849	.....	200	Tender to Corinthian.
Do	do	81	do	Sept. 1, 1849	Apr. 22, 1851	.....	220	
Betsey	do	113	South Pacific	Aug. 14, 1840	June 8, 1842	200	.....	Also 12,000 hair-seal skins, 200 other skins, and whale oil.
Do	do	125	South Seas	July 18, 1842	June 3, 1844	300	.....	Also 12,000 hair-seal skins, 400 other skins, and whale oil.
Do	do	125	Cape Horn	July 19, 1844	.....	.....	.....	Lost in Straits of Magellan January 3, 1845.
Stonington, Conn.								
Bolton	Bark	220	South Seas	July 30, 1843	May 24, 1844	.....	1,400	
Do	do	220	Crozet Islands	July 1, 1844	May 30, 1845	.....	600	
Byron	do	170	South Seas	July 20, 1843	May 26, 1845	.....	1,000	Also 300 barrels whale oil and 2,400 pounds whalebone.
New London, Conn.								
Charles Carroll	Ship	404	Desolation Island	June 26, 1844	Mar. 10, 1845	.....	1,200	Also 2,000 barrels whale oil and 17,000 pounds whalebone.
Do	do	412	do	Aug. 26, 1845	May 24, 1847	.....	2,000	Also whale oil and bone.
Do	do	412	do	July 21, 1847	June 3, 1849	.....	3,000	Went to California in 1849.
Columbia	do	492	South Atlantic	July 9, 1840	May 6, 1842	.....	4,000	Also 100 barrels sperm oil.
Do	do	492	do	July 13, 1842	Apr. 8, 1844	.....	3,200	Also 1,000 barrels whale oil and 7,000 pounds whalebone.
Corinthian	do	505	Desolation Island	Sept. 3, 1847	June 26, 1849	.....	2,000	Also whale oil.
Do	do	505	do	Sept. 7, 1849	Apr. 27, 1851	.....	1,000	Also whale oil and bone.
Mystic, Conn.								
Emmeline	Schooner	76	South Seas	July 9, 1843	Apr. 4, 1844	650	600	
Stonington, Conn.								
Enterprise	Brig	95	South Atlantic	Sept. 3, 1840	May 5, 1842	300	.....	
Do	do	95	Coast of Chili	Aug. 10, 1842	May 30, 1844	500	.....	Also 1,000 hair-seal skins.
New London, Conn.								
Exile	Schooner	70	Desolation Island	July 17, 1844	Jan. 8, 1846	.....	200	Also whale oil and bone.
Do	do	83	do	Apr. 9, 1846	May 10, 1848	.....	330	
Do	do	83	do	Aug. 14, 1848	July 3, 1850	.....	260	Tender to Peruvian.
Franklin	do	119	South Atlantic	Aug. 13, 1842	Apr. 8, 1844	120	1,100	Tender to Columbia.
Do	do	119	Desolation Island	June 5, 1844	Apr. 7, 1846	.....	500	
Do	do	119	South Seas	July 28, 1846	July 19, 1847	.....	400	Also 50 barrels sperm oil.
Do	do	119	Desolation Island	Sept. 7, 1849	May 10, 1851	.....	183	Tender to Julius Cæsar.
Garland	do	60	do	June 17, 1844	.....	.....	.....	Tender to Charles Carroll; lost on Desolation in 1848.
Hand	do	86	South Atlantic	June 6, 1840	Apr. 30, 1842	.....	.....	Tender to Columbia.
Do	do	86	do	June 29, 1842	Apr. 10, 1844	.....	300	Do.
Do	do	86	Desolation Island	June 5, 1844	.....	.....	200	Lost near home on No Man's Land, 1846.
Jason	Ship	335	do	Apr. 9, 1846	May 20, 1848	.....	1,000	Also whale oil and bone.
Julius Cæsar	do	347	do	Sept. 7, 1849	May 10, 1851	.....	1,000	Do.
Leader	Schooner	130	South Seas	July 6, 1845	.....	.....	.....	Seized at Chiloe for infringement of law in 1846; released in 1847 and sold at Valparaiso.
Newport, R. I.								
Ohio	Schooner	....	South Seas	July 9, 1841	.....	.....	.....	No report.
Stonington, Conn.								
Pacific	Schooner	...	South Seas	June 10, 1843	Apr. 9, 1844	1,500	.....	
Do	do	...	do	Aug. 8, 1844	May 12, 1845	1,500	.....	

ANTARTIC SEALING VOYAGES FROM 1840 TO 1850—Continued.

[Arranged alphabetically by vessel's name.]

Name and home port.	Rig.	Tons.	Sealing ground.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
New London, Conn.								
Peruvian	Ship	388	Desolation Island.	Aug. 14, 1848	Aug. 8, 1850	.....	1,300	Also whale oil and bone.
Stonington, Conn.								
Richard Henry	Bark	137	South Seas	July 20, 1843	.....	.....	.....	Lost at South Shetlands, 1845.
New London, Conn.								
Shaw Perkins	Sloop	55	South Atlantic	June 6, 1840	Apr. 16, 1842	.....	.....	Tender to Columbia.
Do	do	55	do	Jnne 29, 1842	Apr. 10, 1844	.....	115	Do.
Do	do	55	Desolation Island.	June 5, 1844	.....	.....	.....	Lost at Desolation with crew of eight men in 1847.
Stonington, Conn.								
United States	Ship	244	South Seas	Apr. 27, 1842	Apr. 19, 1843	.....	2,000	Also sperm oil.
Do	do	244	do	June 19, 1843	May 30, 1844	.....	1,500	Also 110 barrels sperm oil.
Do	do	244	do	Dec. 4, 1847	May 3, 1849	.....	1,800	
Do	do	244	Crozet Islands	June 18, 1849	May 24, 1851	.....	845	
Mystic, Conn.								
Uxor	Brig	96	South Atlantic	July 22, 1840	Jan. 1, 1841	.....	400	Sailed again in 1841 and was lost on Crozet Islands October 28.
New London, Conn.								
White Oak	Bark	292	South Seas	Apr. 10, 1841	Mar. 15, 1843	500	.....	Also whale and sperm oil.

ANTARCTIC SEALING VOYAGES FROM 1850 TO 1860.

[Arranged alphabetically by vessel's name.]

Mystic, Conn.								
Aeronant	Ship	265	South Seas	Aug. 9, 1852	May 22, 1853	.....	1,188	
Do	do	265	do	July 28, 1853	July 13, 1854	.....	490	
New London, Conn.								
Alert	Bark	398	Desolation Island.	Oct. 7, 1853	June 18, 1856	.....	2,300	Also whale oil and bone.
Do	do	398	do	July 23, 1856	May 31, 1858	.....	2,900	Do.
Do	do	398	Heard's Island	June 29, 1858	May 14, 1860	.....	3,237	Do.
Fairhaven, Mass.								
Alfred	Schooner	180	Heard's Island	Aug. 16, 1856	.....	.....	.....	Tender to Samuel Robertson; lost at Heard's Island December 29, 1856.
New London, Conn.								
Atlantic	Schooner	130	Desolation Island.	July 19, 1856	Jan. 12, 1857	.....	.....	Tender to larger vessel.
Do	do	130	Heard's Island	July 19, 1857	July 28, 1858	....	283	Withdrawn, 1859.
Atlas	do	81	Desolation Island.	Aug. 12, 1851	June 14, 1850	.....	115	Tender to larger vessel.
Do	do	81	do	July 31, 1856	.....	.....	.....	Sold at Cape Good Hope.
Nantucket, Mass.								
Catawba	Ship	335	South Seas	Sept. 3, 1857	Apr. 19, 1859	.....	2,827	Also sperm oil.
New London, Conn.								
Corinthian	Ship	505	Desolation Island.	Aug. 19, 1851	June 24, 1853	.....	3,500	Also whale oil and bone.
Do	do	505	do	Nov. 15, 1853	June 9, 1856	.....	2,000	Do.
Do	do	505	Heard's Island	July 19, 1856	Apr. 10, 1858	.....	2,700	Do.
Mystic, Conn.								
Cornelia	Schooner	197	Heard's Island	Aug. 9, 1857	June 6, 1858	.....	1,092	
Do	do	197	do	July 14, 1858	May 12, 1860	.....	1,600	Also whale oil and bone.
Warren, R. I.								
Dolphin	Bark	325	Heard's Island	Sept. 30, 1858	.....	.....	.....	Lost in 1859; no report of oil.
New London, Conn.								
Dove	Bark	151	Desolation Island.	Aug. 11, 1859	July 15, 1861	.....	933	One of the "Stone fleet" sunk at Charleston, S. C.
Nantucket, Mass.								
Eliza Jane	Schooner	130	South Seas	Aug. 15, 1857	Apr. 9, 1859	....	550	Tender to Catawba.

ANTARCTIC SEALING VOYAGES FROM 1850 TO 1860—Continued.

[Arranged alphabetically by vessel's name.]

Name and home port.	Rig.	Tons.	Sealing ground.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
New London, Conn.								
E. R. Sawyer	Schooner	126	Heard's Island	Aug. 13, 1856	Apr. 10, 1858	.....	512	
Do	...do	126	..... do	June 10, 1858	May 16, 1860	.....	388	
Exile	...do	83	Desolation Island	Aug. 18, 1852	June 12, 1859	.....	212	Tender to larger vessel.
Do	...do	83	.....do	Sept. 1, 1859	.....	.....	.....	Lost at Heard's Island in 1860.
Stonington, Conn.								
Flying Cloud	Schooner	100	Cape Horn	July 20, 1852	May 7, 1853	.....	40	
Do	...do	100	.....do	July 28, 1853	.....	.....	.....	No report.
Mystic, Conn.								
Frank	Schooner	200	Heard's Island	June 18, 1858	.....	.....	.....	Lost at Heard's Island in February, 1859; crew saved.
New London, Conn.								
Franklin	Schooner	119	Desolation Island	July 15, 1859	June 4, 1862	.....	500	Also whale oil and bone.
H. Brewer	Bark	293	.....do	Sept. 29, 1852	July 15, 1854	.....	1,200	Do.
Do	...do	293	.....do	Aug. 19, 1854	.....	.....	600	Condemned at St. Helena, February 19, 1857; cargo sent home.
Nantucket, Mass.								
Homer	Brig	140	South Atlantic	July 6, 1858	Oct. 4, 1859	.....	325	
New London, Conn.								
Isaac Hicks	Ship	495	Heard's Island	July 19, 1856	June 2, 1858	.....	4,275	Also whale oil and 600 pounds bone.
Do	...do	495	.....do	July 20, 1858	Apr. 30, 1861	.....	3,500	Also whale oil and bone.
J. E. Comstock	Schooner	75	.....do	May 30, 1857	.....	.....	.....	Tender to Zoe.
John E. Smith	...do	119	.....do	Aug. 4, 1851	June 26, 1854	.....	205	Also whale oil and bone.
Julius Cæsar	Ship	347	Desolation Island	Aug. 18, 1851	June 4, 1853	.....	1,500	Do.
Do	...do	347	.....do	Sept. 3, 1853	Apr. 7, 1856	.....	1,000	Do.
Laurens	...do	420	Heard's Island	Sept. 17, 1855	May 8, 1857	....	4,700	
Do	...do	420	..... do	Aug. 4, 1857	Aug. 15, 1858	.....	4,196	
Mystic, Conn.								
Lion	Schoonsr	150	South Seas	Aug. 18, 1852	July 10, 1853	.....	.....	Tender to Aeronant.
Do	...do	150	..... do	July 28, 1853	.....	.....	.....	Lost on English Bank March 22, 1854.
New London, Conn.								
Marcia	Schooner	128	Desolation Island	Aug. 4, 1851	May 6, 1853	.....	639	Tender to larger vessel.
Do	...do	128	.....do	Aug. 2, 1853	June 16, 1856	.....	218	
Mary Powell	...do	240	Heard's Island	June 28, 1858	.....	.....	1,000	Lost at Heard's Island October 21, 1859, with 400 barrels oil.
Fairhaven, Mass.								
Oxford	Schooner	130	Desolation Island	July 17, 1857	Apr. 11, 1860	.....	580	Tender to Samuel Robertson. Reported ten sealing vessels at Desolation Island.
New London, Conn.								
Pacific	Schooner	161	Heard's Island	July 12, 1856	May 12, 1858	.....	991	
Do	...do	161	.....do	July 7, 1858	Apr. 16, 1861	.....	651	
Peruvian	Ship	388	Desolation Island	Sept. 11, 1850	July 21, 1852	.....	1,800	
Do	...do	388	.....do	Aug. 19, 1852	July 6, 1854	.....	1,400	
Pioneer	Bark	235	Heard's Island	Oct. 4, 1855	June 13, 1857	.....	1,200	Also whale oil.
Do	...do	235	.....do	July 9, 1857	July 10, 1859	.....	2,398	
R. B. Coleman	Schooner	115	..... do	June 25, 1859	.....	.....	---	Lost at Heard's Island in 1859.
Mystic, Conn.								
Romulus	Ship	365	Desolation Island	June 3, 1858	May 9, 1860	.....	2,538	
Fairhaven, Mass.								
Samuel Robertson	Ship	421	Desolation Island	Aug. 23, 1856	Oct. 17, 1858	.....	3,399	
Stonington, Conn.								
Sarah E. Spear	Bark	150	South Shetlands	Sept. 27, 1852	May 18, 1853	500	530	
Do	...do	150	.....do	July 28, 1853	.....	.....	.....	No report.
New London, Conn.								
Silver Cloud	Schooner	140	Desolation Island	June 10, 1858	Nov. 17, 1859		510	

ANTARCTIC SEALING VOYAGES FROM 1850 TO 1860—Continued.

[Arranged alphabetically by vessel's name.]

Name and home port.	Rig.	Tons.	Sealing ground.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
Stonington, Conn.								
Tehoa	Schooner	143	South Seas	June 9, 1853	Apr. 12, 1854		600	
United States	Bark	244	do	Aug. 6, 1851	June 5, 1852		1,400	Also whale oil and bone.
Do	do	244	do	July 20, 1852	May 10, 1853		2,029	
Do	do	244	do	July 28, 1853	July 6, 1854		600	
Warren, R. I.								
William Wilson	Ship	375	Desolation Island	Oct. 3, 1857	Jan. 4, 1861		45	Also good cargo of whale oil and bone.
Mystic, Conn.								
Wilmington	Schooner	100	South Seas	July 28, 1852				No report.
New London, Conn.								
Zoe	Brig	197	Heard's Island	Oct. 26, 1855	Apr. 4, 1857		1,299	Also 11 barrels sperm oil.
Do	do	197	do	June 10, 1857	Apr. 15, 1859		1,280	

ANTARCTIC SEALING VOYAGES FROM 1860 TO 1870.

[Arranged alphabetically by vessel's name.]

New London, Conn.								
Alert	Bark	398	Heard's Island	July 24, 1860	July 12, 1862		3,090	Burned by privateer Alabama in 1863.
Arab	do	276	do	Dec. 23, 1862	June 8, 1864		2,241	Also whale oil and bone.
Do	do	276	do	Aug. 4, 1864	June 23, 1865		1,692	Do.
Do	do	276	do	Aug. 9, 1865	June 6, 1866		2,064	Do.
Atlantic	Schooner	130	do	July 20, 1860	Sept. 9, 1861			Tender to Alert.
Charles Colgate	do	250	Desolation Island	June 4, 1860	May 20, 1862		1,289	
Do	do	250	do	May 23, 1863	Apr. 9, 1865		1,265	
Do	do	250	do	June 5, 1865	May 28, 1867		1,800	Also whale oil and bone.
Do	do	250	Heard's Island	June 22, 1865	May 4, 1869		1,000	Do.
Do	do	250	Desolation Island	June 13, 1869	Apr. 18, 1871		1,114	
Mystic, Conn.								
Cornelia	Schooner	197	Heard's Island	June 16, 1860	June 17, 1862		968	
New Bedford, Mass.								
Eliza Jane	Schooner	89	Cape Horn	Oct. 24, 1861				Lost on east coast of Patagonia August 5, 1862.
New London, Conn.								
Emma Jane	Schooner	86	Desolation Island	July 6, 1867	Apr. 26, 1872		80	Also whale oil and bone.
E. R. Sawyer	do	126	do	June 27, 1860	July 2, 1862		493	
Do	do	126	Heard's Island	July 24, 1862	May 25, 1864		556	
Do	do	126	do	July 14, 1864				Lost at Heard's Island September 17, 1866.
Golden West	do	144	Desolation Island	Nov. 30, 1865	May 25, 1868		1,800	Also whale oil and bone.
Do	do	144	do	June 30, 1868	Apr. 18, 1871		849	
Lydia	Bark	351	Heard's Island	Aug. 18, 1864	May 17, 1865		1,734	
Provincetown, Mass.								
M. E. Simmons	Schooner	160	Desolation Island	Aug. 16, 1865	May 31, 1868		1,659	
New London, Conn.								
Pacific	Schooner	161	Desolation Island	June 17, 1862				Lost at Heard's Island February 1, 1863; sent home 1,500 barrels oil.
Roman	Ship	350	do	Aug. 22, 1866	June 2, 1867		1,584	Also whale oil and bone.
Do	do	350	Heard's Island	Aug. 12, 1867	June 6, 1868		1,926	Also sperm oil.
Do	do	350	Desolation Island	Aug. 13, 1868	May 18, 1869		1,500	Also whale oil and bone.
Do	do	350	do	June 25, 1869	May 23, 1870		1,800	Also sperm and whale oil and bone.
Roswell King	Schooner	134	do	Aug. 23, 1864	Apr. 30, 1867		1,200	Also whale oil and bone.
Do	do	134	Heard's Island	July 13, 1867	May 19, 1870		2,000	Do.
Silver Cloud	do	140	Desolation Island	June 13, 1860				Lost in 1862 with all on board; sent home 700 barrels sea-elephant oil.
Somerset	Bark	201	do	June 4, 1864				Lost at Desolation Island August 26, 1864.

ANTARCTIC SEALING VOYAGES FROM 1870 TO 1880.

[Arranged according to year of sailing.]

Name and home port.	Rig.	Tons.	Sealing ground.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
1870–'72.								
New London, Conn.								
Flying Fish	Schooner	75	South Georgia	July 5, 1870	Apr. 18, 1871	.....	.....	Bought from Gloucester; returned home clean; tender to Trinity.
Francis Allyn	...do	107	South Atlantic	June 30, 1870	June 6, 1872	.....	800	Brought home also whale and sperm oil.
Roman	Ship	350	Heard's Island	June 22, 1870	May 3, 1871	.....	1,500	
Roswell King	Schooner	134	...do	June 29, 1870	Apr. 26, 1873	.....	1,750	
Trinity	Bark	417	South Georgia	July 23, 1870	Apr. 21, 1871	500	210	
Charles Colgate	Schooner	250	Desolation Island	Jnue 27, 1871	Apr. 11, 1873	.....	1,500	Brought home also whale oil.
Francis Allyn	...do	107	South Atlantic	July 22, 1871	June 6, 1872	5,500	395	Brought home also 19 barrels sperm oil.
Franklin	... do	119	...do	Aug. 26, 1871	Jnue 9, 1872	.....	.....	Returned clean; tender to Peru.
Golden West	...do	144	...do	Aug. 7, 1871	May 14, 1872	4,000	400	
Peru	Bark	259	...do	Aug. 17, 1871	June 14, 1872	2,730	187	Boat's crew lost by boat capsizing, March 2, 1872; withdrawn 1874.
Roman	Ship	350	Heard's Island	June 26, 1871	Jnne 9, 1872	.....	1,518	Brought home also 21 barrels sperm oil.
Emma Jane	Schooner	86	...do	June 27, 1872	May 2, 1877	.....	800	Tender to Roman.
Florence	...do	56	South Atlantic	Aug. 6, 1872	April—, 1876	10,000	.....	Bought from Gloucester, Mass.; when nineteen months from home had taken only 9skins, bnt between November, 1873, and the beginning of 1876, 10,000 skins were taken, many of them being shipped to Loudon from South American ports. The total value of the cargo was something over $100,000.
Flying Fish	...do	75	...do	Aug. 10, 1872	Apr. 15, 1874	3,000	53	
Francis Allyn	... do	107	...do	Ang. 20, 1872	May 10, 1873	3,000	32	
Franklin	...do	119	...do	Aug. 5, 1872	May 13, 1873	1,500	60	
Golden West	... do	144	...do	Aug. 15, 1872	Apr. 6, 1873	3,500	.....	
Nile	Ship	293	...do	Sept. 3, 1872	May 5, 1873	2,000	303	Brought home also 76 barrels sperm oil.
Roman	...do	350	Heard's Island	July 16, 1872	Mar. 31, 1873	.....	1,225	
Stonington, Conn.								
Thomas Hunt	Schooner	63	South Atlantic	July 31, 1872	Apr. 20, 1873	1,400	.....	Bought from Gloucester, Mass.; stocked, $15,000.
New York, N. Y.								
L. P. Simmons	Schooner	89	South Atlantic	July 25, 1872	May 8, 1873	300	.....	Bought from Provincetown, 1872; fitted from New London.
1873.								
New London, Conn.								
Charles Colgate	Schooner	250	Heard's Island	June 18, 1873	Apr. 27, 1875	.....	900	Brought home also 400 pounds whalebone
Flying Fish	...do	75	South Shetlands	July 23, 1873	Apr. 15, 1874	3,500	53	
Francis Allyn	...do	107	...do	July 25, 1873	June 14, 1875	500	.....	
Franklin	...do	119	...do	July 22, 1873	May 13, 1874	615	267	
Golden West	...do	144	...do	July 24, 1873	Apr. 20, 1874	400	112	Brought home also 31 barrels sperm oil.
Roman	Ship	350	Heard's Island	May 17, 1873	Apr. 17, 1874	.....	1,441	Brought home also some whalebone.
Roswell King	Schooner	134	...do	Aug. 5, 1873	Apr. 29, 1875	.....	550	Brought home also whale oil and bone.
Stonington, Conn.								
Thomas Hunt	Schooner	63	South Shetlands	July 22, 1873	May 10, 1874	1,400	.....	Lost seven men; stocked $33,000.
New York, N. Y.								
L. P. Simmons	Schooner	89	South Shetlands	Aug. 2, 1873	May 7, 1875	1,000	.....	Belonged to New London.
1874.								
New London, Conn.								
Franklin	Schooner	119	South Shetlands	July 15, 1874	Apr. 29, 1875	1,300	160	
Golden West	...do	144	...do	July 18, 1874	May 4, 1875	1,578	50	
Roman	Ship	350	Heard's Island	June 22, 1874	May 13, 1876	.....	1,300	Brought home also 50 barrels sperm oil; sold to New Bedford, 1876.
Stonington, Conn.								
Charles Shearer	Schooner	100	South Shetlands	July 23, 1874	Apr. 28, 1875	1,600	.....	Bought from Gloucester, Mass.; stocked $15,000; lost entire ground tackling at Cape Horn.
Thomas Hunt	... do	63	South Shetlands and Cape Horn	July 22, 1874	Apr. 2, 1875	1,600	.....	Only one skin secured from South Shetlands, on account of ice; stocked $16,000

ANTARCTIC SEALING VOYAGES FROM 1870 TO 1880—Continued.

(Arranged according to year of sailing.)

Name and home port.	Rig.	Tons.	Sealing ground.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
1875.								
New London, Conn.								
Charles Colgate	Schooner	250	Heard's Island	June 15, 1875	May 2, 1877	.....	840	
Flying Fish	...do	75	.....do	July 7, 1875	Apr. 2, 1876	.....	200	
Francis Allyn	...do	107	South Atlantic	July 27, 1875	May 28, 1877	5,000	.....	Also 500 hair-seal skins.
Golden West	...do	144	..... do	June 30, 1875	June —, 1876	2,200	.....	
L. P. Simmons	...do	89	.....do	July 13, 1875	Apr. 1, 1876	500	500	
Roswell King	...do	134	Heard's Island	June 29, 1875	May 18, 1877	.....	1,700	
Stonington, Conn.								
Charles Shearer	Schooner	100	Cape Horn	June 16, 1875	May 16, 1876	2,700	.....	Stocked $16,000; lost five men by drowning and two were massacred by Indians; vessel, with difficulty, saved from being captured.
1876.								
New London, Conn.								
Florence	Schooner	56	South Atlantic	July 22, 1876	Apr. 6, 1877	500	.....	This vessel was employed on the Howgate expedition to Cumberland Inlet in 1877–'78.
Flying Fish	...do	75	.....do	June 29, 1876	May 2, 1877	.....	.....	Tender to Trinity; returned clean.
Golden West	...do	144	.....do	Aug. 9, 1876	Apr. 20, 1877	808	550	
L. P. Simmons	...do	89	.....do	June 27, 1876	Mar. 20, 1877	1,000	500	
Trinity	Bark	317	.....do	July 1, 1876	Apr. 21, 1877	900	2,000	
Stonington, Conn.								
Charles Shearer	Schooner	100	South Atlantic	July 8, 1876	May 20, 1877	400	50	Stocked $4,500.
Thos. Hunt	...do	63	.....do	June 21, 1876	Mar. 20, 1878	5,000	.....	Stocked $25,000.
1877.								
New London, Conn.								
Charles Colgate	Schooner	250	South Atlantic	Aug. 1, 1877	Apr. 6, 1878	.....	130	
Flying Fish	...do	75	.....do	June 28, 1877	May 1, 1878	.....	.....	Tender to Trinity; returned clean.
Francis Allyn	...do	107	Heard's Island	Aug. 28, 1877	May 13, 1879	.....	1,500	
Golden West	...do	144	South Atlantic	June 28, 1877	May 2, 1878	50	550	
Roswell King	...do	134	Desolation Island	Aug. 24, 1877	June 27, 1879	.....	1,800	
Trinity	Bark	317	South Atlantic	July 10, 1877	May 2, 1878	.....	1,500	
Stonington, Conn.								
Charles Shearer	Schooner	100	South Atlantic	July 3, 1877	.....	.....	.....	Lost in neigborhood of South Shetlands.
New York, N. Y.								
Eothen	Schooner	101	South Atlantic	July 22, 1877	—— —1878	75	200	
1878.								
New London, Conn.								
Flying Fish	Schooner	75	South Atlantic	June 24, 1878	.....	.....	.....	Abandoned October 5, 1878, off Cape Horn.
Golden West	...do	144	....do	July 27, 1878	.....	8,000	.....	Cargo sent home; vessel condemned at Sandy Point, 1880.
L. P. Simmons	...do	89	Cape Horn	Dec. 28, 1878	Out, 1881	.....	.....	Sent home 3,700 fur-seal skins up to January 1, 1881.
Trinity	Bark	317	South Georgia	July 2, 1878	May 24, 1879	.....	250	
Stonington Conn.								
Thomas Hunt	Schooner	65	South Atlantic	May 21, 1878	Apr. 17, 1879	3,200	.....	Stocked $32,000; brought home 800 skins, valued at $8,000 taken at Diego Ramirez by boat's crew of lost schooner Charles Shearer.
1879.								
New London, Conn.								
Francis Allyn	Schooner	104	South Atlantic	July 22, 1879	Out, 1881	.....	.....	Up to last advices in 1881 had sent home 2,900 Cape Horn skins.
Mary E. Higgins	...do	98	Desolation Island	July 10, 1879	May 1, 1880	2,000	.....	
Stonington, Conn.								
Express	Schooner	70	South Shetlands	June 10, 1879	Apr. 18, 1880	835	.....	Stocked $14,000.
Henry Trowbridge	Brig	176	South Seas	Oct. 7, 1879	Out, 1881	.....	.....	Arrived at Montevideo in distress in April 1880, and sent home 640 fur-seal skins, valued at $7,500. During season of 1881 sent home 1,310 Cape Horn skins.
Thomas Hunt	Schooner	70	South Shetlands	June 25, 1879	Apr. 18, 1880	1,025	.....	Stocked $15,000.

ANTARCTIC SEALING VOYAGES FROM 1870 TO 1880—Continued

(Arranged according to year of sailing.)

Name and home port.	Rig.	Tons.	Sealing grounds.	Sailed.	Returned.	Number of fur-seal skins.	Barrels of sea-elephant oil.	Remarks.
1880.								
New London, Conn.								
Mary E. Higgins	Schooner	98	Cape Horn.....	June 8, 1880	Ont, 1882	.....	.....	Season of 1881 forwarded 900 Cape skins to London; season of 1882, up to May had forwarded 1,200 Cape seals.
Pilot's Bride.....	...do	194	Desolation Island.	Apr. 27, 1880	.....	.....	.....	Sent home in 1881 1,400 South Sea skins, and 100 barrels of sea-elephant oil. Vessel not heard from up to May, in 1882, since last shipment, and supposed to be lost.
Roswell King.....	...do	134	....do.	May 11, 1880	Apr. 27, 1881	.....	500	Sailed for Cumberland Inlet, whaling, in June, 1881.
Trinity	Bark....	317	Heard's Island....	June 1, 1880	.....	.....	.....	Lost at Heard's Island. The United States Government steamer Marion sent, in November, 1881, to rescue the crew. All but three of the entire crew saved and arrived at Cape Town, Africa, in the Marion in the spring of 1882.
Wanderer	Schooner	151	South Atlantic and Cape Horn.	Aug. 12, 1880	.....	.....	.....	Forwarded during 1881, 80 South Sea skins and 230 Cape skins. Vessel lost on Cape Horn in October, 1881, with 160 barrels sea-elephant oil, and 12 seal skins on board.
Stonington, Conn.								
Express	Schooner	70	Cape Horn.....	July 8, 1880	Ont, 1882	.....	.....	During season of 1881 forwarded 730 Cape skins to London, and during season of 1882 up to May 30, had forwarded 860 Cape skins.
Thomas Hunt	...do	70	....do	June 3, 1880	Ont, 1882	.....	.....	During season of 1881 forwarded to London 750 Cape skins, and during season of 1882, up to May 30, had forwarded to London 2,200 Cape skins.
New Bedford, Mass.								
Adelia Chase	Schooner	85	South Atlantic....	Feb. 16, 1880	Ont, 1882	.....	.....	During season of 1881 forwarded 80 South Sea skins and 160 barrels of sea-elephant oil, and during season of 1882, up to May 30, had taken 600 Cape seal.

7. NARRATIVE OF AN ANTARCTIC SEALING VOYAGE IN THE SHIP NEPTUNE, 1796 to 1799.

Through the kindness of Mr. Charles Peterson, of New Haven, Conn., we are permitted to give the following extracts from letters written by Mr. Eben Townsend, supercargo of the ship Neptune, of New Haven, on her voyage to the fur-seal islands and China. The voyage lasted from November 29, 1796, to July 11, 1799. The Neptune was built in 1796, measured 353 tons, and was owned by several merchants of New Haven. The return cargo from China was a very valuable one, consisting of teas, silks, nankeens, and chinaware, and paid United States customs duties amounting to $55,438.71. Mr. Townsend says:

It is my intention to write you every month the principal events during the voyage which I have undertaken in the ship Neptune, Capt. Daniel Greene, on a sealing voyage into the Pacific Ocean and to China. This I can very conveniently do by a recapitulation from my daily journal of such events as are in any way interesting and would save you the trouble of searching a dry sea journal in which you would not look in expectation of many incidents. We sailed from New York on the 29th of November. You will remember that I left New Haven about the 10th with the ship's crew. I did not expect to leave you the evening that I did, but having hired a vessel to take that part of the crew, being about twenty pretty crazy fellows, I dare not trust them alone. Our entire crew consisted of thirty-six men and boys.

On the 2d of January the Neptune arrived off Buena Vista, Cape de Verds. Saw a ship and brig standing off and on. Boarded the brig, which was commanded by Captain Hathaway. The ship was an Englishman under American colors and hailed from Philadelphia, commanded by Captain French. As the surf was here so high that there would be great difficulty in taking off salt, we proceeded to the Isle of May, and the next day on arriving there found the ship Eliza, of Boston, Captain Jones, from Bremen, taking in salt, which we found rather dearer than at Buena Vista. We took on board 8¼ moy of salt, each moy 60 bushels, at $5, which is about 8 cents a bushel. Paid also a duty of

half a dollar per moy and $12 anchorage. The salt ponds are about 2 miles from the landing and the salt brought down on jackasses.

A ship from Nantucket arrived, Captain Fosdick, bound round Cape Horn on a whaling voyage. He had experienced rough weather and had come in to refit, having stove his try-works.

SEALING AT THE FALKLAND ISLANDS AND PATAGONIA.

Crossed the equator on the 18th of January. On the 22d of February reached the Falkland Islands, eighty-five days from New York. On this day at 6 a. m. made the land hearing east 8 leagues distance, being the Guard and Steeple Jason Islands; got out our boats and all but nine of the crew went ashore and returned in the afternoon in high spirits. Mr. Griswold, our first officer, said the seal appeared very plenty and no crew there. We almost felt sure of our voyage. They soon packed up and were again on shore and we bore away with the ship for the harbor and anchored at dark at the mouth of it. We saw a brig in sight in another harbor about 4 miles from us. This we did not like. Next morning we warped into the harbor. The captain of the brig came on board. It proved to be an English brig, Captain Morse, after a cargo of hair seal and oil from the sea-elephant. As he did not interfere with our voyage we were glad to see him. We soon got our shallop frame landed and went to work setting it up. This frame was brought from the United States.

On the 3d of March Mr. Griswold came in from the Jason Islands with a boat's crew, and, much to our disappointment, says there are very few seals. We drove on with our shallop as fast as possible, as she was much wanted to search the islands.

I have commenced my attack on the seal. It is uncommon to see them in this harbor, but one day I saw a hair-seal swimming near where we were at work on the shallop. As we had frequent opportunities to kill wild hogs we kept a loaded musket handy. I took it up and put the ball just through the back part of the head of the seal. He was so badly wounded that he could not well get under water, but floundered about at a great rate. I jumped into the yawl and attacked him with my oar. Captain Greene laughed at me and told me to haul him into the boat. As he was a stout fellow I did not much like it, but reflecting that it would not do to come so far for seals and then be afraid of them, I watched my chance, and getting hold of one of his hind flippers, I very suddenly jerked him into the boat. He now floundered worse than before. I punched him with the end of the oar, but for some time I did not know which would keep possession of the boat, and I believe if no one had seen me I would have quit and swum ashore; but at last I conquered the rascal. This pleased Captain Greene very much.

Captain Morse, in the brig that had been here with us, left on the 17th of March for Big West Harbor, where he met Capt. David Bunker, in a bark from Hudson, N. Y., and Captain Williams, in a brig from New York. The captains of both these vessels visited us. Both were after elephant oil and hair and fur seal skins. Captain Bunker had been in these islands four months and had taken only 150 barrels elephant oil and six hundred hair-seal skins. Captain Williams had been here eight months and had on board seven thousand fur and twelve thousand hair skins. They are to proceed to the coast of Patagonia and after that to New York.

March 26 we launched our shallop, having set her up and finished her in thirty-three days. She measures about 30 tons. The 29th Captain Greene sailed in the shallop for Jason Islands, leaving only the captain, carpenter, doctor, and myself on the ship.

On the 24th of April we nearly lost the shallop, which would have been a very serious loss. A strong breeze hove a heavy sea into Steeple Jason Cove. The shallop broke off the palms of both anchors and went on shore. The men got her off and at a great hazard got to sea, where they found they could not keep her free of water long enough to make this harbor. They therefore run her into Grand Jason, where they were just able to get her into 2 fathoms of water before she sunk. They afterwards got her up and by nailing canvas over where she had bilged they were able by hard pumping and bailing to get her into this harbor, where we got her on shore and repaired her.

May 21 Captain Greene, having been down to Port Egmont in the shallop, returned with four hogs and forty geese which they had killed down there. They found lying there Capt. David [or Paul] Bunker in a ship from Hudson. She arrived the 8th of January, and her tender—a North River sloop of 50 tons, in charge of his brother, Capt. Prince Bunker—arrived on the 20th, after a passage of one hundred and sixty or one hundred and seventy days. They had but 50 barrels of oil and two thousand fur and hair skins.

On the 7th of July there was thin ice in a bucket of water on deck for the first time.

July 26 the shallop again arrived in distress, having been driven on shore in a gale at the Grand Jason. She got about half full of water. We got her ashore and repaired her by mending her keel, putting in a strake or two and a number of graving pieces in her bottom, and giving her a new rudder and stern-post. After we had repaired her, in heaving her off we broke her best anchor in three pieces and after getting her into the water found she leaked rather bad. We hove her out again and partially stopped the leak, but she has never since been as tight as before she got ashore.

On August 22 Captain Bunker came up from Port Egmont with his sloop tender and agreed with Captain Greene that they make up a crew and go on to the coast of Patagonia in the sloop and search for seal. Accordingly, on the 26th, Captains Greene and Bunker, with twenty-four men sailed in the sloop Betsey with the understanding that if we heard nothing from them in six weeks, I was to send our shallop over and look for them as they may have got their vessel on shore. After being absent about thirty-three days they returned in a passage of twelve days, having left a sealing crew at Cape Mattass, with a whale-boat to shift along the coast if necessary.

On their first arrival on the coast they found a few Spaniards, sealing on an island near the mouth of Port Desire River, who told them there would be no difficulty in getting permission from the commandant at Port Desire to seal.

Captains Greene and Bunker therefore went up to Port Desire with a whale-boat's crew about 7 leagues, leaving the sloop at anchor. When they got to the garrison, after some few questions they were told by the Spaniards that they believed them to be Englishmen, and as Spain was at war with England they must consider themselves prisoners. A boat with twelve armed men was accordingly dispatched to bring up the sloop. They remonstrated and proposed to remain as hostages and send down for the vessel's papers, but all to no purpose. As this would ruin all our voyages—for they said that they must be sent to the River de la Plata for trial, as English and American papers were so much alike—they were therefore determined to make a bold push. The Spaniards were determined to prevent it, and accordingly stationed an armed barge down the river a little below the garrison. It looked very dark, for they were placed inside the garrison, and there appeared no chance for escape. However, Greene, who you know is resolute and hawk-eyed, gave a word of caution to keep together and be ready.

The Spaniards always keep a padre or priest in their garrisons. When their prayer bell rang at 8 o'clock in the evening, and they had all got into a small church which was inside the garrison, the wished for time offered. They started and were soon hold of their whale-boat which had been hauled up. The movement was so quick that it was not known whether an alarm had been given and after they were afloat and it was too dark to be fired at there was little danger but that they could row two feet to one of any boat rowed by the Spaniards. They muffled their oars and got alongside the sloop about midnight, jumped on deck and got possession of the arms, the soldiers being asleep. They then made the soldiers get into their own boat, and after knocking out the flints returned them their muskets and treated them each with a drink of grog. The soldiers were told to tell their commandant that he did not know how to keep Yankees. They then got under way and ran to the northward.

On the 4th of October our shallop came in with all hands from the islands and we began preparing the ship to leave here by getting our topmasts on end and the rigging overhead, as we have had the ship completely stripped since we have been here at the Falklands. On the 11th of October we unmoored and found our cables in good order. Got under way, and running into Big Harbor came to for one night. On the 12th we anchored in the harbor, and, after mooring the ship, prepared for a sealing cruise in the shallop. On the 16th the shallop sailed for a fortnight's cruise, leaving me alone on board, but as it was a good harbor and the ship had good cables and anchors, I felt safe. I was then captain, mate, and all hands. As I had enough to do I was not so lonesome as you may imagine. I was left with a dog, a cat, and five kittens, but the dog killed the cat, and the kittens being but a day old, died also. I never felt the loss of a cat so much.

On the 26th the shallop returned with about seven hundred seal-skins. Had been on a number of islands and found generally that the seal were off. November 9 Captain Greene again sailed in the shallop, and on the 13th returned with two thousand skins which they took on Bird Keys. At New Island he found the ship Betsey, Capt. Edmund Fanning, his first officer Caleb Brintnall, four months from New York, by whom we received letters which were very acceptable. They were also on a sealing voyage. Also ship Lydia, Obed Fitch master, four months from New Bedford, and the ship Olive Branch, Obed Paddock, five months from Nantucket, bound round Cape Horn for sperm oil.

On the 14th of November Captain Bunker arrived from the main in the sloop Betsey, five days passage from Cape Mattas with but two thousand skins. He had been unfortunate. Had his boat stove by a whirlwind and had carrieds away his mast head.

The sloop Betsey sailed for Port Egmont on the 18th, which closed our partnership. Captain Greene made a cruise of a few days in the shallop to the Bashee Islands, in latitude 52° 55′; found no seal of consequence on the island. * * *

Two or three days after Captain Bunker sailed we found on the island a suitable mast for the sloop Betsey, which would be very important for Captain Bunker. Accordingly Captain Greene took the mast in tow with the shallop and went to Port Egmont and gave it to Captain Bunker. Captain Worth in the brig Garland was also lying at Port Egmont and getting elephant oil.

On December 6th Captain Greene sailed in the shallop for New Island expecting to find the Betsey still there, but she had gone. Found there just arrived the ship Maria, Capt. Benjamin Paddock, eighty-four days from Nantucket, bound round Cape Horn for sperm oil.

On the 16th we lost two men by the upsetting of the whale-boat in a tide up.

December 22 Capt. Bazilla Worth, in the brig Garland, and Captain Bunker, in his sloop Tender, came up from Port Egmont and anchored at Island Harbor, the other side of this island, and visited us on board. Captain Worth was on his way to the northwest coast of America and Canton. He thinks to make up his cargo of skins and meet a vessel at the Sandwich Islands, to which he will deliver his cargo and receive from her some "trade" for the northwest coast. The vessel he calculates to meet belongs to the same owners. He calculates that his oil will bring £45 sterling per per ton of 8 barrels or 240 gallons.

The Neptune accompanied by her shallop left the Falklands for Patagonia December 24, having taken thus far thirty thousand skins.

On the 28th of December we struck soundings on the west coast of Patagonia in latitude 49° 38′ south, 40 fathoms, white sand, off St. Julian's Bay. Having experienced very bad weather, in which one shallop made "good weather," on the 29th examined the shore with a whale-boat, found an island in latitude 47° 55′ with about two thousand hair-seal, which we did not want. The two following days found several islands with hair-seal, but no fur-seal. On the 31st we made a cruise in the whaleboat and found a small bunch of dry rocks with about five hundred fur-seals on them. January 1, 1793, we were off Port Desire, and landed on the same island where the captains in the sloop had before landed.

No Spaniards were there, and the fur-seals were very tempting. We held a council of war and determined to take them. The anchorage was bad and some distance from the island, it being also rather an open roadstead, but having started on a voyage of hazard it would not do to be checked by trifles. We therefore ran into a bay, about 4 leagues from the island, and anchored in latitude 47° 43′, moored the ship, struck yards and topmasts, and got our guns on deck and loaded them for the first time; sent a boat up in the night to reconnoiter the garrison, and found there was no vessel of war there, after which we commenced sealing on a point of the harbor where we lay. Soon after four men were seen on shore abreast of the ship. I landed with the boat, as it would not do for the captain of the ship to show himself. They proved to be the commandant of the garrison with three armed soldiers, who with much importance demanded what we were doing there. I plead ignorance of the country, having come in by accident in distress. He gave us ten days to repair and depart. He told me of the sloop having been there, naming the two captains that were in her, and that he had treated them in a very friendly manner, accompanied with many other falsehoods on the subject; also that Captain Farmer from New York had touched there a few days before. I endeavored to persuade him to allow us to continue sealing with part of the crew while the remainder were getting the ship in order. He said it was not in his power to allow it, his instructions from his King would not permit it. I then told him that I would make him some compensation, after which he said no more about his instructions, but that he would go up to the garrison and consult with his commissary, who was the head man of the sealing party that had been taking them on the island. The next day he sent us a pilot, with an invitation to come up with the ship to the garrison, which we declined, but sent him some stores with an invitation to make us a visit on board. A couple of days afterwards he made his appearance in a launch, and we were prepared to receive him; the captain and such men as had been here before in the sloop secreting themselves between decks. We now had the commandant and commissary both on board. After considerable negotiations they agreed that we might take all the seal we would for two months, for which indulgence we agreed to give them our shallop. As soon as the contract was signed (I having occasionally had my secret conferences with the captain between decks), the captain of the ship made his appearance in the cabin, and made his *entrée* in the most perfect good nature, that somewhat allayed the feelings of the commandant, but he was very much astonished and frightened. We, however, soon made him more at his ease, although the lies he had told me must have been fresh on his mind; but we never reminded him of that. The commissary, who had opposed our men's being made prisoners, and who was friendly when they were so, was much pleased with our *finesse*. We could have but little objection to giving them our shallop, as she would be no longer useful to us, and it was important for us to go into the river with the ship, where we should have a good harbor.

Having obtained permission we ran the ship up and moored her alongside the fort, and as we had a crew of forty men, which was more than they could muster, we had nothing to fear from them, and had now a written contract which the commandant would not like to have known to his Government. Towards evening, having unbent our sails and got all snug, the sailors were allowed to go on shore. There were about thirty Patagonian Indians, each of whom had a horse to let for a biscuit apiece. Our men soon verified the old adage "set a sailor on horseback and he will ride to the devil." Up hill and down the speed was the same—a full gallop. The horses were luckily good and very sure footed, yet two or three men got thrown. One horse fell, but the sailor was soon on and started again, saying it was only a lee lurch. None got hurt. The Indians appeared to enjoy it as much as the sailors. As they have plenty of horses, they do not value them much. A few biscuits would have purchased any of them.

Mr. Townsend next records the visits of the Spaniards to the vessel and describes the appearance of the Patagonians.

They are a wandering people and live by hunting, moving with ease as they take their houses with them. These houses are made of light poles with guanaco skins for covering. The guanaco is a kind of deer, more fleet than their horses. They endeavor to surround them and when sufficiently near to entangle them by very dexterously heaving a line, with a stone at each end, round their legs. The line is about 4 feet long. One of the stones is held in the hand, giving the other stone a very quick velocity round their head while the horse is at full speed. It is from this animal that they get 'Bazaar Stone,' once so highly valued for its medicinal properties, but at present thought little of. We got a number of them about the size of a duck's egg. They are formed in concentric coat, and their color is dark green. The Indians kept us well supplied with wild meat, such as guanaco, hares and ostrich, tiger, and wild cat, and we bought from them blankets made from the guanaco skins sewed together, such as they use for clothing. They are covered with wool, or something between wool and fur. We caught plenty of fish. There are also mussel beds, as at the Falkland Islands, but no other shell-fish, although the Spaniards say that there were formerly plenty of oysters.

The garrison is a stockade about 9 feet high, inside of which are the barracks and a block house of two stories about 30 feet square, also a church and a bake-house. They mount seven six-pounders and four swivels, and had about thirty men at that time, some having recently left them and gone home to the river La Plata. At the principal entrance gate they had a poorly carved female figure-head of some ship that had been cast away. They called it the Virgin Mary and never passed it without a bow and crossing themselves.

The commandant had a tolerable garden, in a valley, the only spot which I saw where the vegetation was not very much parched. The hills which surrounded it protected it very much from the sun, and it was watered from a well about 30 feet deep. It required great attention, but they had little else to do. It seldom rains here in the summer; did not rain a drop during our visit, but there is some dew. The whole country appeared as if suffering under a severe drought. There are no woods, and it is surprising how their horses are kept in such good order. It is only in the valleys they can get anything. Even water is difficult to be had, and what there is is brackish. I rode several

times 8 or 10 miles into the country in different directions. It all appeared much the same. Saw here and there a bush, on some of which were a few indifferent herries. About 6 miles from the fort and 2 miles from the sea-shore is a body of salt, about 2 miles long and above a mile wide, perfectly dry, so that we could walk over it. Being perfectly white the appearance was beautiful. The winter rains dissolve it, but in the summer it is dry and about 2 or 3 inches in thickness. The Indians brought us on their horses about 200 bushels, for which we paid a trifle. The salt lay higher than the ocean, so that I do not think it is sea salt. All the land about the place seemed saturated with salt. It was not uncommon to see small patches of salt a few feet square. The weather was very fine and pleasant. Both the Indians and the soldiers enjoyed excellent health. The tide ebbed and flowed about 16 feet, and it was high water on the sea-board at the full and change a little before 12 o'clock.

We lived on the most friendly terms with the Spaniards. The clergyman we esteemed and respected very highly. He was a very excellent man and frequently dined with us.

On the 10th of February the brig Hetty, Captain Robertson, of and from New York, stopped here. Had been out five months, and had on board six thousand hair-seal skins salted, taken on the coast to the northward.

On the 16th of February we sailed from Port Desire, leaving our shallop with the Spaniards, according to contract. During our six weeks' stay at Port Desire we had taken all the seals in the islands, much to the astonishment of the Spaniards, who expected us to work in their own indolent manner. We felt but little regret at leaving the commandant, who was an overbearing "blowed-up-with-a-quill fellow;" but for the commissary, who was a high-minded Castillian, and had seen better days, and the padre, or priest, who was intelligent and all goodness, there was something inexpressibly unpleasant in leaving them in such a country with no possibility of ever seeing them again. It was some time before we neglected occasionally to drink better times to Rosseau, the commissary, and the padre, and "reformation" to the commandant.

After a passage of four days we anchored again at West Point, Falkland Islands, about 4 miles from our old anchorage. We were wooded and watered and took on board about a dozen hogs, part of which were some that we brought from America. They had doubled in numbers; some of the pigs had gone off, but we got all the old ones. We had also left two turkeys and two goats, which we found on our return. We also got from the garden which we had left, 7 bushels of potatoes, which were very important to us, as we had no other vegetables on board. On the 28th we put to sea, but on the 29th, the weather being bad, we were very glad to get back again, where we lay windbound until the 6th of March. At this time we put up a quantity of mussels in the manner of pickled oysters, and they kept quite good.

It was getting late in the season for doubling Cape Horn, as it was now a fall month. We had determined, however, to make the best of our way for Mas-á-Fuera, or the lesser Juan Fernandez, as it is sometimes called, the only place we could now calculate on for making up our cargo of fur-seal skins.

On the 6th of March, 1798, we left the Falkland Islands to double Cape Horn. We intended going through the Straits Le Maire, but adverse winds prevented. We wished to do it, if possible, as it would be gaining westing, which is important in going round the cape, and we had no idea of attempting to pass through Straits of Magellan. The boatswain of our ship had been through there once in a Spanish ship, and was four months getting through. It is a crooked, difficult passage, and can never be preferred to going round. We had heavy weather most of the time, and March 23, when we got the ship's head to the northward, considered ourselves round. Our latitude then was 58° 56′ south and longitude 77° 58′ west. On the 19th we had our greatest southing, being in latitude 60° south, and had the severest weather, splitting several of our sails and getting pretty well loaded with ice. On the 28th, in latitude 49° 54′ south, longitude 85° 30′ west, we saw kelp weed, which we considered as indicating land. The Duke of York's Islands are said to be about here, but their existence is very doubtful. On the 1st of April a small yellow land-bird came on board, and after getting rested left us, taking a correct course for the shore, although we were several degrees from it. About this time we opened a half barrel of sauerkraut put up in America, which was excellent, and I shall always recommend it to be put up in the same manner for long voyages. The cabbage was cut up small, thrown into salt and water overnight, then packed in layers with pepper, pimento, cloves, and vinegar. Our mussels put up as pickled oysters were also fine.

SEALING AT MAS-Á-FUERA AND JUAN FERNANDEZ.

On April 11th we made the Island of Juan Fernandez, which is high mountainous land. The Spaniards have a garrison here. The next day we landed on Mas-á-Fuera, the former residence of Alexander Selkirk, where we took part of our crew on shore, leaving enough on board to work the ship as we were obliged to stand off and on, there being no harbor or good anchorage. We found here a boat's crew left by a New Bedford whaleman to take seal, the vessel intending by and by to call and take them off; and part of the crew of the ship Betsey, of New York, Captain Fanning, having secured skins and proceeded to Canton, these men wishing to try their chances on the island. We also found an English sailor lad named Bill, who had been left alone here several months before. He was contented with his situation and said he could get everything he wanted but bread and rum. He lived in a cave alone and was collecting seal-skins, calculating to sell them as vessels touched there. He brought off and sold us sixty skins, on which he would fix no price beyond filling his keg with rum which only held about 2 gallons. He said he wanted nothing more at that time, with that he would feel rich enough, as he had plenty of bread. As we were unwilling to receive so many skins for less than one tenth of their value we were at a loss how to pay him. He did not even want any more rum, and though we mustered something else and gave him it was not half enough. He left us, apparently as happy as a lord, saying he enjoyed himself better on the island than he ever did before in his life. He could sleep when he pleased, and work when he pleased; there was "no starboard nor larboard watch," and "no one to quarrel with." He

took his keg of rum on shore and buried it in the ground and two or three weeks afterward he invited those of our crew who were left there to come and see him at his cave, as it was his birthday and he wished to treat them. They accepted his invitation and went, when he dug up his keg which they were surprised to find unbroached and entirely full. The party was a merry one and helped him drink it up, which made them all "rich," and after the entertainment stowed away his empty keg and declared that no ship should pass the island without filling it again.

The island of Mas-á-Fuera is in latitude 33° 41′ south, longitude 80° 50′ west from Greenwich, and about 90 miles east by north from Juan Fernandez, which can be seen on a very clear day. The shore is a rugged one all round the island, the mountains very erect, no low land, but here and there a spot that has been made by the stone and earth which has been forced from the mountains by the rains. The high ground is pretty much covered with trees interspersed here and there with a pleasant lawn, the verdure of which appeared beautiful from our boat and from the ship when we stood near on with the land. We frequently saw goats feeding on them in herds of twenty or thirty. The tops of the mountains are frequently whitened with snow, which would cover them in squalls when we have pleasant summer weather below.

Along the shores of the island there are a number of very romantic gulfs, one of which the sailors called the "Pound," because they frequently drove goats in—they could get no farther—and caught them there. In the center of the gulf is a pyramidal rock, about 500 feet high, with a cluster of trees on the top, and apparently cut down on each side by the water which is continually streaming down. After dashing down among the rocks for a considerable distance, the water has a perpendicular fall of about 80 feet, in two columns of about a rod in width, one on each side. The only view of these, however, is near the falls themselves, as they have worn away the rocks until they are left several rods in advance. The main island out of which the gulf was formed maintains a great height to the shore surrounding it, with tall and abrupt mountains, and nearly meeting, so as to form a narrow entrance. The goats go there frequently for the fresh water at the cascade, and half a dozen men could easily prevent their escape. The water running so quick from the region of snow just above was not only clear and pure, but so extremely cold that we could hardly drink it. Hunting goats is generally hazardous, their paths winding along the cliffs where the stones often appear firm, but give way immediately under the weight of a man. One of our men fell, with the stone on which he slipped, about 30 feet into some bushes, which he held to for his life, and from which he was relieved with much difficulty. I have frequently been at a stand several minutes, uncertain whether to advance or retreat in my pursuit after these nimble creatures. In climbing cliffs it is generally safest to advance, as you can with more security test the ground with your hands than with your feet. The fish are abundant and very fine at this island. Our men caught them in plenty close to the shore by taking a seal skin with the fat on it and holding it in one hand, floating, and spread out upon the water. The fish would come into it so carelessly that with the other hand under the skin they could catch what they wanted. These were small, but as we went farther from the shore we got larger ones. We used to get the best fish in 15 fathoms, at which depth we caught them weighing 30 and 40 pounds. We could hook them about as fast as we could pull them in. They are the only food of the seals. Torpedo fish are said to be found here, but we caught none.

We remained here eight weeks, and secured about 15,000 skins. During the latter part of the time, it being the winter season, the weather was very bad, and we frequently stove our boats in the surf. In good weather we took about 500 skins a day, finding them much better in quality than we had expected from the latitude. On leaving we landed a couple of hogs, calculated to increase, for the benefit of those who might come after us. Some one had done the same in landing nine sheep, which we frequently saw together without molesting them. The sailor lad "Bill" we left there still contented, without any apparent wish to leave the place or to accumulate property for that purpose, although he continued to get seal skins.

The crew left here by Captain Fanning we have agreed to take on board, and have purchased their skins. We leave twelve of our crew here on account of myself and Captain Greene, and I have agreed to come out for them; therefore upon my return home I shall make but a very short stay with you. The men we leave are Doctor David Forbes, who is captain of the gang; J. F. Greene, who is second; Oliver Bradley, William Gorham, David Bogie, Benjamin Thompson, John Howard, Elijah Davis, and my negro boy Aaron, and C. W. Jacobs. They are to allow us twenty-two months to get back and take them off. If we are not then here they are at liberty to make the best of their way off. They are on shares. We think they will get a good cargo of skins. The pups are just getting of proper age to take. They have as yet been too black, and we have not taken any but yearlings and old ones. This crew have now chosen a comfortable spot and are building themselves comfortable log-houses, and now, calculating for a lengthy residence, will live more pleasantly than since we have been here. We have on board of Captain Fanning's crew, Josiah Townsend, Gilbert Tomlinson, Lemuel Scot, Jonathan Durgin, Joseph Holley, Joseph Smith, Thomas Carpenter, and Abraham Dickerman.

BOUND FOR CHINA AND HOME.

We left the island of Mas-á-Fuera on the 9th of June, and on the 20th we made the island of St. Felix, one of the St. Ambrose Islands, which form a small and barren cluster in about the latitude of 26 degrees south, and longitude about 81 degrees west. We landed, but found nothing worth our attention except the head of a barrel marked "I. Winship, Boston." These islands bear evident marks of having been volcanic, and are about 60 feet above the level of the sea. The sides are so steep that it was difficult getting on the high ground, which was entirely barren, excepting a few clusters of samphire. The birds were very plenty, and no doubt lay plenty of eggs in the season. There were many just hatched. They lay on the earth, without nests, and we got a few eggs. Fish were as plenty as at Mas-á-Fuera. On Saturday night, June 13, we left these islands with a determination to proceed for Canton, and having now closed

the sealing part of our voyage we gave the crew an extra allowance of grog, with which, as is always usual with sailors on Saturday night, if in their power, they drank "sweethearts and wives"; those who are married invariably drink "wives and sweethearts." After this we mustered all our music, which was a drum and fife, and negro Dick, who could sing jigs and contra dances enough to tire out all on board, found a good opportunity to test his peculiar talents. At midnight the entertainment broke up with three cheers and a "good bye to sealing," none calculating on anything but pleasure for the rest of the voyage, having finished what we considered the fatiguing part of it.

July 4, being fine weather, and feeling disposed to honor the day as much as was in our power, an extra allowance of grog was given to the crew. This produced no little mirth and jollity. Not one of the men thought but that he was under republican government, although nothing but a strict monarchical form was ever tried with success on board of a ship. Many of our crew were very smart, ambitious young men, and might reasonably calculate on being ship-masters, marine monarchs (ship-masters), themselves in proper time, and now seemed to enjoy a little of those feelings by anticipation which they hoped hereafter to possess. In our voyage across the Pacific they exerted themselves to be qualified for commanding ships, and the captain gave them as much indulgence as he could for that object, allowing them time and giving them instruction. It was quite a regular good school on board, and the progress was even greater than in some literary institutions on shore. Some men that could not do a sum in addition when we left America could now work lunar observations. We had fine weather, and nothing material occurred until the 2d of August, when our crew began to complain of the scurvy. It first showed itself in hard, blue spots on the legs, with pain in the joints. Several men were very sick, and ten were sick with it when we arrived at the Sandwich Islands on the 14th of August. They recruited wonderfully on getting vegetables. In twenty-four hours there was an evident convalescence. One man, who was black from his feet to his hips, and whom we expected to lose, was well within a week.

From the 14th to the 30th of August the Neptune was at the Sandwich Islands, about which a detailed account is written.

We left these islands on the 31st of August, on our way to Canton, our crew having benefited much in health during our stay. On the 10th of September our distance is the same east or west from Greenwich, our longitude being 180 degrees east or west from that observatory. We now lose one day and call it the 11th of September. On the 3d of October we made the island of Tinian, in latitude 14° 54′ north, longitude 144° 32′ east.

Mention is made of the inhabitants here and at some islands touched at, and on the 24th of October, 1798, the vessel arrived at Macao.

We went on shore at Macao to get a pilot for Canton. Our first duty was to call on the governor, and we understood that civility required our calling on Captain Turner, the commodore of the English ships then lying in the Typa. We were received by both very politely. At Captain Turner's an English gentleman who had been in America, wishing to be civil, said to me that he had been through the United States, with which he was very much pleased, and, I presume suspecting I was a full-blooded Yankee, said to me, "Were you ever in Connecticut?" I replied, "Yes". He said, "Were you ever in New Haven?" "Yes, sir; I have been there frequently." "Well, that is the place that I was pleased with."

After three hours' delay at Macao, we secured a pilot and proceeded up the river, and anchored at Whampoo at 2 o'clock on the morning of the 25th. On the 26th we got up among the shipping at our moorings and went up to Canton in a san pan, which is one of their small passage boats. We had to stop about half a dozen times at the chop houses for examination. * * * On our arriving at Canton we were immediately invited by several of the captains and supercargoes to take up our quarters with them until we should be fixed in our own. I accepted the invitation of Mr. Gray, of Boston. * * * On the 29th we took possession of our factory between us and a northwest trader from Boston, each to pay $400, not expecting to want it over a month or five weeks.

We sold our skins at $2 each, and the northwest captain sold his sea-otter skins at $28 each, both making great voyages. On the 2d of November we began receiving our skins into the factory. The lower part was for storage and we lived in the upper part. On the lower floor there was a large space in the center and a small room on the other side, with which we had nothing to do. The skins were brought in and laid in piles of one hundred.

The men were bringing them in and I was walking back and forth. I soon noticed a change in one of the piles, counted them, and found five skins missing. They could not have gone out of the door, for there was one man standing there. The door of the room we had not seen opened, but we concluded they could not possibly go anywhere else, and inquired for the key, which could not be found. We got an ax and were about breaking it open when a Chinin stepped up with the key, letting us know that it was his room. We went in and found nothing there but a sailor's chest, apparently empty, and were about giving up the search when we thought possibly they might be in the chest. We were obliged to apply the ax to that, and found in one end a small box, into which the skins were packed, and into which we should not have thought it possible to have got a single skin. There was great dispatch and ingenuity in the management; I think none but a Chinin could have done it. We gave the fellow a good rattaning on the spot and let him run, which was less trouble than to have applied to the police, and there was no danger of his complaining, for if he had he would have been more severely punished. It appears to be very much the practice here for foreigners to take their own satisfaction for petty offences.

As we had agreed for about 1,000 chests of Bohia tea, which is something of a job to be packed, we soon commenced receiving that part of our cargo. This sort of tea is brought in from the country in baskets, and is a very in-

definite quality. It is a mixture of inferior teas. They are stacked into a heap and examined. If found inferior, other black teas, as Campoy or Congo or such like, are mixed with it until it is considered merchantable Bohia, and as nothing here is managed on a contracted scale, if the purchaser attends closely to his interests and is a judge of what he is receiving he is likely to be dealt liberally with, for I consider the Hong merchants as very honorable men. There is seldom anything little or contracted with them. They are above it, and I think it due to their character to say as a class of merchants no body of merchants of any country are more honest or more honorable. They are above little actions, but, as in all other countries, it is necessary that a man should attend to his own business and attend to it closely. We received our teas from Ponqua. Our Bohia we complained of. He gave us Souchong to mix with it—a few baskets was of no consequence. He allowed us to mix until we should have been dishonest not to have been satisfied. He was the man who bought our skins, to pay us in barter, and he complied with his contract in the most honorable manner. Our silks we bought from Yonqua, who is in China street, and not a Hong merchant, but a very honest, clever fellow. They have been trying to get him into the Hong, but he wishes to keep out of it. He therefore is very private in his business, wishing the impression to be that he is able to do but little. He does a heavy business in a very private manner.

We commenced packing our Bohia tea. This was a very dirty, unpleasant business. We packed two hundred chests a day, beginning at 4 o'clock in the morning, and had them finished and marked about noon. One man packs one chest, treading it in with his feet. After the packing it is the custom to dine with the Hong merchant in his hong, or store, for we never visit their houses. With the expectation that we will invite all our friends, a dinner is accordingly provided in elegant English style.

The Neptune completed taking in her cargo of teas, silks, and other Chinese products, and sailed about January 1 for home, via Cape of Good Hope, arriving at New Haven July 11, 1799. The shares of the sailors were about $1,200 each.

4.—THE SEA-LION HUNT.

By Henry W. Elliott.

1. CAPTURE OF THE SEA-LION.

While the greatest number of sea-lions are captured on the Pribylov Islands every year, yet it should be plainly understood that the hunting of these animals is not restricted to those islands in Alaska by any means, as is so remarkable in the case of the fur-seal. On the contrary the sea-lion is secured at many points between Attoo and Kadiak, and has been the means of making the Aleuts of the Aleutian chain very independent as to the construction of their elegant sea-going "bidarkies" and "bidarrahs," which are simply necessary to their means of procuring a livelihood by fishing and the chase of the sea-otter.

Unlike the method of the Pribylov natives, the Aleutians are obliged to employ their otter spears and fire-arms when they seek the sea-lion, approaching the dozing animals either as they sleep in the water or on the rocks awash, in their bidarkies with the wind well to leeward. Sometimes they manage to approach from the sea so cautiously as to stampede the astonished brutes up ravines or over rolling moorlands, where they are easily shot and speared. Generally, however, the natives secure only three or four out of the herd, the others escaping pell mell into the freedom and shelter of the sea.

The great intrinsic value to the domestic service of the Aleuts rendered by the flesh, fat, and sinews of this animal, together with its skin, arouses the natives of Saint Paul and Saint George, who annually make a drive of "seevitchie," by which they capture, on the former island, two or three hundred, as the case may be, every year. On Saint George, driving is so much more difficult, owing to the character of the land itself, that very few are secured there; but at Saint Paul unexceptional advantages are found on Northeast Point for the capture of these shy and wary brutes. The natives of Saint Paul, therefore, are depended upon to secure the necessary number of skins required by both islands for their boats, &c. This capture of the sea-

lion is the only serious business which the people have on Saint Paul; it is a labor of great care, industry, and some physical risk for the Aleutian hunters. A curious, though doubtless authentic, story was told me in this connection, illustrative of the strength and energy of the sea-lion bull when at bay. Many years ago (1817), on Saint Paul Island, a drive of September sea-lions was brought down to the village in the usual style; but when the natives assembled to kill them, on account of the great scarcity, at that time, of powder on the island, it was voted best to lance the old males also, as well as the females, rather than shoot them in the customary style. The people had hardly set to work at the task when one of their number, a small, elderly, though tough, able-bodied Aleut, while thrusting his lance into the "life" of a large bull, was suddenly seen to fall on his back, directly under the huge brute's head; instantly the powerful jaws of the "seevitchie" closed upon the waistband, apparently, of the native, and, lifting the yelling man aloft, as a cat would a kitten, the sea-lion shook and threw him high into the air, away over the heads of his associates, who had rushed up to the rescue. *Leo marinus* was quickly destroyed by a dozen furious spear-thrusts, but in its clenched jaws were the tattered fragments of Ivan's trousers, an unimpeachable evidence of the poor fellow's emasculation.

By reference to my sketch map of Northeast Point fur-seal rookery on a previous page, the observer will notice a peculiar neck or boot-shaped point, which I have designated as Sea-Lion Neck. This area is a spot upon which a large number of sea-lions are always to be found during the season. As they are so shy, and sure to take to water upon the appearance or presence of a man near by, the natives adopt this plan:

Preparations for the drive.—Along by the middle or end of September, as late sometimes as November, and after the fur-seal rookeries have broken up for the season, fifteen or twenty of the very best men in the village are selected, by one of their chiefs, for a sea-lion rendezvous at Northeast Point. They go up there with their provisions, tea and sugar, blankets, &c., and make themselves at home in the "barrabbora" and houses, which I have located on the sketch-map of Novastoshnah, prepared to stay, if necessary, a month, or until they shall get the whole drove of two or three hundred sea-lions together.

Methods of driving sea-lions.—The "seevitchie," as the natives call these animals, can not be approached successfully by daylight, so these hunters lay by, in this house of Webster's, until a favorable night comes along—one in which the moon is partially obscured by drifting clouds, and the wind blows over them from the rookery where the sea-lions lie. Such an opportunity being afforded, they step down to the beach at low water, and proceed to creep flat on all-fours over the surf beaten sand and bowlders up to the dozing herd, and between it and the high-water mark where it rests. In this way, a small body of natives, crawling along in Indian file, may pass unnoticed by the sea-lion sentries, which doubtless, in the uncertain light, see but confound the forms of their human enemies with those of seals. When the creeping Aleuts have all reached the strip of beach that is left bare by ebb-tide, which is between the water and the unsuspecting animals, at a given signal from their crawling leader they all at once leap to their feet, shout, yell, brandishing their arms, and firing off pistols, while the astonished and terrified lions roar and flounder in all directions.

The natives appreciate this peculiarity of the sea-lion very keenly, for good and sufficient cause, though none of them have ever been badly injured in driving or "springing the alarm." I camped with them for six successive nights in September, 1872, in order to witness the whole procedure. During the several drives made while I was with them I saw but one exciting incident; everything went off in the orthodox manner, as described in the text above. The exceptional incident occurred during the first drive of the first night, and rendered the natives so cautious that

it was not repeated. When the alarm was sprung, old Luka Mandirgan was leading the van, and at that moment, down upon him, despite his wildly gesticulating arms and shrill yelling, came a squad of old bull "seevitchie." The native saw instantly that they were pointed for the water, and, in his sound sense, turned to run from under, his tarbosar slipped upon a slimy rock awash, he fell flat as a flounder, just as a dozen or more big sea-lions plunged over and onto his prostrate form in the shallow water. In less time than this can be written the heavy pinnipeds had disappeared, while the bullet-like head of old Luka was quickly raised, and he trotted back to us with an alternation of mirth and then chagrin in his voice; he was not hurt in the least.

BEHAVIOR OF THE SEA-LIONS WHEN SURPRISED.—If, at the moment of surprise, the brutes are sleeping with their heads pointed toward the water, they rise up in fright and charge straight on in that way directly over the men themselves; but if their heads have been resting at this instant pointed landward, up they rise and follow that course just as desperately, and nothing will turn them either one way or the other. Those sea-lions which charged for the water are lost, of course; but the natives promptly follow up the land-turned animals with a rare combination of horrible noises and demoniacal gesticulations until the first frenzied spurt and exertions of the terrified creatures so completely exhaust them that they fall panting, gasping, prone upon the earth, extended, in spite of their huge bulk and powerful muscles, helpless and at the mercy of their cunning captors, who, however, instead of slaying them as they lie, gently rouse them up again, and urge the herd along to the house in which they have been keeping this watch during the several days past so as to be on hand in time to take advantage of such a night in which to make this effort.

THE "CORRAL."—Here, at this point, is a curious stage in the proceedings. The natives drive up to that "Webster's" house the twenty-five or thirty or forty sea-lions, as the case may be, which they have just captured—they seldom get more at any one time—and keep them in a corral or pen right by the "barrabbora," on the flattened surface of a sand-ridge, in the following comical manner: When they have huddled up the "pod," they thrust stakes down around it at intervals of 10 to 30 feet, to which strips of cotton cloth are fluttering as flags, and a line or two of sinew-rope, or thong of hide, is strung from pole to pole around the group, making a circular cage, as it were. Within this flimsy circuit the stupid sea-lions are securely imprisoned, and, though they are incessantly watched by two or three men, the whole period of caging and penning which I observed, extending over nine or ten days and nights, passed without a single effort being made by the "seevitchie" to break out of their frail inclosure; and it was passed by these animals not in stupid quiescence, but in alert watchfulness, writhing, twisting, turning one upon and over the other, so that they resembled to my fancy a handful of worms as they struggle to escape when thrown upon a heated saucer.

By this method of procedure, after the lapse usually of two or three weeks, a succession of favorable nights will have occurred; and the natives secure their full quota, which, as I have said before, is expressed by a herd of two or three hundred of these animals.

PREPARATION AND METHOD OF DRIVING TO THE VILLAGE.—The complement filled, the natives then prepare to drive their herd back to the village, over the grassy and mossy uplands and intervening stretches of sand-dune tracts, fully 11 miles, preferring to take the trouble of prodding the clumsy brutes, wayward and obstinate as they are, rather than to pack their heavy hides in and out of boats; making, in this way, each sea-lion carry its own skin and blubber down to the doors of their houses in the village. If the weather is normally wet and cold, this drive, or caravan of lions, can be driven to the point of destination in five or six days; but, should it be

dry and warmer than usual, three weeks, and even longer, will elapse before the circuit is traversed.

When the drive is started the natives gather around the herd on all sides, save the opening which they leave pointing to the direction in which they desire the animals to travel; and in this manner they escort and urge the "seevitchie" on to their final resting and slaughter near the village. The young lions and the females being much lighter than the males, less laden with fat or blubber, take the lead, for they travel twice and thrice as easy and as fast as the old males, which, by reason of their immense avoirdupois, are incapable of moving ahead more than a few rods at a time, when they are completely checked by sheer loss of breath, though the vanguard of the females allures them strongly on; but, when an old sea-lion feels his wind coming short, he is sure to stop, sullenly and surlily turning upon the drivers, not to move again until his lungs are clear.

In this method and manner of driving, the natives stretch the herd out in extended file, or, as a caravan, over the line of march, and, as the old bulls pause to savagely survey the field and catch their breath, showing their wicked teeth, the drivers have to exercise every art and all their ingenuity in arousing them to fresh efforts. This they do by clapping boards and bones together, firing fusees, and waving flags; and, of late, and best of all, the blue gingham umbrella repeatedly opened and closed in the face of an old bull has been a more effective starter than all the other known artifices or savage expedients of the natives. Is it not an amusing coincidence that while lions are hunted under umbrellas in Africa, their marine namesakes are chased with them in Alaska?*

ARRIVAL OF THE DRIVE AT THE VILLAGE.—The procession of sea-lions managed in this strange manner day and night—for the natives never let up—is finally brought to rest within a stone's throw of the village, which has pleasurably anticipated for days and for weeks its arrival, and rejoices in its appearance. The men get out their old rifles and large sea-lion lances, and sharpen their knives, while the women look well to their oil-pouches, and repair to the field of slaughter with meat-baskets on their heads.

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* The curious behavior of the sea-lions in the Big lake, when they are *en route* and driven from Novastoshnah to the village, deserves mention. After the drove gets over the sand-dunes and beach between Webster's house and the extreme northeastern head of the lake, a halt is called and the drove "penned" on the bank there; then, when the sea-lions are well rested, they are started up, and go pell-mell into the water; two natives, in a bidarka, keep them from turning out from the shore into the broad bosom of Meosulkmahnee, while another bidarka paddles in their rear and follows their swift passage right down the eastern shore. In this method of procedure the drive carries itself nearly two miles by water in less than twenty minutes from the time the sea-lions are first turned in, at the north end, to the moment when they are driven out at the southeastern elbow of the Big pond. The shallowness of the water here accounts probably for the strange failure of the sea-lions to regain their liberty, and so retards their swimming as to enable the bidarka, with two men, to keep abreast of their leaders easily, as they plunge ahead; and "as one goes so go all sheep," it is not necessary to pay attention to those which straggle behind in the wake; they are stirred up by the second bidarka, and none make the least attempt to diverge from the track which the swifter mark out in advance; if they did, they could escape "scot-free" in any one of the twenty minutes of this aquatic passage.

By consulting the map of Saint Paul, it will be observed that in a direct line between the village and Northeast Point there are quite a number of small lakes, including this large one of Meosulkmahnee; into all of these ponds the sea-lion drove is successfully driven. This interposition of fresh water at such frequent intervals serves to shorten the time of the journey fully ten days in warmish weather, and at least four or five under the best of climatic conditions.

This track between Webster's house and the village killing-grounds is strewn with the bones of *Eumetopias*. They will drop in their tracks, now and then, even when carefully driven, from cerebral or spinal congestion principally; and when they are hurried the mortality *en route* is very great. The natives, when driving them keep them going day and night alike, but give them frequent resting spells after every spurt ahead. The old bulls flounder along for a hundred yards or so, then suddenly halt to regain breath, five or ten minutes being allowed them; then they are stirred up again, and so on, hour after hour, until the tedious transit is completed.

The younger sea-lions, and the cows which are in the drove, carry themselves easily far ahead of the bulls, and being thus always in the van, serve unconsciously to stimulate and coax the heavy males to travel. Otherwise, I do not believe that a band of old bulls, exclusively, could be driven down over this long road successfully.

MANNER IN WHICH THE KILLING IS CONDUCTED.—No attempt is made, even by the boldest Aleut, to destroy an old bull sea-lion by spearing the enraged and powerful beast, which, now familiar with man and conscious as it were of his puny strength, would seize the lance between its jaws and shake it from the hands of the stoutest one in a moment. Recourse is had to the rifle. The herd is started up the sloping flanks of the black, bluff hill-sides; the females speedily take the front, while the old males hang behind. Then the marksmen, walking up to within a few paces of each animal, deliberately draw their sights upon their heads and shoot them just between the eye and the ear. The old males thus destroyed, the cows and females are in turn surrounded by the natives, who, dropping their rifles, thrust the heavy iron lances into their trembling bodies at a point behind the fore-flippers, touching the heart with a single lunge. It is an unparalleled spectacle, dreadfully cruel and bloody.

This surround of the cows is, perhaps, the strangest procedure on the islands. To fully appreciate the subject, the reader must first call to his mind's eye the fact that these female sea-lions, though small beside the males, are yet large animals, 7 and 8 feet long, and weighing, each, as much as any five or six average men. But, in spite of their strength and agility, fifteen or twenty Aleuts, with a rough, iron-tipped lance in their hands, will surround a drove of fifty or one hundred and fifty of them by forming a noisy, gesticulating circle, gradually closing up, man to man, until the sea-lions are literally piled in a writhing, squirming, struggling mass, one above the other, three or four deep, heads, flippers, bellies, backs all so woven and interwoven in this panic-stricken heap of terrified creatures, that it defies adequate description. The natives spear the cows on top, which, as they sink in death, are mounted in turn by the live animals underneath, these meet the deadly lance in order, and so on until the whole herd is quiet and stilled in the fatal ebbing of their hearts' blood.

2. ECONOMIC USES OF THE SEA-LION.

HIGH APPRECIATION OF THE SEA-LION BY THE ALEUTS.—Although the sea-lion has little or no commercial value for us, yet to the service of the natives themselves, who live all along the Bering sea-coast of Alaska, Kamtchatka, and the Kuriles, it is invaluable; they set great store by it. It supplies them with its hide, mustaches, flesh, fat, sinews, and intestines, which they make up into as many necessary garments, dishes, &c. They have abundant reason to treasure its skin highly, for it is covering to their neat "bidarkies" and "bidarrahs," the former being the small "kyak" of Bering Sea, while the latter is a boat of all work, exploration, and transportation. These skins are unhaired by sweating in a pile; then they are deftly sewed and carefully stretched over a light keel and frame of wood, making a perfectly water-tight boat that will stand, uninjured, the softening influence of water for a day or two at a time, if properly air-dried and oiled. After being used during the day, these skin boats are always drawn out on the beach, turned bottom-side up and air dried during the night, in this way made ready for employment again on the morrow.

When slowly sketching, by measurements, the outlines of a fine adult bull sea lion which the ball from Booterin's rifle had just destroyed, an old "starooka" came up abruptly; not seeming to see me, she deliberately threw down a large, greasy, skin meat-bag, and whipping out a knife, went to work on my specimen. Curiosity prompted me to keep still in spite of the first sensations of annoyance, so that I might watch her choice and use of the animal's carcass. She first removed the skin, being actively aided in this operation by an uncouth boy; she then cut off the palms to both fore flippers; the boy at the same time pulled out the mustache bristles; she then cut out its gullet, from the glottis to its junction with the stomach, carefully divested it of all fleshy attachments, fat, &c.; she then cut out the stomach itself, and turned it inside out, carelessly

scraping the gastric walls free of copious biliary secretions, the inevitable bunch of *ascaris*, &c.; she then told the boy to take hold of the duodenum end of the small intestine, and as he walked away with it she rapidly cleared it of its attachments, so that it was thus uncoiled to its full length of at least 60 feet; then she severed it, and then it was recoiled by the "melchiska," and laid up with the other members just removed, except the skin, which she had nothing more to do with. She then cut out the liver and ate several large pieces of that workhouse of the blood before dropping it into the meat-pouch. She then raked up several handfuls of the "leaf lard," or hard, white fat that is found in moderate quantity around the viscera of all these pinnipeds, which she also dumped into the flesh-bag; she then drew her knife through the large heart, but did not touch it otherwise, looking at it intently, however, as it still quivered in unison with the warm flesh of the whole carcass. She and the boy then poked their fingers into the tumid lobes of the immense lungs, cutting out portions of them only, which were also put into the grimy pouch aforesaid; then she secured the gall-bladder and slipped it into a small yeast-powder tin, which was produced by the urchin; then she finished her economical dissection by cutting the sinews out of the back in unbroken bulk from the cervical vertebra to the sacrum. All these were stuffed into that skin bag, which she threw on her back and supporting it by a band over her head, she trudged back to the "barrabkie" from whence she sallied a short hour ago, like an old vulture to the slaughter; she made the following disposition of its contents: The palms were used to sole a pair of tarbosars, or native boots, of which the uppers and knee tops were made of the gullets, one sea-lion gullet to each boot top; the stomach was carefully blown up, and left to dry on the barrabkie roof, eventually to be filled with oil rendered from sea-lion or fur-seal blubber. The small intestine was carefully injected with water and cleansed, then distended with air, and pegged out between two stakes, 60 feet apart, with little cross-slats here and there between to keep it clear of the ground. When it is thoroughly dry, it is ripped up in a straight line with its length and pressed out into a broad band of parchment gut, which she cuts up and uses in making a waterproof "kamlaykie," sewing it with these sinews taken from the back. The liver, leaf-lard, and lobes of the lungs were eaten without further cooking, and the little gall-bag was for some use in poulticing a scrofulous sore. The mustache-bristles were a venture of the boy, who gathers all that he can, then sends them to San Francisco, where they find a ready sale to the Chinese, who pay about one cent apiece for them. When the natives cut up a sea-lion carcass, or one of a fur seal, on the killing-grounds for meat, they take only the hams and the loins. Later in the season they eat the entire carcass, which they hang up by the hind flippers on a "laabas" by their houses

VALUE OF THE INTESTINES.—A peculiar value is attached to the intestines of the sea-lion, which, after skinning, are distended with air and allowed to dry in that shape; then they are cut into ribbons and sewed strongly together into that most characteristic water-proof garment of the world, known as the "kamlaika;"* which, while being fully as water-proof as India rubber, has far greater strength, and is never affected by grease and oil. It is also transparent in its fitting over dark clothes. The sea-lions' throats are served in a similar manner, and, when cured, are made into boot-tops, which are in turn soled by the tough skin that composes the palms of this animals fore flippers.

* The Aleutian name for this garment is unpronounceable in our language, and equally so in the more flexible Russian; hence the Muscovite "kamlaika," derived from the Siberian "kamläia." This is made of tanned reindeer skin, unhaired, and smoked by larch bark until it is colored a saffron yellow; and is worn over the reindeer-skin undershirt, which has the hair next to the owner's skin, and the obverse side stained red by a decoction of alder bark. The "kamläia" is closed behind and before, and a hood, fastened to the back of the neck, is drawn over the head when leaving shelter; so is the Aleutian "kamlaika," only the one of Kolyma is used to keep out piercing dry cold, while the garment of the Bering Sea is a perfect water repellant.

STOMACH-WALLS USED AS OIL POUCHES.—Around the natives' houses, on Saint Paul and Saint George, constantly appear curious objects, which, to the unaccustomed eye, resemble overgrown gourds or enormous calabashes with attenuated necks; an examination proves them to be the dried, distended stomach walls of the sea-lion, filled with its oil; which, unlike the offensive blubber of the fur seal, boils out clear and inodorous from its fat. The flesh of an old sea-lion, while not very palatable, is tasteless and dry; but the meat of a yearling is very much like veal, and when properly cooked I think it is just as good; but the superiority of the sea lion meat over that of the fur-seal is decidedly marked. It requires great skill in the *cuisine* ere sausage and steaks of the *Callorhinus* are accepted on the table; while it does not, however, require much art, experience, or patience for the cook to serve up the juicy ribs of a young sea-lion so that the most fastidious palate will fail to relish it.

CARING FOR THE FLESH.—The carcass of the sea-lion, after it is stripped of its hide, and disemboweled, is hung up in cool weather by its hind flippers, over a rude wooden frame or "labaas," as the natives call it, where, together with many more bodies of fur seals treated in the same manner, it serves from November until the following season of May as the meat-house of the Aleut on Saint Paul and Saint George. Exposed in this manner to the open weather, the natives keep their seal meat almost any length of time, in winter, for use; and, like our old duck and bird hunters, they say they prefer to have the meat tainted rather than fresh, declaring that it is most tender and toothsome when decidedly "loud."

CHINESE DEMAND FOR WHISKERS.—The tough, elastic mustache bristles of the sea-lion are objects of great commercial activity by the Chinese, who prize them highly for pickers to their opium pipes, and several ceremonies peculiar to their joss houses. These lip bristles of the fur-seal are usually too small and too elastic for this service. The natives, however, always carefully pluck them out of the *Eumetopias*, and get their full value in exchange.

DIET OF THE SEA-LION.—The sea-lion also, as in the case of the fur-seal, is a fish-eater, pure and simple, though he, like the latter, occasionally varies his diet by consuming a limited amount of juicy sea weed fronds and tender marine crustaceans; but he hunts no animal whatever for food, nor does he ever molest, up here, the sea-fowl that incessantly hovers over his head, or sits in flocks without fear on the surface of the waters around him. He, like his agile cousin, *Callorhinus*, is without question a mighty fisherman, familiar with every submarine haunt of his piscine prey; and feeds also like his furry relative, by rejecting the heads of all fishes which have hard, horny mouths, filled with large teeth or bony plates. I have never detected a sea-lion eating water birds or even noticing them as they flock upon the water all around these animals.

CALIFORNIA SEALING.—Professor Jordan obtained the following information about the sea-lion and hair-seal fishery of California:

At Los Angeles County the hair-seal, which abounds along the coast, is occasionally shot for its oil. Only the "bull seals" are killed. A seal will yield half a barrel of oil, worth 25 cents a gallon. The galls and genitalia are saved and sold to the Chinese, who are said to eat them. The seal is a source of great annoyance to those fishermen who use gill-nets. It waits until the nets are set, and then rifles them of the fish, evidently considering the whole performance an improvement on his previous methods of fishing. He seldom much injures the nets.

At Santa Barbara County the hair-seal is killed principally for its oil, as is the sea-lion, both of which animals, if distinct species, are extremely abundant on Anacapa and the other islands. They breed in June and July, and are chiefly killed from May to July. Only the pups are shot in winter. The average seal makes 5 to 15 gallons of oil, worth from 20 to 25 cents a gallon. Rogers Bros. sold last year 150 barrels of oil at about $15 per barrel. There is now very little profit in

this business. The hides are in general not used, but an attempt is being made to use them for shoe-soles. The "trimmings" of the seals are saved and sold to the Chinese. They consist of—

1. The whiskers, which are mounted with silver, &c., three together, and used as toothpicks.
2. The intestines, gullet, &c., used as food.
3. The genitals, used for soup.
4. The galls, used as medicine.
5. The teeth, used for rings and made into ornaments.

A sea-lion skin entire averages about 125 pounds; when the belly is thrown away, about 87½ pounds; and the body produces about 11½ gallons.

Very lately an agent of a San Francisco firm has come to Santa Barbara to buy seal-skins for some purpose of boat-making in Alaska; he offers good prices for them. Fifteen to twenty men are employed by this firm in seal and otter hunting, mostly Californians, at $25 to $39 per month. A few Chinese at $20 to $25.

5.—THE NORTH-ATLANTIC SEAL-FISHERY.

By A. Howard Clark.*

1. THE SEALING GROUNDS: EXTENT OF THE FISHERY.

Species taken.—"The seals hunted in the North Atlantic and Arctic waters belong chiefly to four species, namely, the harp, or Greenland seal, *Phoca* (*Pagophilus*) *grœnlandica*, the rough seal, *Phoca* (*Pusa*) *fœtida*, the harbor seal (*Phoca vitulina*), and the hooded seal (*Cystophora cristata*). The first, by its numbers, far exceeds in importance all the others together, and is hence the chief object of pursuit. Two other species, the bearded seal (*Erignathus barbatus*) and the gray seal (*Halichœrus grypus*), are also taken when met with, but both are rare, and neither enters largely into the general product of the seal-fishery. The Newfoundland seal-fishery is limited to the capture of the Greenland, harbor, and hooded seals. The latter is not, however, a regular object of pursuit, but is taken as opportunity favors, and some seasons but very few individuals of this species are met with. The harbor seal is taken along the shores, where it is permanently resident, but comparatively only in small numbers. The rough seal and the bearded seal are of considerable importance to the Greenlanders, the former especially, more than half of the seals taken by them belonging to this species.

"The pursuit of seals for their commercial products forms, as is well known, a highly important branch of industry, giving employment for a considerable part of each year to hundreds of vessels and thousands of seamen, as well as to many of the inhabitants of the seal-frequented coasts of Newfoundland, Greenland and Northern Europe. Although these animals are destitute of the fine soft coat of under-fur that gives to the fur-seals their great economic importance, their oil and skins render them a valuable booty. Seals have been hunted from time immemorial, but until within the last hundred years their pursuit was limited to the vicinity of such inhabited coasts as they were accustomed to frequent. For nearly a century, however, a greater or less number of vessels have been constantly employed in their capture on the ice-floes of the Arctic seas, or on the uninhabited coasts and islands of the far north. This industry, therefore, plays an im-

*This fishery is not at present participated in by the United States, yet in view of its great importance I give in some detail an account of its history and methods, quoting largely from Allen's "North American Pinnipeds."

portant part in the history of the species here under consideration, and is, moreover, of such high commercial importance as to render a somewhat detailed account of the general subject indispensable in the present connection. As all the species hunted in the northern waters belong to the North American fauna, the consideration of the subject involves other hunting-grounds than those geographically connected with the North American continent.

"The principal 'scaling-grounds' in the North Atlantic and Arctic Oceans are: (1) the West Greenland coasts; (2) Newfoundland, the coast of Labrador, and the islands and shores of the Gulf of Saint Lawrence, but especially the ice-floes to the eastward of these coasts; (3) the Spitzbergen and Jan Mayen seas; (4) Nova Zembla and the adjacent waters; (5) the White Sea. In addition to these districts (6) the Caspian Sea affords an important seal-fishery."*

EXTENT OF THE FISHERY.—Mr. Allen has given an extended statistical account of the seal-fisheries of the North Atlantic, from which it appears that along the West Greenland coasts seal hunting is mainly prosecuted by the natives of that country and is their chief means of support, the average annual catch amounting, according to Rink, to about eighty-nine thousand seals, the skins of about half of which are exported.

"Many seals," says Mr. Allen, "are taken at the Magdalen and other islands at the mouth of the Gulf of Saint Lawrence, as well as along the shores of Newfoundland, in nets or with the gun, but by far the greater part are captured on the floating ice to the eastward of Newfoundland, to which several hundred vessels annually repair at the proper season, and where alone the yearly catch aggregates about half a million seals. This, indeed, is the scaling-ground *par excellence* of the world, twice as many seals being taken here by the Newfoundland fleet alone as by the combined scaling fleets of Great Britain, Germany, and Norway in the icy seas about Jan Mayen, or the so-called 'Greenland Sea' of the whalemen and sealers.

"According to Charlevoix, thousands of seals were taken along the shores of the Gulf of Saint Lawrence as early as the beginning of the last century, but a high authority on the subject—Mr. Michael Carroll, of Bonavista, Newfoundland—states that the seal-fishery was not regularly prosecuted, at least in vessels especially equipped for the purpose, prior to the year 1763. As early as 1787 the business had already begun to assume importance, during which year nearly five thousand seals were taken. Twenty years later (1807) thirty vessels from Newfoundland alone were engaged in the prosecution of sealing voyages, and subsequently the number became greatly increased. In the year 1834 one hundred and twenty-five vessels, manned by three thousand men, sailed from the single port of St. John's; two hundred and eighteen vessels, with nearly five thousand men, from Conception Bay, and nineteen from Trinity Bay, besides many others from other ports, making in all not less than three hundred and seventy-five, with crews numbering in the aggregate about nine thousand men.† To these are to be added a considerable number from Nova Scotia (chiefly from Halifax) and the Magdalen Islands. In 1857 the Newfoundland sealing-fleet exceeded three hundred and seventy vessels, their 'united crews numbering thirteen thousand six hundred men.' The total catch of seals for that year was 500,000, valued at £425,000, provincial currency.‡ The business at this date seems to have attained its maximum so far as the number of men and vessels are concerned, the number of vessels subsequently employed falling to below two hundred, which has since still further decreased. Yet the number of seals annually captured has not apparently diminished, the business being prosecuted in larger vessels, which secure larger catches. According to statistics furnished by Governor Hill, C. B., of New-

*JOEL ASAPH ALLEN: History of North American Pinnipeds: Department of the Interior; Washington: 1880.

"† BONNYCASTLE: Newfoundland in 1832, vol. i, p. 159."

"‡ CARROLL: Seal and Herring Fisheries of Newfoundland, p. 7."

foundland, to the home government,* it appears that in 1871 the whole number of vessels employed in sealing was one hundred and forty-six sailing-vessels and fifteen steamers, manned by eighty-eight hundred and fifty men. The exports of seal products for that year from Newfoundland were 6,943 tuns of oil, valued at $972,020, and 486,262 skins, valued at $486,262, the catch for the year being about 500,000 seals, which were sold for the aggregate sum of $1,458,282. The single steamship Commodore, of Harbour Grace, brought in 32,000 seals, valued at £24,000 sterling. While the number of vessels employed in the Newfoundland seal slaughter had at this time declined more than one half, and the number of men engaged was one-third less, it appears that the annual catch was equal to that of average seasons twenty years earlier.

"Prior to about 1866 the sealing fleet consisted wholly of sailing-vessels, but since that date a small but steadily increasing number of steamships have been added. In 1873, of the one hundred and seven sealing vessels fitted out from the ports of Newfoundland, nearly one-fifth were steamers. Notwithstanding, however, this comparative small number of vessels, the 'catch' for that year is said to have been 526,000.

"The number of vessels sailing from other provincial ports is usually small in comparison with the number from Newfoundland, and they are generally of smaller size."

2. AMERICAN SEALING VESSELS.

In this extensive fishery, producing annually hundreds of thousands of seal-skins and thousands of barrels of seal-oil, few vessels from the United States have ever participated. Occasionally vessels have been fitted from ports in New England to cruise for a time on the sealing-grounds, and then to go in pursuit of whales, but only two or three vesse ls have made the seal their sole pursuit.

One vessel from the United States that participated in this business was the ship McLennan, of New London, which from 1846 to 1853 took about 6,000 hair-seal skins, 600 barrels of seal-oil and a quantity of whale oil and bone. On her several voyages she was specially fitted for sealing as well as whaling, yet pursued the seal-fishery for only a limited period each year, preferring the larger game. Several other vessels have been similarly engaged, among them the Georgiana, George Henry, and the Amaret, afterwards the Rescue of Kane's expedition.

From 1860 to 1880 the Hudson Bay and Cumberland Inlet whaling fleet from the United States took about 10,000 hair-seal skins, valued at about 75 cents each, and about 1,000 barrels of seal-oil, valued at 40 cents per gallon.

The following account, by Capt. N. E. Atwood, of Provincetown, of a sealing trip to Newfoundland is worthy of record as a matter of history:

"In 1819 or 1820 the schooner Pilgrim, of Provincetown, 62 tons, o. m., fitted out for a sealing voyage, sailing about the middle of March for the ice-floes to the east of Newfoundland, where she joined the Newfoundland fleet of sealers. No one on board was acquainted with sealing. Before they went into the ice they fell in with a sealer from St. John's, with whom they talked. They entered the ice near each other, and the Pilgrim soon outsailed the Newfoundland vessel, so that by night he was nearly out of sight. At night they tied the vessel up to a small iceberg. The weather grew rough and the ice began to pound. They used the cedar poles they had brought for fenders, but they did no good. The stem of the vessel started, the bolts came out, and it turned around. After the ice closed, by piling ice on the after part of the vessel they got the stem out of the water and repaired damages. They then got out of the ice again and ran to the north,

"* Papers relating to Her Majesty's Colonial Possessions, part ii, 1873, pp. 143, 145."

where they entered the ice again, and when they got in it was Sunday. They were surrounded by seals. They would not touch them Sunday, but Monday they got 250 seals, and Tuesday they got 60. They got a few afterwards, which made up 450, and got out of the ice again. Afterwards they fell in with a Newfoundlander, and bought 40, and came home. When they got home the oil and the pelts did not fetch more than they had paid for them. They made about $13 to a share, having been gone six weeks, while the owners lost considerably by the venture. Two members of the crew, James Dyer and Joshua Nickerson, are living in 1879, the former seventy-two and the latter seventy-seven years old."

Mr. Earll obtained the information that the schooner Caleb, 54 tons, with standing fore topsail, engaged in sealing in 1829. She belonged at Deer Isle, Me., and took the seals at Magdalen Islands. The pelts and oil were brought home. Samuel Haveloek and his brother each fitted a vessel at Mount Desert in 1829, and engaged in the seal-fishery at Magdalen Islands or Newfoundland.

The above vessels are the only American craft, other than whaling vessels, that engaged in the hair-seal fishery prior to 1870. In the latter year the steamer Monticello, 526 tons, manned by one hundred and seventy men, was sent out from Bay Roberts, Newfoundland. This steamer was owned by parties in New York City and Capt. Lorenzo Wilson, of Eastport, Me. She sailed three years to the seal-fishery from Newfoundland, the first year from Bay Roberts, under Captain Ludlow, but landed only 250 skins. The crew "panned" about 10,000 seals, but did not succeed in putting them on board because of an accident to the propeller. An action was taken in court to recover the missing seals, but the crew not being in a position to prove the claim the suit was abandoned. The second year, 1871, she sailed from Bay Roberts, under command of Capt. A. Bartlett, and captured about 22,000 seals, the oil of which was shipped to Boston and the skins to London, the catch being valued at $90,000. In 1872 she sailed from Catalina under Captain Murphy, and captured 3,000 seals. Her stem and stern posts and propeller being broken by the ice, she was obliged to abandon the voyage, and after arriving at Saint Johns, and finding the dock capacity not sufficient to take her up, she cleared for Boston, via Sydney, Cape Breton, with passengers, and while crossing the gulf she foundered. The passengers and crew were taken off by a fishing schooner and landed at St. Pierre.

The Monticello was not built for the seal-fishery, and not at all suited for such a voyage, being very flat on the floor, hollow bowed, with a very fine stern, which was the principal cause of the accident to the propeller.

Concerning this sealing steamer, the annual report for 1871 of the St. John's, Newfoundland, Chamber of Commerce, is reported, by a correspondent of the New York Weekly Post, to state that "the fitting out of the Monticello from a port in Newfoundland was clearly illegal; but the special and obnoxious condition of the enterprise was that she brought her seals into this port, manufactured them here, and was enabled to land the produce in the United States free of duty, while oils, the produce of British fisheries, are subjected there to a tax of from 20 to 40 per cent. on their value. This unjust state of things seems to the chamber to demand every effort of the public for its removal. Fair reciprocity in trade with the United States this colony desires, and would make all reasonable concessions to obtain; but it ought not, the chamber feels, be willingly tolerated that all shall be free to Americans here, while they persistently maintain these trade barriers against us."

An official correspondent in Newfoundland writes, under date of July 11, 1881, as follows: "There is no obstruction to either American steamers or sailing-vessels participating in the seal-fishery within 3 miles of the coast, and I consider that a large and profitable business could be

worked up by New Bedford and New London whaling steamers and sailing-vessels. Crews and labor are plentiful and cheap. Seals are generally found from 10 to 20 miles off the land, ranging from Cape Bonavista to Labrador."

3. THE PRODUCTS.

USE OF OIL, FLESH, AND SKINS.—The chief value of seals is their oil, so well known for its valuable properties for illuminating purposes and for the lubrication of machinery. "The amount annually obtained falls not far short of 90,000 tuns, with a total value of $1,250,000. Next in importance are the skins, which are nearly as valuable as the oil. From very early times they were used for covering trunks, the manufacture of knapsacks, and for many of the uses of ordinary leather. They have been extensively employed, as indeed they are still, for the manufacture of caps, gloves, shoes, and jackets. Of late many have been converted in England into lacquered leather, which is said to be of a superior quality, being beautiful and shining, and of firm texture, and can be furnished at moderate cost. The skins differ in value according to size and color, these varying, of course, with the species and with the age of the animal.

"As an article of food seals are of the utmost importance to the natives of Greenland and the northern tribes generally, they deriving from them the greater part of their subsistence. They have been found likewise not unpalatable by our Arctic voyagers, whose sustenance often for long periods has been mainly the flesh of these animals. The Eskimo and allied tribes of the north are well known to depend upon the seals, not only for their food, but for most of the materials for their boats and sledges, as well as for clothing and the various implements of the chase."*

In respect to the character of seal flesh as food, and the importance of these animals to the Eskimos, Dr. A. Horner, surgeon to the Pandora, thus refers to the general subject:

"From the length of time these people have inhabited this cold country, one naturally expects them to have found some particular food well adapted by its nutritious and heat-giving properties to supply all the wants of such a rigorous climate, and such is found to be the case, for there is no food more delicious to the tastes of the Eskimo than the flesh of the seal, and especially that of the common seal (*Phoca vitulina*). But it is not only the human inhabitants who find it has such excellent qualities, but all the larger carnivora that are able to prey on them. Seal's meat is so unlike the flesh to which we Europeans are accustomed, that it is not surprising we should have some difficulty at first in making up our minds to taste it; but when once that difficulty is overcome every one praises its flavor, tenderness, digestibility, juiciness, and decidedly warming after-effects. Its color is almost black, from the large amount of venous blood it contains, except in very young seals, and is, therefore, very singular looking and not inviting, while its flavor is unlike anything else, and cannot be described except by saying delicious. To suit European palates there are certain precautions to be taken before it is cooked. It has to be cut in thin slices, carefully removing any fat or blubber, and then soaked in salt water for from twelve to twenty-four hours, to remove the blood, which gives it a slightly fishy flavor. The blubber has such a strong taste that it requires an Arctic winter's appetite to find out how good it is. That of the bearded seal (*Phoca barbata*) is most relished by epicures. The daintiest morsel of a seal is the liver, which requires no soaking, but may be eaten as soon as the animal is killed. The heart is good eating, while the sweetbread and kidneys are not to be despised.

"The usual mode of cooking seal's meat is to stew it with a few pieces of fat bacon, when an excellent rich gravy is formed, or it may be fried with a few pieces of pork, or 'white-man,' being cut up with the seal, or 'black man.'

* ALLEN: *Op. cit.*

"The Eskimo make use of every part of the seal, and, it is said, make an excellent soup by putting its blood and any odd scraps of meat inside the stomach, heating the contents, and then devouring tripe, blood, and all with the greatest relish.

"For my own part I would sooner eat seal's meat than mutton or beef, and I am not singular in my liking for it, as several of the officers on board the Pandora shared the same opinion as myself. I can confidently recommend it as a dish to be tried on a cold winter's day to those who are tired of the everlasting beef and mutton, and are desirous of a change of diet. It is very fattening, and if eaten every day for several weeks together is likely to produce rather surprising effects.

"Seal's meat is a panacea for all complaints among these primitive people. Our Eskimo interpreter, 'Joe,' had a most troublesome cough when we left England, and was convinced he should not get rid of it until he had seal's flesh to eat. He would not look at any medicine offered to him on board, but shook his head and said, 'By and by, eat seal, get well.' His prescription turned out to be a very good one, for he had not long been feasting on his favorite food before he lost his cough, and we heard no more of it. For delicate persons, and especially young ladies and gentlemen who cannot succeed in making their features sufficiently attractive on chicken and cheesecakes, no diet is likely to succeed so well as delicate cutlets from the loin of a seal.

"For my own part I cannot help thinking that the diminution in the number of seals caught near the principal Danish settlements in Greenland has a great deal to do with the prevalence of consumption and other diseases among the native inhabitants of those places. Seals are becoming scarcer every year, and, in company with the bison of the North American prairies, will ere long be of the past, and leave the poor Greenlander and Red Indian to follow them."*

4. THE SEAL HUNT.

DESCRIPTION OF A SEAL HUNT.—The following description of the seal hunt is from Allen's History of North American Pinnipeds:

"The season for 'ice hunting' begins at the Newfoundland 'sealing grounds' about the first of March and continues for about two months. The seals are then on the ice-floes at a considerable distance from land, often several hundred miles. The same vessel, however, sometimes makes two, and, on rare occasions, three voyages during the season. About fifty years ago vessels engaged in sealing rarely left port before March 17, but more recently have sailed by the first of that month, and sometimes during the last days of February. This, Mr. Carroll claims, is too early, and tends greatly to the detriment of the interests of the sealers themselves, as they thus disturb the seals at a time when they should be left in peace, or before the 'whelping time' is over. He strongly advocates the prohibition by Government of the departure of any vessels for the sealing-grounds before March 15, since otherwise, he observes, the seal-fishery of Newfoundland may soon, and very soon, dwindle away to such a character that it will not be worth the risk of money to prosecute it.

"The vessels employed in the sealing business are 'pounded off in the hold,' or divided into small compartments to protect the pelts from injury by friction, as well as to preserve the cargo from shifting. The pelts are allowed to thoroughly cool before they are stowed, and are packed 'hair to fat, to prevent the fat from running.' The owners of sealing vessels find all the boats, sealing-gear, powder, shot, and provisions, in consideration of which they are entitled to one half of the seals; the men are entitled to the other half. In steamships the owners find everything required for the prosecution of the voyage, and receive two-thirds of the value of the seals, and the men one-third." †

* Land and Water, December 18, 1875.

† CARROLL: Seal and Herring Fishery of Newfoundland, p. 9.

"The voyages are attended with much danger, great hardships, and uncertainty of results, a 'good rip' being entirely a matter of chance. Not unfrequently the vessels become 'jammed in the ice,' and if not crushed in the pack-ice may be detained for weeks before being able to force their way to the ice-flocs, which form at this season the grand rendezvous of the seals. The incidents and dangers ordinarily attending a sealing voyage, as well as the manner of capturing and disposing of the seals, have been so graphically set forth by Professor Jukes in his entertaining and instructive work entitled 'Excursions in Newfoundland,' that I transcribe in this connection portions of his account of a sealing cruise participated in by him in March, 1840, in the brigantine Topaz, Captain Furneaux, of St. John's, Newfoundland. Having, after a week's arduous cruise, fallen in with the seals and captured a few young ones, he says: 'We soon afterwards passed through some loose ice, on which the young seals were scattered, and nearly all hands were overboard, slaying, skinning, and hauling. We then got into another lake of water and sent out five punts. The crews of these joined those already on the ice, and dragging either the whole seals or their pelts to the edge of the water, collected them in the punts, and when one of these was full brought them on board. The cook of the vessel, and my man Simon, with the captain and myself, managed the vessel, circumnavigating the lake and picking up the boats as they put off one after another from the edge of the ice. In this way, when it became too dark to do any more, we found we had got 300 seals on board, and the deck was one great shamble. When piled in a heap together the young seals looked like so many lambs, and when occasionally from out of the bloody and dirty mass of carcasses one poor wretch, still alive, would lift up its face and begin to flounder about, I could stand it no longer; and, arming myself with a handspike, I proceeded to knock on the head and put out of misery all in whom I saw signs of life. After dark we left the lake and got jammed in a field of ice, with the wind blowing strong from the northwest. The watch was employed in skinning those seals which were brought on board whole, and throwing away the carcass. In skinning, a cut is made through the fat to the flesh, a thickness generally of about 3 inches, along the whole length of the belly, from the throat to the tail. The legs, or flippers, and also the head, are then drawn out from the inside and the skin is laid out flat and entire, with the layer of fat or blubber firmly adhering to it, and the skin in this state is called the "pelt," and sometimes the "sculp." It is generally about 3 feet long and 2½ wide, and weighs from 30 to 50 pounds. The carcass when turned out of its warm covering is light and slim, and, except such parts as are preserved for eating, is thrown away.

"'The next day,' continues Mr. Jukes, 'as soon as it was light, all hands were overboard on the ice, and the whole of the day was employed in slaughtering young seals in all directions and hauling their pelts to the vessel. The day [March 13] was clear and cold, with a strong northwest wind blowing, and occasionally the vessel made good way through the ice, the men following her and clearing off the seals on each side as we went along. The young seals lie dispersed here and there on the ice, basking in the sun, and often sheltered by the rough blocks and piles of ice, covered with snow. Six or eight may sometimes be seen within a space of 20 yards square. The men, armed with a gaff and a hauling rope slung over their shoulders, disperse about on the ice, and whenever they find a seal strike it a heavy blow in the head, which either stuns the animal or kills it outright. Having killed or at least stunned all they see within a short distance, they skin, or, as they call it, sculp them with a broad clasp knife, called a sculping-knife, and making two holes along the edge of each side of the skin they lay them one over another, passing the rope through the nose of each pelt and lacing it through the side holes in such a manner that when pulled taut it draws them into a compact bundle. Fastening the gaff in this bundle, they then put the rope over the shoulder and haul it away over the ice to the vessel. In this way they bring

in bundles of pelts, three, six, or even seven at a time, and sometimes from a distance of two miles. Six pelts, however, is reckoned a very heavy load to drag over the rough and broken ice, leaping from pan to pan, and they generally try to keep two or three together to assist each other at bad places, or to pull those out who fall into the water. The ice to-day was in places very slippery, and in others broken and treacherous, and as I had not got my boots properly fitted with "sparable" and "chisels" I staid on board and helped the captain and cook in managing the vessel and whipping in the pelts as they were brought alongside. By 12 o'clock, however, my arms were aching with the work, and on the lee side of the vessel we stood more than knee-deep in warm seal-skins, all blood and fat. Some of the men brought in as many as sixty each in the course of the day, and by night the decks were covered in many places the full height of the rail. As the men came on board they occasionally snatched a hasty moment to drink a bowl of tea, or eat a piece of biscuit and butter; and as the sweat was dripping from their faces, and their hands and bodies were reeking with blood and fat, and they often spread the butter with their thumbs, and wiped their faces with the backs of their hands, they took both the liquids and the solids mingled with the blood. The deck, of course, when the deck could be seen, was almost as slippery with it as if it had been ice. Still there was a bustle and excitement in the scene that did not permit the fancy to dwell on the disagreeables, and after a hearty refreshment the men would snatch up their gaffs and hauling ropes, and hurry off in search of new victims; besides, every pelt was worth a dollar. During this time hundreds of old seals were popping up their heads in the small lakes of water and holes among the ice, anxiously looking for their young. Occasionally one would hurry across a pan in search of the snow-white darling she had left, and which she could not recognize in the bloody and broken carcass, stripped of its warm covering, that alone remained of it. I fired several times at these old ones in the afternoon with my rifle from the deck, but without success, as unless the ball hits them on the head it is a great chance whether it touch any vital part, the body being so thickly clothed with fat. In the evening, however, Captain Furneaux went out on the ice and killed two with his sealing gun, loaded with seal shot. The wind had now sunk to a light air, and the sun set most gloriously, glancing from the golden west across the bright expanse of snow, now stained with many a bloody spot, and the ensanguined trail which marked the footsteps of the intruders on the peacefulness of the scene. Several vessels came up near us from the south in the afternoon; but, notwithstanding all the slaughter, the air as night closed in resounded with the cries of the young seals on every side of us. As the sunlight faded in the west, the quiet moon looked down from the zenith, and a brilliant arch of aurora crossed the heavens nearly from east to west, in a long waving line of glancing light, slowly moving backward and forward from north to south across the face of the moon.

"'Early in the morning [of the next day, March 14] the crew were out on the ice, and brought in 350 seal. The number hauled in yesterday was 1,380, making the total number now on board upwards of 2,000. After suffering the pelts to lie open on deck for a few hours, in order to get cool, they are stowed away in the hold, being laid one over the other in pairs, each pair having the hair outwards. The hold is divided by stout partitions into several compartments, or pounds, to prevent too much motion among the seal-skins and keep each in its place. The ballast is heaved entirely out as the pelts are stowed away, and the cargo is trusted to balance the vessel. In consequence of neglecting to divide the hold into pounds in one of his earlier voyages, Captain Furneaux told us he once lost his vessel. He was detained on his return, with 5,000 seals on board, by strong contrary gales, which kept him at sea till by the continued motion and friction his seals began to run to oil. The skins then dashed about from one side of the hold to the other with every roll of the vessel, and he was obliged to run before the wind, which was then blowing from

the northwest. The oil spread from the hold into the cabin and forecastle, floating over everything and forcing the crew to remain on the deck. They got up some bags of bread, and by putting a pump down through the oil into the water casks they managed to get fresh water. After being in this state some days, he and his crew were taken out of the vessel by a ship they luckily fell in with, and carried to St. Johns, New Brunswick; but his own vessel, with her once valuable cargo, and almost all the valuable property of himself and his crew, were necessarily abandoned to the mercy of the wind and waves, and what became of her was never known. This was a good practical lesson as to the proper method of stowing a cargo of seals, and one not likely to be forgotten. In the present instance, therefore, the pounds were both numerous and strong.'*

"In a few days more they completed their cargo and returned to St. John's with the vessel loaded with between 4,000 and 5,000 seals. 'It was a very good season,' Professor Jukes further remarks; 'one vessel in two trips brought in 11,000 seals, and the total take this year [1840] must have been considerably upward of 500,000.'

"Mr. Reebs states that in 1866 one vessel, which made two successful trips to the ice, brought into St. John's Harbor 25,000 seals."†

"To complete the picture here partially drawn of the seal-fishery as pursued by the Newfoundland seal hunters, I quote still further from the same author, respecting the scenes incident to a sealing voyage of forty years ago. Under date of March 5 Mr. Jukes writes: 'This morning was dark and foggy, with the wind at southeast. At 7 o'clock, after making a tack or two about an open lake and finding no channel, we dashed into the ice with all sails set, in company with two other vessels, on a north-northwest course. The ice soon got firmer, thicker, and heavier, and we shortly stuck fast. "Overboard with you, gaffs and pokers," sang out the captain, and over went, accordingly, the major part of the crew to the ice. The pokers were large poles of light wood, 6 or 8 inches in circumference and 12 or 15 feet long. Pounding with these, or hewing the ice with axes, the men would split the pans near the bows of the vessel, and then, inserting the ends of the pokers, use them as large levers, lifting up one side of the broken piece and depressing the other, and several getting round with their gaffs, they shoved it by main force under the adjoining ice. Smashing, breaking, and pounding the smaller pieces in the course the vessel wished to take, room was afforded for the motion of the larger pans. Laying out great claws on the ice ahead when the wind was light, the crew warped the vessel on. If a large, strong pan was met with, the ice-saw was got out. Sometimes a crowd of men, clinging round the ship's bows, and holding on to the bights of rope suspended there for the purpose, would jump and dance on the ice, bending and breaking it with their weight, shoving it below the vessel, and dragging her on over it with all their force. Up to their knees in water, as one piece after another sank below the cut-water they still held on, hurrahing at every fresh start she made, dancing, jumping, pushing, shoving, hauling, hewing, sawing, till every soul on board was roused into excited exertion. They continued these exertions the whole day, relieved occasionally by small open pools of water, and in the evening we calculated that we had been 15 miles. It continued foggy all day, and at night it began to rain. We had seen no vessel since morning—nothing but a dreary expanse of ice and snow, stretching away into the misty horizon. The next day the wind was from the west, and the sky fine and clear. Several vessels were near us, and several more on the horizon; the ice became thicker, stronger, and more compact. We made a few miles in the morning, and stuck fast the rest of the day in a very large pan or field of ice, sawing, axing, prising, warping, &c., as yesterday.'‡

"* Excursions in Newfoundland, vol. 1, pp. 272–280."

"† Zoölogist, 2d ser., vol. vi, 1871, p. 2548."

"‡ Excursions in Newfonndland, vol. 1, pp. 261–263."

"This, in short, was the history of their daily experiences for a week, at the end of which time they first heard the cry of the seals, and entered upon the work of slaughter."*

6.—THE SEA-OTTER FISHERY.

By Henry W. Elliott.†

1. THE DISCOVERY AND THE GEOGRAPHICAL DISTRIBUTION OF THE SEA-OTTER.

The sea-otter (*Enhydra marina*), which yields to the votaries of fashion and lovers of luxuriant trappings the richest, the finest, and the costliest fur known to man, is, like the fur-seal, another illustration of an animal long cognizant to and highly prized in the commercial world, yet respecting the habits and life of which nothing definite has been ascertained or published; indeed, for that matter, it is exceedingly difficult to trace the figures representing the large volume of fur business transacted under this head.‡

Perhaps the primary reason for this deficiency of knowledge in respect to the biology of the sea-otter is due to the fact that until quite recently none save the natives hunted them, and no naturalist or observer of our own race, who has been qualified, ever enjoyed an opportunity of seeing the "kalan" so as to study it in a state of nature; for, of all the shy, wary, sensitive beasts, upon the capture of which man sets any value, this creature is the most keenly on the alert and difficult to obtain.

Limited geographical distribution.—Another salient point touching the restricted distribution of this solitary marine inhabitant: It is a little strange that its life seems to be principally confined to our own northwest coast and Bering Sea, though, as we shall point out, it has quite an extensive distribution over the Kurile Islands and the Kamtchatkan coast. A truthful account of the strange, vigilant life of the sea-otter and of the hardships and perils encountered by its human hunters would surpass in novelty and interest the most attractive work of fiction. I mention this with much emphasis, because throughout the following narrative many instances

* Allen: *op. cit.*

† I wish, however, to have it plainly understood that what I here present as my contribution to the life-history of the sea-otter is due, chiefly, to diligent inquiry and examination of sea-otter hunters, at Oonalashka, and their friends. In all my knocking about over Alaskan waters and down the northwest coast, I have never seen a live *Enhydra;* the villainous weather which prevailed during September, 1874, prevented me from visiting Saanak in the "Reliance," where the main sea-otter camp of all this region is located, and which is composed principally of Oonalashka and Borka Aleuts. Thus, I am able to offer very little of real biography; but, scanty as is my material, still it seems to cover a great deal more ground than hitherto cultivated in this direction, hence I submit it.

‡ It is a very curious fact that Steller, who knew well what a sea-otter was, should have ever described one as a new and strange animal to him—a "sea ape." It was finally termed so by certain students of Swainson, who declared that such an animal must be in existence in order that his "circular series of types in the Quadrumana should be completed." When Steller, in August, 1740, was with Bering on the "St. Peter," in sight of the coast near Mount St. Elias, he saw a very singular animal which he called a sea ape. "It was five feet long; the head was like a dog's; the ears were sharp and erect, and the eyes large; there was on both lips a sort of a beard * * *. It was full of frolic and played a thousand monkey tricks; sometimes swimming on one side and sometimes the other of the ship, looking at it with great amazement. It would come so near the ship that it could be touched with a pole; but if any one stirred it would immediately retire. It often raised one-third of its body out of the water and stood erect for a considerable time; it then suddenly darted under the ship and reappeared in the same attitude on the other side; it would repeat this manœuver thirty times together. It would frequently bring up a sea-plant not unlike a bottle gourd, which it would toss about and catch again in its mouth, playing numberless fantastic tricks with it."—[Pennant's trans. Hist. Brit. Quad., vol. ii, p. 301.]

Father Shaiesnekov, at Oonalashka, in 1874, gave me an account of the gambols of the *Enhydra* that reads substantially as the above comes from Steller, who saw a sea-otter sure enough.

will arise, coupled with the life and chase of the sea-otter, which may strike the reader's mind as the evolution of romantic thought.

THE IMPORTANCE OF THE SEA-OTTER TO THE PROGRESS OF GEOGRAPHICAL EXPLORATION.—To the sea-otter geographers owe their early knowledge of Russian-America; had it not been for the greed and covetousness excited in the minds of fur-dealers by the beauty and costliness of its peltries which Altasov and his Tartars first secured, towards the close of the seventeenth century, on the Kamtchatkan coast,—had it not been for this incentive the exciting, pushing, aggressive, indomitable search made by the Russian "Promishlyneks" would never have been undertaken. Indeed, for that matter, much of the glory which old Titus Bering is enveloped with, as a discoverer, was not due to his love for geography or hydrography, but it was the direct stimulation of fur hunters for a rich return. They backed him; they fitted out his small, miserable vessels, which, in the light of the present hour, make his voyages fairly fabulous, when the rickety, "ram-shackley" construction of his rough Amoor-built shallops is understood.

THE SEA OTTER KNOWN TO THE JAPANESE.—The Japanese had, however, from time immemorial, perhaps as far back as a thousand years or so before the discovery of America by Columbus, been entirely aware of the existence and the value of this animal. Its shining coat was the fur of their mighty tycoons, valued as ingots of gold or precious stones. But true to their conservative nature, what they had within their border sufficed, and what they knew slept in the recesses of an unknown language to the rest of the civilized world, and sleeps there to-day, for all I know.

RUSSIAN SEARCHINGS FOR THE SEA-OTTER.—It was not, therefore, until the Russians opened up the trade, swiftly supplemented by the third voyage of Captain Cook and the aroused attention of the Hudson Bay Company, which speedily began to search the coasts of British Columbia and Oregon in those early days—it was not until this action was taken, towards the close of the seventeenth century and the beginning of the eighteenth, that the sea-otter became known, first to the courts and then to the nobility of the civilized world. It is as favorably recognized to-day and valued just as highly in the markets, being, in this respect, as fixed in its intrinsic value as the demand on any of the precious metals.*

When the Russians first opened up the Aleutian Islands, and the Hudson Bay traders scoured the coasts of Puget's Sound and Oregon, they found the natives commonly wearing sea-otter cloaks, with which they parted in the beginning for a trifle, not placing a special value on the animal, as they did upon the hair-seal or the sea-lion, the flesh and skins of the latter being vastly more palatable and serviceable.

But the offers of the greedy traders soon set the natives after them in hot haste, and the kalan became the first in importance and the objective point of every hunting expedition throughout Russian America, and the northwest coast as far down as San Francisco. It was the prime factor to the success of every fur-hunting expedition, in which over ten thousand hunters were annually engaged, from 1741 until its practical extermination in 1845.

EARLY ABUNDANCE.—During the first few years after discovery the numbers of sea-otters taken all along the Aleutian chain, and down along the whole northwest coast as far as the southern boundary of Oregon, were very great, and, compared with what are now captured, seem perfectly fabulous. For instance, we are told when the Pribylov Islands were first discovered, two sailors, Lukannov and Kiekov, killed at Saint Paul's Island during the first year's occupation, 5,000, but the next year they secured less than 1,000 and six years after not a single sea-otter reappeared, and none have been there since.

* A prime sea-otter skin is worth to-day $150. An average good skin $100. Exceptionally fine skins have been sold as high as $350 each, but these instances are not common.

When Shellikov's party first visited Cook's Inlet they secured 3,000; during the second year 2,000; in the third season only 800, and in the succeeding year they obtained 600, and finally, in 1812, less than 100, and since then not one-tenth of that number, although I am told, at the date of this writing, that during the past two years more than 500 sea-otters annually have been taken on the coasts of Cook's Inlet, much to the surprise of the oldest inhabitant and the great gratification of the energetic hunters.

During the first visit made by the Russians to the Gulf of Yakootat, in 1794, 2,000 sea-otters were taken. But they diminished so rapidly that in 1799 the most persistent scouring of the hunters secured less than 300.

In 1798 a large party of Russians and Aleuts captured in Sitka Sound and that neighborhood 1,200 skins, besides those for which they traded with the Woloshes, or natives, who had fully as many more. In the spring of 1800 a few American and English vessels came into Sitka Sound, anchored off the small Russian settlement there and traded with the Indians for over 2,000 skins, getting this native barter away from the Russians by giving fire-arms, powder, ball, and even liquor, which the Russians did not dare to do, leaving them, as they were, in fixed settlements throughout the country of the aborigines.

In one of the early years of the Russian-American Company, about 1804 I believe, Baranov went to the Okhotsk from Alaska with 15,000 sea-otter skins in the hold of a single ship, which he himself convoyed; and they were worth then just as much as they are now, namely, fully $1,500,000.

Early decrease in numbers.—The result of this warfare upon the sea-otters, faintly sketched above, with ten hunters then where there is one to-day, was not long delayed. Everywhere throughout the whole coast line frequented by them the rapid disappearance of the otter set in, and it is not difficult to find places where 1,000 had been as easily obtained as 25 or 30 could now be secured.

A Russian chronicler* says, and I translate him literally: "The numbers of several kinds of animals are growing very much less in the present as compared with past times; for instance the company here (Oonalashka) regularly killed more than 1,000 sea-otters annually; now (1835) from 70 to 150 are taken; and there was a time, in 1826, when the returns from the whole Oonalashka district (the Aleutian Isles) where only 15 skins." * * * "Sea-otters are distinguished above everything, on account of their great value and small numbers. There was a time when they were killed by thousands; now, only by hundreds. There are plenty of places where formerly there were great numbers of sea-otters, but now not one is to be seen or found. The reason for this is most evident; every year, hunted without rest, they have fled to places unknown and without danger."

Effect of the decrease.—It is also a fact, coincident with this diminution of the sea-otter life, that the population of the Aleutian Islands fell off almost in the same proportion. The Russians regarded the lives of these people with the same respect—and no more—than they did those of dogs, and treated them accordingly. They took on one occasion, under Baranov and his subjects, hunting parties of from 500 to 1,000 picked Aleuts 1,100 or 1,200 miles away from and to the eastward of their homes, conveying them in skin "baidars" and "bidarkies," traversing one of the wildest and roughest of coasts, and using them not only for the severe drudgery of sea otter hunting, but also to kill the Koloshians and other savages, all the way up and down the coast. This combination of hunting, exposure, and war-like destruction soon destroyed them, and very few of these unhappy men ever got back alive to the spots of their birth, to their wives and their children.

* Bishop Veniaminov: Zapieskie ot Oonlaashkenskaho Otdayla; St. Petersburg, 1842.

CONDITION OF THE BUSINESS WHEN CEDED TO THE UNITED STATES.—When the Alaskan Territory came into our possession the Russians were taking between 400 and 500 sea-otters from the Aleutian Islands and south of the peninsula of Alaska, with perhaps 150 from Kenai, Yakootat and the Sitkan district. The Hudson Bay Company and other traders were then getting about 200 more each year from the coast of Queen Charlotte's and Vancouver's Island and off Gray's harbor, near the mouth of the Columbia River, Washington Territory—an annual average yield of less than 1,000 skins from the whole Russian-American and northwest coast.

This is interesting, because an extraordinary excess of these figures is recorded by the results of the last year's catch in Alaska, for, instead of securing less than 700 skins, as obtained by the Russians, our traders handled in 1880 nearly 6,000 skins. This immense difference is not due to the fact of there being a proportionate increase of sea-otters, but rather, in my opinion, to the organization of hunting parties fired by the same spirit and competitive ardor as that which animated and shaped the hunting during early days of Alaskan discovery.

This keen competition of our traders, it seems to me, will in a short time ruin the business if some action is not taken by the Government, although the Treasury Department has, agreeably to my recommendation in 1874, made a very promising beginning in this matter. And, to the credit of the traders up there, it should be said that, while they cannot desist, for if they do others will step in and profit at their expense, yet they are anxious that some prohibition should be laid upon the business. This can be easily done and in such a manner as to perpetuate the sea-otter, not only for themselves but for the natives, five thousand of whom are wholly dependent upon this hunting for a living, which lifts them above the barbarous life of savages.

BREEDING-GROUNDS OF ALASKA.—Over two-thirds of all the sea-otters taken in Alaska are secured in those small areas of water and little rocky islands, and on the reefs around the islands of Saanach and the Chernobours, which proves that these animals, in spite of the incessant hunting all the year round on this marine ground, seem to have some particular preference for it to the practical exclusion of nearly all the rest of the coast in the Territory.

I think that this is due, perhaps if not wholly so at least in part, to the fact that those crustaceans and mollusks upon which the kalan feeds are secured here by that animal in the greatest profusion and constancy of supply; otherwise, I cannot see why it should, in spite of its intensely suspicious and wary nature, hug a coast that literally bristles with human enemies and entails its wholesale destruction annually. Again, these reefs and rocky shoals, before indicated, furnish an anchorage to immense areas of kelp, upon the semi-submerged masses of which, I believe, the sea-otter breeds. I think it breeds there and there only, because I cannot find a scintilla of evidence showing that there is any spot of landing ground about an island or along the main coast which has ever been occupied by the *Enhydra* for the purpose of breeding.*

SEA-OTTER AT STRAITS OF FUCA.—It is also noteworthy that nearly every one of the sea-otters taken below the Straits of Fuca are shot by the Indians and white hunters off the beach in the surf at Gray's Harbor, all shot within a stretch of less than 20 miles. Here every year some fifty to one hundred are taken in this manner, while not half that number can be obtained from

* The gigantic *Nereocystis lütkeanus*, with stems resembling clothes-lines, sometimes over 300 feet in length, which are supported by large air-vessels, crowned with bunches of chicotomous leaves, each 30 and 50 feet in length. This submarine forestry, when disengaged from its anchorage, floats in large raft-like aggregations here and there all over Bering Sea and the North Pacific. Upon these floating fuci islands the sea-otter brings forth its young; or else, I know of no other place where this act of reproduction culminates. It is well established by the concurrent testimony of sea-otter hunters during the last century that this animal does not repair to land or reef during this period of its life and habit.

all the rest of the Oregon and Washington coast line. There is nothing in the external appearance of this reach of coast, so favored by these animals, to cause its selection, except perhaps that it may be a little less rocky. It is shoaler and more sandy, but that signifies nothing.

EFFECTS OF OVERHUNTING.—As matters are now conducted in Alaska by the hunting parties, the sea-otters do not have a day's rest during the whole year. Parties relieve each other in succession and a continual warfare is maintained. This persistency is stimulated by the traders and is rendered still more deadly to the sea-otter by the use of rifles which, in the hands of the young and ambitious natives, in spite of the warnings of the old men, must result in the extermination of these animals, unless some authority is exerted to prohibit the use of fire-arms on the grounds. These same old men, who object to the use of powder and ball, are compelled, in order successfully to compete with their rivals, to drop their time-honored bone-spears and arrows and themselves take up fire-arms in self-defence. So the bad work goes on too rapidly, though the majority of the natives, and all the reputable traders, deprecate it.

CALIFORNIA SEA-OTTER.—Professor Jordan has derived the following information about the capture of sea-otter at Santa Barbara, Cal.:

Messrs. Rogers Bros. have a schooner (the Surprise) which carries Chinamen to the various islands to catch abalones, which also supplies parties of hunters on the same islands who are shooting seal, and is otherwise engaged in obtaining the skins of the sea-otter.

This animal lives in the kelp of Anacapa, San Miguel, and other islands, and is shot with some difficulty. Its fur is very valuable, the skins being worth from $2.50 to $110 each, according to size and quality. Mr. Rogers estimates that in 1880 75 skins were obtained, averaging $50 each or $3,750.

The animals go in schools of forty to fifty (?), and are shot from small boats. Only the skins are utilized. The fur is always prime on the sea-otter. No distinction of season is apparent in the abundance of the animals or the quality of the fur.

2. THE HABITS OF THE SEA-OTTER.

SIZE OF SEA-OTTERS.—An adult kalan is an animal not much larger than a mature and well conditioned beaver (*C. canadensis*). It will measure from the tip of its tail, which is short, to the extremity of the muzzle, 3½ to 4½ feet, the tail not being over 6 to 8 inches long, and it has a proportionate girth of a little over 2 feet; the skin lies upon it, however, in a very different manner from that peculiar to the giant rodent above cited, with which I have just compared it as to size, for the folds of the otter's hide, when seized by the hand, seem to stretch and rise from the body just as the skin does on the scruff of a puppy's neck. In other words, the skin of the animal seems to be big enough for a creature twice its anatomical bulk. There is no sexual dissimilarity in color or size amongst the adults, and both manifest the same intense shyness and aversion to man, coupled with the greatest solicitude for their young, which they bring into existence at all seasons of the year. The natives get young pups every month in the calendar. As the natives have never caught the mothers bringing forth their offspring on the rocks, they are disposed to believe that the birth takes place on kelp beds, in pleasant or not over-rough weather. The mother otter bears a single pup, which is only about 15 inches long when born, and provided from that time until it is a month or two old with a coat of coarse, brownish, grizzled fur; head and nape brindled grayish, rufous and white, with the roots of the hair growing darker to black towards the skin. The feet, as in the adult, are very short, webbed, and brownish, with nails like a dog, the fore paws being exceedingly feeble and small, all covered with a short, fine bister-brown hair or fur. From this poor condition of the pelt at birth they improve as they grow older, though

slowly; it becomes darker, finer, thicker, and softer, so that by the time they are two to three years of age they are prime, though the animal is not full-grown under its fourth or fifth year. The white nose and mustache of the pup are not changed in the adult; the whiskers are white, short, and stiff.

When the skin is taken from the body the native makes but one cut in it, and that is at the posterior; the body is turned literally inside out. The skin is next air-dried and stretched, so that it then gives the erroneous impression of an animal at least 6 feet and over in length, with a disproportionately lesser girth, suggestive of the shape of a weasel or mink.

VARIETIES OF SKINS.—Owing to the number of young skins brought in to the traders' hands by the natives, there is quite a variety in the shading of the pelts. The prime skins are, however, by their rare beauty, instantly distinguishable; there is the characteristic shimmering gloss and velvety sheen always apparent in a fine specimen; the fur, when blown open by the inspectors, shows much lighter towards its roots than upon the surface, and extending over all are scattered glistening hairs, whitish to pure white, which add greatly, or rather curiously, to the beauty of the coat.

SWIMMING HABITS.—The feet are so small that really nothing of the whole expansion of the sea-otter's skin is lost when they are cut off. I should say, however, that the hind flippers evidently are the swimming or propulsive organs. They, compared with the impotent tiny fore feet, are large and strong, and webbed between the toes like those of a duck. The natives say that this creature swims with surprising rapidity and is a famous diver; and that in its desperation and determination not to be captured alive, it will deliberately jam itself into rocky interstices and crevices below the surface of the water, from which it never rises.

SEA-OTTER NOT GREGARIOUS.—They are not gregarious to any noteworthy extent, seeming to go about in solitary, isolated pairs, though the younger of their kind do undoubtedly gather together in bodies of forty or fifty, with a sprinkling of a few parent otters; and, at times, so far forget themselves as to crawl *en masse* upon some lonely rocky reef awash, or clamber over the bowlders of an island beach.

NURSING THE YOUNG.—The female has two teats only, and they resemble externally those of a cat; they are placed between the hind limbs on the abdomen. The pup nurses a year at least, and longer if its mother has no other. The maternal otter is said to lie upon her back in the water—or upon the rocks, as the case may be—when she is surprised and desires to protect her young. She clasps the pup in her fore paws, and, turning her back to the danger, receives the Aleutian spear or the instantaneous death wound from the bullet; but desert her young, never.

SHEDDING HABITS.—The natives also assured me that as these skins, taken by them during every month of the year, never show at any season those signs of shedding and staginess so marked in the seal, they do not renew their pelage by that process, but that it grows and falls out just as the hair on our heads does. There seems to be a reason for this peculiarity in the fact that they are in the water at all times and must be ready to take to it at any moment.

SLEEPING HABITS.—The natives say that the sea-otter mother sleeps in the water on her back with her young clasped between her fore paws. The pup cannot live without its mother, though frequent attempts have been made by the Aleuts to raise them, as they often capture them alive. They have no commercial value, but, like other species of wild animals, it seems to be so deeply imbued with fear and distrust of man that it invariably dies from self-imposed starvation.

FOOD.—Their food, as might be inferred from the flat molars of dentition,* is almost entirely

* The remarkably concise and thorough discussion of the dentition of this animal, which Dr. Elliot Coues gives in his "Fur-Bearing Animals," pp. 332 to 334 inclusive, renders it simply superfluous for me to attempt its repetition here. This little brochure of the doctor's should be in the hands of every naturalist, at home or abroad.

composed of clams, mussels, and sea-urchins (*Echinoderms*), of which they are very fond. The shells of the last-mentioned animal they are said to break by striking them together, one held in each fore paw, and suck out the contents as they are fractured by these efforts. Of this, however, I am skeptical, for their puny fore hands do not, in my opinion, warrant any such action. They also undoubtedly eat crabs and small fishes, perhaps large ones, together with the juicy, tender fronds of kelp or sea-weed.

They are not polygamous, and it is very rarely, indeed, that more than one individual is ever seen at a time when noticed out at sea.

THE SEA-OTTER AT PLAY.—They are said to be exceedingly playful, and I am assured by several old sea-otter hunters that they have watched the kalan for more than half an hour as it lay upon its back in the water, and tossed a piece of seaweed up in the air alternately from paw to paw, taking all this time great delight in catching it before it could fall into the water; they also told me that it was tireless in its manifestation of affection for its young, and would humor the juvenile gambols of its offspring for hours at a time.

SENSE OF HEARING AND SMELL.—The quick hearing and the acute smell possessed by the sea-otter are not surpassed by any other creatures known to sea or land. They will take alarm and leave from the effects of a small fire as far as 4 or 5 miles to the windward of them, and the footsteps of man must be washed by many an ebb and flood before its traces upon the beach cease to alarm this animal and drive it from landing there, should it happen to approach for that purpose.

PHYSIOGNOMY.—The physiognomy of the sea-otter is ugly, its small, glittering, snaky, black eyes enhance the *mal contour* of its repulsive globose face. The ears are insignificant, situated remarkably low down, far below the eyes, and in fact little above the level of the commissure of the mouth. They are very small, flat, obtusely pointed, and sparsely and very shortly pilose outside, and only partially furry within.

3. METHODS OF CAPTURE.

There are four principal methods of capturing the sea-otter, namely, by surf-shooting, by spearing surrounds, by clubbing, and by nets.

SURF-SHOOTING.—This method is the common one, but has only been in vogue among the natives for a short time. The practice is borrowed from the keen hunting of our own people along the Oregon coast. The young Aleuts of Alaska have nearly all been supplied with rifles by the traders, and with these rifles they patrol the shores of the islands and inlets, and whenever a sea-otter's head is seen in the surf, even at 1,000 yards, they fire at it. The great distance and the noise of the surf prevent the sea-otter from taking alarm until it is hit, provided the wind blows right; and in nine times out of ten when it is hit in the head, which is the only part ever exposed, the shock is fatal and the hunter waits patiently for hours until the surf brings his quarry when it is too rough for him to venture out in his "bidarkie." This shooting is kept up now the whole year round, and this constant "pop," "pop," "pop," by vigilant, experienced, and tireless marksmen is the only danger that threatens the sea-otter with extinction.

The practical result of the destruction of the sea-otter in Alaska means simply the reduction of the entire Aleutian population to a savage life and method of existence. It is therefore a subject well worthy the serious attention of our Government, especially the Secretary of the Treasury, upon whose action the entire responsibility is devolved by Congress. He has it in his power to protect these interests, and he should not neglect it.

THE SPEARING SURROUND.—This is the orthodox native system of capture. It is the method of their far-away ancestors, and it reflects the highest credit upon the Aleuts as bold, hardy watermen.*

A party of fifteen or twenty "bidarkies," with two men in each as a rule, all under the control of a chief elected by common consent, set out in pleasant weather, or weather not too rough, and spread themselves in a long line, slowly paddling over the waters where sea-otters are most usually found, or where they expect to surprise them. When any one of these hunters discovers an otter, asleep most likely in the water, he makes a quiet signal by lifting his paddle or throwing up his arms; not a word is spoken or a paddle splashed while they are scouring on this line of hunting.

He darts toward the animal, but generally the alarm is taken by this sensitive creature, which instantly dives before the Aleut can get near enough to throw his spear. The hunter, however, keeps right on and stops his canoe directly over the spot where the otter disappeared, leaving the circling rings of water in displacement with the floating bubbles from its quick-caught breath. The other hunters, taking note of this action and of the position of this hunter, instantly deploy and scatter, forming a circle of half a mile wide around the place where he last was seen, and patiently wait for the reappearance of the surprised animal, a reappearance which must take place at any time within from fifteen to thirty minutes, for this creature must come to the surface to breathe. As soon as this happens, the hunter nearest to it in turn again darts forward in the same manner as his predecessor did, while all hands shout and throw up their spears to make the animal dive again, thus giving it scarcely an instant in which to recover itself and expel the surcharged and poisoned air from its long-loaded lungs. A sentry is again placed over this second diving wake, as before, and the circle is drawn anew; thus the surprise is quickly and often repeated, sometimes lasting for two or three hours, until the sea-otter, from oft-interrupted respiration becomes so filled with air or gases that he cannot sink, and is then an easy victim.

THE CLUBBING.—This is the gamey undertaking of the sea-otter hunter, and it only transpires in the winter season, and then during those unfrequent intervals which occur when tremendous gales of wind from the north, sweeping down over Saanach, have about blown themselves out. Then the natives, that is, the very oldest of them, set out from Saanach and Chernobours to scud down on the tail of the gale to those far-outlying rocks just protruding above surf-wash, where they creep up from the leeward to the Bobrooksie occasionally found there at such times. The sea-otter are lying with their heads pushed under and into the beds of kelp, to avoid the fierce pelting of the spray from the hands of a furious gale. But the noise of the tempest is greater than that made by the stealthy movement of the hunters, who, armed each with a short, heavy, wooden club, dispatch the animals one after another without alarming the whole body; and in this way, I am informed, two Aleuts, who were brothers, were known to have slain seventy-eight sea-otter, young and old, in less than one and a half hours. The result of this fur bonanza, so speedily worked, had they been provident in its investment, would have clothed and fed them for the rest of their natural lives; but, like our own coal-oil Johnny, they quickly squandered their wealth, and are poorer now than ever, or were so when I last heard from them.

NETTING.—The hunting by use of nets, which is a method adopted by and peculiar to the Atka and Attoo Aleuts, calls up the strange dissimilarity which exists now, as it has in all times past, between the practice of these Western Aleuts and that of those who, living in Oonalashka and to the eastward, never have used nets.

*According to Crantz, in his History of Greenland (1765), this method of securing the sea-otter was the style in which the Greenlanders captured hair-seals (*Phocidæ*) during the period of his observation there. I do not find that any modern writer speaks of such a chase in Greenland waters, or any other ancient authority who alludes to it.

These Attoo people, however, make little nets, from 16 to 18 feet long and from 6 to 10 feet wide, with a coarse diamond-shaped mesh, which in olden times was entirely made of sinews, but at the present writing is principally constructed of twine. They take these nets out to those kelp-beds, known by them to be favorite resorts of the otter, and spread them carelessly here and there over a floating mass of the "sea cabbage". Then, on returning, after a few days' absence, they frequently find sea-otters entangled therein, having, as they say, died of excessive fright; for were they as self-possessed as the sea-lion is when entrapped thus, they would speedily tear and gnaw themselves free. Sometimes, the natives say, they have caught as many as six sea-otters at one time in one of these small nets, and frequently get three, if they get anything at all. They also watch for surf-holes or caves in the bluffs at tide wash, and when one is found to which a sea-otter habitually resorts they set this net by spreading it over the entrance, usually succeeding in capturing the animal. The salt water or the kelp seems to act as a disinfectant to the net, so that the smell of it does not alarm or repel the shy animal.

DANGERS OF SEA-OTTER HUNTING.—In conclusion it may be noted that there is no driving of these animals out upon the land; it cannot be done. They are very fierce and courageous, and when surprised by a man between themselves and the water, they will make for the sea straight, without any regard for the hunter, describing their progress by a succession of short leaps that carry them rapidly over the rocks, a little distance at a time.

There is probably no chase of terrestrial or marine animals so exhaustive and exposed as is the hunting of the sea-otter in Alaska to-day; for the only periods in which man can expect with reason to surprise and capture this valuable animal is immediately after or on the eve of tempests, when the pounding of the surf, with a force like whirling fine shot, or briny spray in the wind, literally drives the tired otter to the land; but the moment the howling of the gale subsides the kalan is rested sufficiently, and, in obedience to its intensely suspicious nature, hies himself to sea again.

Therefore, in the tempest, or as it just begins to wane, must the successful Aleut hunter venture out. He must be a man with hardy thews and sinews, so that he can sit, if the case require (and it frequently does), for forty-eight hours in his conical, shallow boat, and battle for life against the furious gale, in order that he may hold his own and not drift to certain death into the vast expanse of the great Pacific.

The greatest care must be taken by the sea-otter hunters at Saanach and Chernolours when they go down to these islands for their summer, and, more particularly, their winter campaigns. They cannot, during all the six weeks or two months of their residence there at one time, light a fire or boil a cup of tea unless the wind is blowing just so. They have lived thus, in the dead of a severe winter, eight weeks at a time without a moment's interruption by the lighting of a fire. They do not dare to smoke or use tobacco in any form, nor do they scatter or empty their food refuse on or near the beaches. It must be carried inland and buried.

Of all these details I am assured by one who is perhaps the first white eye-witness of this winter hunting, as he lived on the island through that severe hyemal season of 1872–'73; and, though he was moderately successful, he told me that all future gain, no matter how alluring it could be held up to him, would never tempt him to repeat the experience.

PART XIX.

THE TURTLE AND TERRAPIN FISHERIES.

By FREDERICK W. TRUE.

1.—THE TURTLE FISHERY.

2.—THE TERRAPIN FISHERY.

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THE TURTLE AND TERRAPIN FISHERIES.

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1.—THE TURTLE FISHERY.

1. TURTLE FISHERIES OF NORTH CAROLINA.

The most northern points at which any considerable turtle fishery is prosecuted are Beaufort, and Morehead City, N. C.

A small number of loggerhead, hawks-bill, and green turtles enter Cove and Bogue Sounds and other shallow inlets in this vicinity during the summer months, in search of food. The green turtles arrive about the first of April and disappear early in November. The loggerheads and hawks-bills are of medium size, the average weight of the former being about 50 pounds; the green turtles are small, and weigh about 8 pounds each.

The capture of loggerheads in this vicinity was formerly effected by means of spears or "gauges." The turtles were struck by the fishermen with these implements while swimming in the water. They were frequently very badly wounded, however, and often injured to such a degree that they were unfit for shipment or sale. To avoid this difficulty Mr. Joshua Lewis, of Morehead City, conceived the idea of diving upon the turtles while in the water, and securing them with his hands. When starting out in search of them he ties the painter of his boat to his leg; then rowing along leisurely until one is seen, he approaches it and dives upon it from the boat. Seizing the anterior edge of the carapace with one hand, and the posterior edge with the other, he turns the head of the turtle upward, when the animal immediately rises to the surface, bringing the fisherman with it. If the water is deep he steers the turtle toward a shoaler spot, keeping hold of it with one hand; and with the other pulling the boat after him. When a suitable spot is reached he seizes the animal and throws it into the boat. Usually there is no difficulty in bringing turtles to the surface and directing them toward shallow water, but occasionally a very large one is encountered, which is strong and unmanageable. In such case the fisherman is forced to let go his hold and return to the surface, allowing the turtle to escape.

The method of capturing turtles by diving is employed at present by many of the fishermen in this locality, and the greater proportion of those taken are captured in this way. Good swimmers do not hesitate to dive for a turtle when seen, however great may be the depth of the water.

The small number of hawks-bill turtles taken are captured by the same method as that employed for loggerheads, and usually no distinction is made between the two kinds. The green turtles are caught in drag-nets and seines.

The loggerhead turtles find a ready sale at limited prices in the interior cities of North Caro-

lina, and a small shipping business has been established. The fishermen receive about 50 cents apiece for the turtles, which induces them to catch all that come in their way, but does not warrant their engaging very extensively in the fishery. The average annual catch of loggerheads in this vicinity does not exceed two hundred.

The green turtles are usually eaten by the fishermen, who consider them a delicacy, but occasionally they are sold to dealers for about 15 cents apiece. The catch at this point, if sold at local prices, would have a value of not more than $50.

2. TURTLE FISHERIES OF SOUTH CAROLINA.

At Charleston, S. C., a few small green turtles are taken at irregular intervals. In weight they vary ordinarily from 5 to 15 pounds, the largest specimens weighing not more than 25 pounds. They are usually caught by accident in the drag-seines or cast-nets used for the capture of shrimp. Probably not more than one hundred and fifty are taken annually, in the season, which extends from June to the middle of September.

The fishermen sell the turtles to the marketmen for their city trade, and receive from 50 cents to $1 apiece for them.

3. TURTLE FISHERIES OF FLORIDA.

Saint Augustine.—Green turtles make their appearance in the waters of Saint Augustine in May and remain until October, but they are most plenty in July, August, and September. They are smaller than those taken farther south, usually having an average weight of 20 or 25 pounds, although many are much smaller.

The gill-nets used for their capture are about 200 feet long and 12 feet deep; the mesh is about 11 inches. They are made of twine, of a size a trifle smaller than that of ordinary chalk-line. They are seldom bought, but are made by the fishermen in their leisure hours, and are valued by them at from $25 to $40. About twenty in all are owned in Saint Augustine, Indian River, Mosquito Inlet, and Fernandina. These nets are set in the harbor, and are watched by the men from the shore. When a turtle is captured they paddle out and secure it.

In 1879 about three hundred and fifty turtles were caught, weighing in the aggregate 8,000 pounds; in 1878 seven hundred were taken, weighing 16,000 pounds. They are usually sold at once, and the price received is generally below 75 cents, often as low as 15 cents apiece. At present a few are saved for the hotel trade in the winter, and these bring 10 cents per pound. In 1879 thirty were reserved for that purpose, and it is probable that a larger number will be disposed of in this way in the future. They are kept without difficulty in "crawls," being fed on fish and "turtle grass."

No turtles are shipped from Saint Augustine.

Halifax River.—The next locality south of Saint Augustine at which turtle-fishing is carried on is Halifax River. A number of green turtles come into this lagoon every year, and are captured by some seven fishermen from the little hamlets in the vicinity. They are somewhat larger than those caught farther north, their average weight being about 35 pounds. The fishery lasts for two months, during which time about two hundred turtles are taken. They are sent to Jacksonville, and from thence shipped to New York. The fishermen receive about 11 cents a pound for the turtles, and therefore the value of the annual catch is about $770.

Indian River.—A short distance south of Halifax River is Indian River, one of the most noted places for the capture of green turtles on our coast. More turtles are taken in this inlet than in any other locality in the State of Florida. They remain here during the greater part of

the year, but it is only during the winter months, when the saw-fish and large sharks are absent, that the fishermen will risk their nets in capturing them. Larger green turtles are taken at this point than at any other on the east coast of Florida. The average weight is 50 or 60 pounds, and specimens weighing 200 pounds have been frequently taken. The largest specimen taken here of which reliable information has been obtained weighed 275 pounds.

Fishing begins late in September or early in October, and continues to the last of December. It is said that the best catch is made during the coldest weather. The turtles are taken in nets similar to gill-nets. The size of mesh employed is about 11 inches. The nets are set directly across the channel, and extend from the surface to the bottom. A turtle, while swimming about in the water, comes in contact with them and thrusts its head through one of the meshes. Not noticing the obstruction it attempts to continue its course, and in a short time one flipper and then the other is entangled, and the animal is unable to extricate himself. If the fisherman is near his net he knows by the movement of the corks that the turtle is caught, and hastens to row up and secure it. Taking it to the shore he confines it in a "crawl," or pen, until a favorable opportunity is afforded to ship it to market.

The fishery has been carried on at Indian River for many years. Previous to 1860 the catch was bartered to merchant, trading, and Government vessels for such goods as they chanced to have on board. The turtles were then carried by these vessels to northern cities and sold in the markets. Lately, however, many of the fishermen have sought direct communication with the northern markets, principally with New York, through agents residing in Jacksonville. By these arrangements, after all expenses have been paid, they receive 10 or 11 cents per pound for the turtles shipped. A part of the catch, however, is sold to the fishing schooner at the inlet, and is taken by her to Savannah to be sent farther north.

The success of the fishery in the winter of 1877–'78 was the greatest for many years. During that season eight fishermen caught about sixteen hundred turtles. In the winter of 1879–'80 sixteen men prosecuted the fishery, and the catch was about fourteen hundred turtles.

KEY WEST.—At Key West, Fla., turtle fishing is carried on throughout the year, but reaches its height during the summer months. Turtles are more abundant here than at any other locality on the coast, except in the shoal water near Homosassa River, where these congregate in great numbers. The fishermen say that they have seen large schools of both green and loggerhead turtles in the sea between the Keys and Cape Romano, swimming near the surface, and apparently bound northward.

The turtles are caught at Key West in nets from 50 to 100 fathoms long and from 16 to 24 feet deep, having meshes each a foot square. The fishermen set their nets across the little channels and in the "hohr," among the keys and reefs near Key West. The turtles are kept in small "crawls" until needed for shipment.

There is only one firm at Key West which deals in turtles, and all shipments are made to New York. Several small vessels, which at certain seasons of the year are engaged in sponge fishing, participate in the turtle fishery to a limited extent, and the market fishing-boats also bring in some from time to time. The specimens which weigh from 40 to 100 pounds are shipped away, but the extremely large ones are sold to marketmen, who retail the flesh in Key West. It is estimated that an average number of fifty turtles, weighing 40 pounds apiece, are brought to Key West every week during the year.

CEDAR KEYS.—The green-turtle fishery at Cedar Keys is of recent origin, having grown up within the past eight or ten years. It is prosecuted during the summer months, usually from May

to October. The length of the season varies considerably, however, in different years, for the fishermen continue the business only as long as they may do so profitably.

The fishing-grounds extend 20 or 30 miles northward from Cedar Keys, and southward along the whole coast. The best grounds, however, are located where the bottom is covered with marine plants, on which the turtles feed.

The boats employed for setting the nets are similar to those used in gill-netting and seining. It is necessary sometimes to go 20, 30, or even 50 miles southward in order to find turtles in abundance, and as the ordinary small open boats would be unsuitable for trips of such length, larger sail-boats are hired, which have room for several men and their nets and other apparatus. The crew numbers three or four men, and the trip usually lasts eight or ten days. The nets are made of the largest and strongest cotton twine, and have a length of from 75 to 100 fathoms, and a depth of from 10 to 16 feet; the meshes are 2 feet long.

On arriving on the grounds the boat or vessel is kept beating back and forth until signs of turtles are noticed and several are seen to "blow" in one place, when the craft is anchored near by. A man in a small boat then makes a thorough investigation of the depth of the water in the vicinity, in order to find the deeper spots to which the turtles retire at low tide, and in which they usually prefer to feed. When the deep places have been discovered, the nets are set out near them and in a straight line parallel with the course of the tide. The turtles come to the surface every few minutes to breathe, and while rising and sinking near the net are very apt to become entangled in it. Only one flipper may be caught at first, but when the animal turns the other is entrapped and, shortly, the whole body is securely wrapped in the cords. After a little time it must come to the surface for air, when it is seen by the fishermen struggling to make its escape and is at once removed from the net.

This is said to be the dullest of all fishing, and unending patience and considerable skill are required to make it successful. Fishing is considered very good if one turtle is taken every hour during a half day, and commonly only one or two are caught during the whole day. The large boats frequently bring in, as the result of one cruise, a sufficient number of turtles to make up an aggregate weight of from 3,000 to 5,000 pounds, while for the small boats the aggregate weight of one day's catch may be from 50 to 800 pounds. Green turtles weighing 600 or 800 pounds are sometimes caught on the grounds in this vicinity, and, rarely, individuals weighing 1,000 pounds. The largest specimen which has been brought to Cedar Keys weighed 1,200 pounds.

For keeping the turtles alive after they are caught a pen, or "crawl," as it is termed, is constructed. It is an inclosure about 50 feet long and 25 feet wide, surrounded by piles driven closely together, and covered above with boards. A sort of crane or derrick for hoisting large turtles in and out is arranged close by it. It is usually constructed near the shore, in a position where the water is 5 or 6 feet deep.

4. TURTLE-CANNING IN TEXAS.

Turtle-canning.—At Rockport, on the coast of Texas, there is a firm engaged in canning green turtles and fish. It employs ten men with boats, who are engaged a part of the time in the capture of turtles, and in addition twenty persons who attend to the operations of canning. The company has been in existence only about one year. During the first six months of active work about 8,500 pounds of turtle meat were canned. A 2-pound can of this preparation sells at wholesale for 22 cents, and hence the value of the quantity canned in the first half-year was about $950. The work continues throughout the entire year, and the value of the quantity of turtle meat prepared at this point annually will not be less than $1,900.

5. TURTLE FISHERIES ON THE PACIFIC COAST.

On our Pacific coast very few turtles are taken. Five or six hundred are brought annually from Mexico on steamers, and occasionally on schooners. In 1879 a schooner brought one hundred and ninety turtles to San Francisco, retailed a number of them, and sold the remainder to a firm of fish dealers for 87½ cents apiece. The usual price received, however, is about $4 each. The turtles weigh from 150 to 200 pounds.

6. STATISTICS OF PRODUCTION.

Production of salt and fresh water turtles in 1880.

	Number.	Pounds.	Value.
Delaware	.....	15,300	.....
North Carolina	.....	36,000	.....
South Carolina	.....	22,000	.....
East Florida	1,900	88,250	$9,600
West Florida	.....	180,000	7,200
Texas	.....	54,000	1,920
Total	.....	395,550	.....

2. THE TERRAPIN FISHERY.

1. THE TERRAPIN FISHERIES OF NORTH CAROLINA.

Roanoke Island.—The waters of Pamlico and Roanoke Sounds abound in terrapins, and the salt marshes on the south side of Roanoke Islands and on the western shore of Pamlico Sound are favorite breeding grounds for them. A few also are found along the ridge on the eastern side, which shuts out the ocean, but they are sufficiently abundant there to induce anyone to make a business of gathering them. The terrapins found in this locality are of medium size.

Prior to 1845 no terrapins were shipped from this district, and the comparatively small number required by the inhabitants for their own consumption were gathered in summer by hand. In 1845, however, Mr. William Midgett, of Roanoke Island, invented a "terrapin drag," which he used in obtaining a supply for himself during the winter, when the animals lie dormant, buried in the mud. The dredge in use at present resembles the ordinary oyster dredge. The upper and lower bars are 3 or 4 feet in length and are separated at the ends by two hoops about 14 inches in diameter. The lower bar is made of iron and is furnished with teeth 3 inches long, and the distance between two teeth is 2 inches. The upper bar is made of wood. The bag is 4 feet in length. The only difference between the original dredge and the one now used is in the lower bar, which in the former was not furnished with teeth.

The "terrapin drag" is used chiefly in winter when the terrapins are dormant in the mud, and those who make an extensive business of dredging usually employ small vessels or large canoes. They sail along the channels and mud-flats, carrying one dredge out over each side and one over the stern. The pitch of the dredge is regulated by changing the position at which the lines are fastened to two rings. After dragging for a few moments the dredge is taken up. The bunt of the net is made with large meshes, and the mud and other débris readily passes through it. Dredging is largely successful only when the water is sufficiently cold to chill the terrapins, and make them torpid; at other times they are apt to escape.

Another form of apparatus used in the terrapin fishery in this region is the trap. It consists

of four or five hoops, about 3 feet in diameter, placed near each other, so as to make the total length of the trap about 4 feet. The hoops are covered with net. At each end there is a funnel, arranged after the manner of a lobster-pot. Bait in the form of fish is suspended near the center.

The trap is used in the summer months, when the terrapins are moving about in the water. It is set in the places most frequented by the terrapins. A pole is driven firmly into the mud, and the trap is fastened to it in such a manner that a part of it remains about the surface of the water. The object of this mode of setting is to allow the terrapins which enter the trap to breathe the air, without which they would drown in a short time. There is an opening on one side of the trap, through which the terrapins are taken out and the trap baited.

The hunting of terrapins with dogs seems to be confined to this locality. This method is carried on most extensively during the spawning season, when the terrapins come out of the water to deposit their eggs, and many nests are broken up. It is, therefore, the most objectionable of all modes now in use. The *modus operandi* is to set the dog to follow along the water-line until he comes to the track of a terrapin which has come out of the water. He takes the trail at once and follows it to the nest in the grass or bushes. When the terrapin is discovered the dog begins to bark, giving the signal to his owner, who, coming, picks it up and starts the dog on another trail.

A number of terrapins also are sent to market from two "pounds," as they are called, in which the catch is confined until there is a good demand. There are two such pounds in this region, one at Roanoke Island, built in 1875, and one at Sladesville, built in 1877. In 1875 and 1876 there were others at New Berne, but they are now discontinued.

There seems to have been no sale of terrapins in this region prior to 1849, when Capt. John B. Etheridge, at that time keeper of Body's Island light, caught 2,150 in February by dredging about the southern part of Roanoke Island. He took the catch to Norfolk and sold it for $400. Returning immediately he captured 1,900 more terrapins, and sold them in Baltimore for $350. The news of his success spread rapidly, and many men went into the business and prosecuted it with such vigor that the terrapins were shortly almost exterminated. Improvements were made in the original dredge, oyster tongs were brought into use, and dogs were employed.

The principal market supply is sent from the pounds, but some other dealers also send some during the winter months. On account of the general distribution of the terrapin over the whole section many are picked up by farmers and others, and while the majority of these are eaten, a small proportion are shipped to market. The principal local markets are Roanoke Island, Sladesville, Washington, and New Berne.

In the markets the terrapin are divided into three grades, according to size, namely: "counts," "heifers," and "bulls." "Counts" are those whose under shell measures over 6 inches in length; "heifers" have the under shell between 5 and 6 inches long, and all whose under shell is less than 5 inches in length are "bulls." The number taken at present is about one-third less than in former years. In 1879 the catch, including those eaten by the fishermen, was about 4,000 counts, 4,000 heifers, and 9,000 bulls, or about 17,000 terrapins in all. Of these about 3,000 were sent to New York, 5,000 to Philadelphia, and 2,000 to Baltimore.

The capital invested in dredges and traps is about $1,500.

TERRAPIN CULTURE.—At Roanoke Island there is a large "pound," in which terrapins are to be raised for market. The inclosure contains about 4 acres, of which three-fourths are covered with water. The bottom in this part is soft and muddy and covered with grass. The remaining acre is sand. The pound is arranged so that the tide ebbs and flows, passing in and out through a brick sluice-way, which is protected at the mouth by a wire screen. The tide rises and falls about 1 foot.

In this pound from 3,000 to 6,000 terrapins are kept. They are fed twice a week with 6 or 8 bushels of crabs and fish. The young are raised from the egg and kept until of marketable size. About the first of June the females come out of the water and deposit their eggs in the sand, each laying from eight to twenty. It is found necessary to protect the eggs from crows, blackbirds, and gulls, by spreading a net over the ground above them, otherwise they would be scratched out and destroyed. The young hatch out about the 1st of September, but often remain buried in the sand until the following spring. When first hatched they have a diameter of about half an inch. They seem to fear the water, and will not go into it willingly until several weeks old. The owner of the pound sometimes packs the young in boxes filled with straw, and keeps them in a barn during the first winter of their existence, turning them loose again in spring. Careful experiments seem to show that these terrapins grow about 1 inch each year, "counts," therefore, being at least six years old.

The method of keeping terrapins in pounds has been strongly objected to by certain persons, who claim that it tends to decrease rather than increase their abundance. Fishing is encouraged at a time when the terrapins are breeding, and the nests are badly broken up. Furthermore, the pound-owners will buy the young at small prices, and thus cause the destruction of immense numbers of them when their value is less then a twentieth of that of the full-grown terrapin. Again, the pound-men reap an unfair proportion of the profits of the business, because, having facilities for keeping the terrapin, they can buy them in summer, when there is no market and the price is almost nominal.

The pound-owners, on the other hand, claim that they are really increasing the abundance of the species, since they protect the eggs and young from birds and other destructive animals. Some urge also that in buying terrapins in summer, when other branches of the fisheries decline, they are directly benefiting the fishermen, who otherwise would be unable to support their families.

Beaufort and Morehead City.—An extensive trade in terrapins has recently sprung up. Most of the methods of capture employed are similar to those already described. The terrapins are caught in winter in dredges, introduced many years ago from Roanoke Island; they are tracked to their nests in breeding season, or they are searched for in shallow water, and secured in dip-nets. A method peculiar to this locality is that of burning the grass in the swamps in winter. The terrapins which have hid themselves for the winter, feeling the warmth, are deluded into the notion that spring has arrived, and come out in considerable number, when they are immediately captured by the fishermen. Several pounds, also, have been constructed. The summer fishing begins about the 1st of May, and is prosecuted by children and a few men.

The average annual shipment of terrapins from this locality is about 10,000, of which number one-third are sent to New York, one-third to Philadelphia, one-sixth to Baltimore, and the rest to Norfolk, Richmond, and the interior towns generally. About two-thirds of the entire number are bulls, and the remainder is equally divided between counts and heifers. About 2,000 terrapins are eaten by the people of the locality. The price received by the fishermen in winter for counts is $10 per dozen. In summer the price for counts is about 40 cents apiece; for heifers, 10 cents apiece; for bulls, 15 to 40 cents per dozen. The value of the products of the fishery at this locality, therefore, is about $3,500.

Prior to the war there was no shipment of terrapins from this point, and the local demand also was very small. Most of the terrapins caught were eaten by the fishermen.

Wilmington.—The terrapins in the sounds about Wilmington, N. C., are said to be comparatively small, not one in twenty measuring 6 inches in length. There has never been any extensive trade in this locality, although many terrapins are eaten here. The first shipments were made in

1875 by the captain of one of the New York steamers, and were continued for several seasons. He bought the terrapins, both large and small alike, at $4 per dozen. They were carried to New York. The next shipments were made in 1878 by Mr. C. C. Morse, of Wrightsville Sound. In 1879 about 500 dozen, valued at $2,000, were captured, and a part shipped, and the remainder eaten by the fishermen. None of the Wilmington dealers have entered into the business very heartily. A law recently passed forbids the capture of terrapins in Brunswick County between April and September.

2. TERRAPIN FISHERIES SOUTH OF CAPE FEAR.

The terrapin fisheries on the Atlantic coast south of Cape Fear are not very extensive at present. Terrapins are found in considerable numbers in any of the creeks, bays, and sounds, as far south as Fernandina, but they are especially abundant in the vicinity of Saint Helena Sound and Bull's Bay, and in Saint Andrew's Sound.

Terrapins are captured throughout this region by means of boats and seines. Vessels are employed of sufficient size to go from one harbor to another, and even to run the risk of being caught out in stormy weather. Each boat carries a seine and a bateau for ascending the shoal-water creeks, where the seines are set and hauled. The seines are usually from 60 to 90 fathoms long and 18 to 20 feet deep, the mesh varying from 4 to 5 inches.

The terrapins generally remain in deep holes in the creeks, and the fishermen on entering them commonly rap on the bottom or side of their boats with an oar or stick, in order to discover their presence. It is said that upon hearing the noise the terrapins immediately come to the surface to discover its cause. If no terrapins come to the surface after a noise has been made the fishermen seldom set out their seine. In setting the seine a pole, to which one end of the net has been fastened, is driven firmly into the mud. The seine is then set out in circular form from a boat, and when the two ends have been brought together it is rapidly brought into the boat, the terrapins gradually passing into the bunt. During the hauling of the seine the fishermen commonly rap frequently on the boat, in order to draw the terrapins from the bottom. This method is known as "bucking." Since the decrease of the fisheries it has been largely superseded by another method, known as "torching," which is practiced principally by negroes. Having provided themselves with torches they visit the sandy shores at night and catch the terrapins as they come upon the beach to spawn.

Fishing sometimes continues from the time of the first appearance of the terrapins, in April, until the middle of October, when they bury themselves in the mud. At present, however, it is frequently discontinued by the net fishermen during the breeding season. Occasionally the winter beds are discovered, and entire colonies captured by "bucking" on them.

The price now paid by dealers varies from 10 to 25 cents apiece, according to the season and the locality, but at times it is difficult to find a market for them at any price.

The statistics of men and apparatus for this region are as follows:

	Men.	Nets.	Boats.
Charleston	10	4	3
Savannah	15	6	
All other localities	12	6	

Besides the three boats given here, others are employed a part of the time. The men cannot be considered as engaged exclusively in this fishery. The total value of the nets is $560, and of the boats $900.

Previous to the late war many men were employed and considerable capital involved in this fishery. Several thousand dozen terrapins were shipped annually to the northern markets, and the fishermen received an average price of $6 per dozen for them. In 1860 the fishery appears to have been at its height, both in point of men engaged and number of terrapins taken. During the war it was entirely discontinued, but in 1865 and 1866 it revived again and was carried on with considerable enterprise. A few small vessels were sent from the North to engage in it, and several men, both at Charleston and Savannah, fitted out a number of small craft for the purpose. A number of fishermen, too, in the different localities owned boats, and shipped their catch either directly or through dealers.

In 1866 Capt. T. E. Fisher, of Savannah, with two boats and six men, secured 653 dozen, and in the same year Capt. David Kemp caught 870 dozen, and several others did equally well. In addition to the catch of the boat fishermen, many were picked up along the shore during the breeding season, so that the total number taken during the year must have reached 5,000 or 6,000 dozen.

3. STATISTICS OF THE FISHERY.

The number, weight, and value of terrapin taken in 1880 *in the Atlantic States.*

	Number.	Pounds.	Value.
New York	600	1,800	$300
New Jersey	3,000	9,000	1,500
Delaware	10,236	30,708	5,118
Maryland	.....	30,000	4,000
Virginia	.....	165,600	18,550
North Carolina	.....	123,000	10,850
South Carolina	.....	23,400	1,950
Georgia	.....	19,800	1,650
East Florida	.....	3,000	200
Total	.....	406,308	44,118

PART XX.

THE OYSTER, SCALLOP, CLAM, MUSSEL, AND ABALONE INDUSTRIES.

By ERNEST INGERSOLL.

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PART XX.

THE OYSTER, SCALLOP, CLAM, MUSSEL, AND ABALONE INDUSTRIES.

By Ernest Ingersoll.

1.—THE OYSTER INDUSTRY.

1. INTRODUCTION, DEFINING AMERICAN OYSTERS.

It is now settled that along the Atlantic coast of the United States there is only one species of oyster, under the name *Ostrea virginica* of Gmelin.

Great dissimilarity can often be seen when one compares two specimens of different ages, or grown at localities widely separated, or in waters of unequal depth and temperature, upon unlike bottoms, or under some other contrasted set of circumstances. Out of this diversity, inevitable to our great extent of north and south coast line, the early naturalists were deceived into naming several species, such as "*borealis*," "*canadensis*," &c., which they supposed to be distinct from one another; but a more extended knowledge has shown that all these grade into one another indistinguishably. "All the various forms," says Prof. A. E. Verrill, of the U. S. Fish Commission, "upon which the several nominal species, united above, have been based by Lamarck and others, often occur together in the same beds in Long Island Sound, and may easily be connected together by all sorts of intermediate forms. Even the same specimen will often have the form of *borealis* in one stage of its growth, and then will suddenly change to the *virginiana* style; and, perhaps, still later, will return to the form of *borealis*. Or these differences may be assumed in reverse order."

This eastern oyster is to be met with, almost without a break, from the northern shores of the Gulf of Mexico northward to Massachusetts Bay. Beyond this it occurs only in a few almost extinct beds on the coast of Maine and Nova Scotia, but reappears again in abundance in the southern part of the Gulf of Saint Lawrence and around Prince Edward Island.

On the Pacific coast, as might be expected, the oysters are different from those of the Atlantic. From California northward occurs the *Ostrea lurida*, commonly known as the "Shoalwater Bay oyster"; while southward, even as far as Ecuador, there flourishes the little *Ostrea conchophila*, reaching its best development in tropical waters.

The full natural history of the species on the Pacific coast is not known. But in respect to the eastern species it has been fully worked out by Mr. W. K. Brooks and Mr. John A. Ryder within the past few years. All the details of the development of the egg and the growth of the young may be found in the writings of these gentlemen since 1880 in the reports of the U. S. Fish Commission, the Maryland State Fish Commission, and the biological publications of the Johns Hopkins University. The general results can only be sketched here in a single paragraph.

It appears that among American oysters there is no distinction of sex, each individual producing one year either spawn (eggs) or the fertilizing milt (spermatozoa), under influences hidden

to us, and the next year the same or perhaps the opposite. By early summer (or later in more northerly latitudes and cooler water), the eggs have ripened in the ovaries of such as are taking the rôle of females for the time being, and gush out into the water in a milky cloud. At the same time spermatozoa are emitted by the males. Both eggs and milt float near the surface of the water and their future depends on an almost immediate and wholly accidental meeting, so that only a very small percentage of the eggs are fertilized before their vitality is lost. Development proceeds rapidly, and in a few hours embryos are hatched and swim about by means of circlets of filaments, called *cilia*, surrounding them. Undergoing speedy growth and change of form, only a few hours pass before they begin to sink to the bottom.

During all this time both eggs and embryos are exposed to a great variety of perils. Sudden changes of temperature and storms are liable to destroy them at a stroke, and they form the food of a long list of marine animals. The moiety which survives to be hatched, and then to sink toward a hoped-for resting place, must face a new danger, for their subsequent life depends upon their avoiding on the one hand an oozy bottom, where they would be smothered, and, on the other, the insecurity of shifting sands. It is necessary that the soft and still microscopic embryos find some solid surface, uncoated with slime, where their filaments may take firm hold and make a firm attachment.

By the time this has been safely accomplished by the "lucky few" out of the crowd of swimming embryos, their companions have exhausted their day of life, or met with some fatal mischance. Every moment witnesses a thinning of the ranks, and shows the necessity of the great supplies of eggs put forth by the mother. Even where the embryo has secured a foothold upon some submerged pebble, or stranded log, or the surface of an old reef, he is still exposed to the danger of being eaten by crabs and fishes and various other depredators. His danger constantly decreases, however. The fewer—perhaps now only a score or so—individuals there are left out of the million or two eggs emitted by the one parent, the more carefully nature guards and cares for them. A few months later the surviving oysterlings have been clothed in an armor stout enough to resist all but a small number of enemies, no more in proportion than it falls to the lot of all animals to encounter in the "struggle for existence."* Various circumstances combine to make the settlement and growth of oysters concentrate at certain favorable points. These congregations of oysters, crowding one another side by side, each generation capped and overborne by the settlement of ensuing ones, form great stony masses in shallow inshore waters, called "grounds," "bars," "reefs," or "rocks." Each of these names is appropriate, since the colonies are often widespread, may oppose barriers to navigation, and are likely to become solid masses of rock through excessive growth and the crushing, solidifying, and cementing action of the sea, which grinds down their protuberances and fills their hollows with stony freight.

2. GEOGRAPHICAL DISTRIBUTION OF AMERICAN OYSTERS.

Having seen that, after his brief embryo stage of freedom, the oyster becomes a fixed and motionless creature, growing in reef-like masses or "beds" along the sea margin, let us now sketch the condition of these oyster-beds on the eastern coast of the Union as they appeared when first discovered by Europeans. This will lead to some notice of the use made of them by the native races of the continent, and form a basis for an inquiry as to the effect which the civilization of the country has upon their quantity and distribution. Let us begin at the north.

Gulf of Saint Lawrence.—The Gulf of Saint Lawrence occupies a huge bight, Gaspé and Anticosti Island on the north and east and Cape Breton on the west. Down in the bottom of the

* A complete popular account, with illustrations, of this early life of the oyster may be found in the present writer's book "Country Cousins," published by Harper & Brothers, New York.

bight lies Prince Edward Island, between which and the mainland flow the shallow currents of Northumberland Strait.

The shores of this region are, for the most part, low bluffs of reddish soil and sloping meadows. Many rivers come down out of the interior, and at the mouth of each there is a shallow estuary or inlet, usually protected from the swell of the outer sea. This condition of things seems highly favorable for oyster growth, since nearly all of these inlets contain colonies of these mollusks, both on the mainland and engirdling Prince Edward Island, except at its western end. On Cape Breton oysters were plentiful throughout the Bras d'Or, and their remains exist at several points on the ocean coast of Nova Scotia.

Probably many of these beds had ceased to be productive long before Europeans arrived, and the region now seems to be slowly becoming less adapted to oyster growth.

THE GULF OF MAINE.—Having passed the peninsula of Nova Scotia we enter what has been called the Gulf of Maine, that great inward bend of coast between Cape Sable and Cape Cod. Between these limits oysters were so rare that so well informed a naturalist as A. A. Gould, in his "Invertebrates of Massachusetts," expressed himself in doubt as to whether they ever had been indigenous north of Cape Cod.

The evidence that this is a mistake, and that formerly oysters grew naturally in the Gulf of Maine, is found partly in the allusions of the early chroniclers, but more strongly in the remains of beds now extinct, and in the relics of Indian oyster-fishing.

When the earliest explorers landed upon the shores of North America, they found that the Indians ate all the various shell-fish we now make use of. They understood the superior value of the clam and oyster, and everywhere along the New England coast were accustomed to assemble at favorable points and have feasts of mollusks and maize, with much merry-making. That fine old institution of Rhode Island and Connecticut, the clam-bake, almost the only thing that was allowed to warm the cockles of a Puritan's heart, and still the jolliest festival in summer experience alongshore, perpetuates this practice of the aborigines.

The red men along the Gulf of Maine were not so blessed as those of more southerly latitudes in respect to a supply of this food, but utilized their privileges as well as they could, and found it worth while to eat some things their more fortunate kinsman rejected. At the mouth of the Damariscotta there exists the greatest of monuments to the antiquity of the oyster in these waters, and a remarkable evidence of how important a food resource it formed to the primitive inhabitants. I refer to that enormous heap of shells, estimated to contain no less than eight millions of cubic feet, which was heaped up by the Indians as the refuse from their long feeding upon oysters at this spot.

But Damariscotta is only one of many places on the Gulf of Maine where these shell-heaps, or extinct deposits under water, show that the oyster once flourished. They are to be found at suitable points all along the coast. More than this, there is abundant evidence that at the time of the coming of Europeans to that coast, beds of living oysters were flourishing (or had very recently become extinct) about the inlets into the Bay of Fundy; at Mount Desert Island, in George's, Damariscotta, and Sheepscot Rivers; throughout the upper and sheltered parts of Casco Bay; probably off Searborough Headlands, N. H.; in Portsmouth Harbor and the Great Bay of Durham River, Brainford County, N. H.; in Newbury (Parker and Rowley Rivers), Ipswich, Boston (both Charles and Mystic Rivers), Weymouth, Barnstable and Wellfleet, Mass. So far as I can find out, however, there were no other localities of oyster growth north of Cape Cod; and in most of these it was exterminated at a very early day.

One point calls for more particular mention. The limited sea-coast of New Hampshire pro-

duced oysters at Scarborough Headlands, in the Cocheco River, and in Great Bay, an inclosed area of shallow tide-water a few miles up from the mouth of the Piscataqua River, and from the harbor of Portsmouth. At the two former localities no oysters have ever been known alive, but in Great Bay they are not yet quite eradicated.

This interior basin is perhaps 10 miles long and 5 to 7 wide. Large portions of the shores are left as dry flats at every low tide, yet there are channels deep enough to allow large vessels to go up to Newmarket and Exeter when the water is favorable. This spot was renowned among the Indians for the oysters living there, and considerable shell-heaps attest the constant use made of the bivalves. The beds occupy the channels at a dozen or more points, where the water over them is hardly more than 10 feet deep, and fresh. The tide-way, as a rule, is strong, and the bottom tough, clayey mud. The oysters are very large, have the appearance of extreme age, and are heavy, rough, sponge-eaten, and generally dead. In taste this oyster is flat and rather insipid, which is attributed to the too great freshness of the water.

That remains such as I have described prove that the mollusks of whose shells they are made up once lived in the adjacent bay, I think no one could possibly deny. The chief mollusk is the oyster. Now it happens, as I hinted before, that it had been forgotten, and even denied, that this precious bivalve was indigenous north of Cape Cod. Of this, however, there seems to have been plenty of evidence besides these heaps of shells.

As long ago as 1606, when Champlain and Poitrincourt visited Massachusetts Bay, they noted the abundance of "good oysters" as one of the attractions of their landing place, which commentators have decided was probably Barnstable. From this earliest mention down I find that all the descriptions and records of the Massachusetts colonists count the native oysters as an important part of their natural riches, and some interesting incidents are put down in this connection.

Cape Cod to Delaware Bay.—The outer side of Cape Cod, a smooth, surf-hammered beach of sand, is unsuitable to oyster growth, but the first rocky islets at the southern end or "shoulder" of the cape are tenanted by these mollusks, however, and can be traced from the Sandwich all along the eastern shore of Buzzards Bay, at Red Brook, Pocasset, Monument, and far up Wareham River. In colonial days the present townships of Rochester, Mattapoiset, Marion, and Wareham, which are ranged around the head of the bay, were known as Rochester, and tradition says that the place was named after the city of Rochester in England (famous for shellfish) because of the abundance of oysters, quahaugs, clams, scallops, &c., along the shores.

The lower end of the bay, in the neighborhood of New Bedford, is not so well adapted, and consequently poorly stocked. In Newtown Pond, on Martha's Vineyard, oysters were native, but thin and insipid because of the freshness of the water. In the Westport River, just west of New Bedford, a large natural bed formerly existed. Beyond this there is a gap in oyster-growth until the mouth of the Taunton River is reached.

For 12 miles from its mouth this river produces natural oysters, which also grow around the point separating it from Cole's River, where are a few beds. With the exception of the secluded lagoon called Kickamuit, between Warren and Bristol, no more natural beds are to be found until we get around to Warren and Barrington Rivers, which are filled with them as far as the tide goes freshly. Crossing the head of Narragansett Bay, living beds occur at Gaspé Point, in Cowesset Bay and at Wickford on the western shore. Extinct colonies once existed near Newport and elsewhere at that lower end of the bay, while at the upper end tradition points out many places long since depopulated. Thus the whole upper half of Providence River was full of them originally, even to the city of Providence and that pretty "cove," now inclosed by a park, near the railway station.

Everywhere on these shores the grass-grown shell heaps show how important to the red men were these mollusks as food in times of scarcity, or as a variation from their inland diet.

Great Salt, or Powaget Pond, in Charlestown, and the Pawtucket River at Westerly, are additional localities for Rhode Island, but neither is of importance. On Block Island an abundance of small oysters formerly dwelt in the pond that occupies so much of the interior of the island, but they were rarely found in a fit condition for food, though made serviceable by transplanting. Their shells were so delicate that it was easy to pinch your thumb and finger through them, and they often contained so much air and fresh water that they would float when thrown overboard in planting, and drift away.

From the eastern part of Connecticut westward and southward along the coast, the thing noteworthy is not where oysters grew naturally in primitive times, but where they did not. Every spot of shore or river-mouth, as far as tide-waters and suitable grounds extended, besides many shallow "reefs" in the open water of Long Island Sound, were crowded with these mollusks, unless unfavorable condition prevented. The most noticeable barren areas were the eastern half of the north shore of Long Island, the storm-swept outer beaches of Montauk and the south shore of Long Island (though these beaches sheltered extensive areas of oyster-beds between them and the mainland), and the open coast of New Jersey, from Sandy Hook almost to Cape May. Here, however, great bays, like that at Barnegat, and several rivers, such as those which reach the sea through Atlantic County and Cape May County, furnish the quiet shallow waters that make an oyster tenantry possible, and in these an extensive growth has always flourished.

In New York Bay—to go back a little—oysters once grew naturally all along the Brooklyn shore, and in the East River; all around Manhattan Island; up the Hudson as far as Sing Sing; on the Jersey shore from that point to Keyport, N. J., and in Keyport, Raritan, Newark, and Hackensack Rivers; all around Staten Island, and on many reefs and wide areas of bottom between Robyn's Reef and Jersey City. Explorers and colonists were saved any trouble in finding this out for themselves, since the red men were in the habit of gathering clams and oysters at all practicable seasons, and depended upon them largely for their food.

Delaware Bay was equally well filled with a native oyster population, not only all along the marshes and inlets of its shores, even above Philadelphia, but over wide areas of its bottom far from shore, and in water of many fathoms depth.

CHESAPEAKE BAY AND SOUTHWARD.—As for the Chesapeake, everybody knows oysters are scattered over every part of its vast area and extend as far up all the rivers as salt water penetrates. To the southward, along the coasts of Virginia and the Carolinas, the inside of the outer "banks" or long line of beaches that protect the inner submerged area of nearly fresh water from the demolishing force of the ocean, is lined with oyster growth to a greater or less degree along its whole extent, but this natural growth is not always available for commerce.

South of New Berne and Beaufort there is no regular production until New River is reached, about half way between Beaufort and Wilmington, where the oysters are of a large size, fairly regular shape, and for the most part single.

South Carolina, having a less broken coast, offers fewer opportunities, but wherever a sheltered nook affords a good chance "reefs" will be found. In the Savannah River itself none grow above the immediate mouth, on account of the great volume of fresh water. Off Potato Point, however, and in the shape of two elongated banks in mid-stream, fine oyster beds are to be found, while everywhere in the thousand channels which intersect the marshy islands that border the coast, making a perfect net-work of salt water tide-ways, the "raccoon" or "bunch" oysters thrive in endless profusion. This abundance becomes more and more noticeable as you approach Fernandina,

Fla. Every stake or bit of sunken log in the marshes, or fallen tree whose branches trail in the water, become at once loaded with "coons." Frequently large specimens are obtainable, and such are very good, but they are rarely eaten.

On the point of land terminating Old Fernandina are remains of an extensive Indian shell heap; and in the bottom of the harbor opposite the marshy shore, between the old and new towns, was formerly an exceedingly large bar of raccoon oysters. Latterly these have died, and now they are being washed up and are forming a long, firm shell beach. At the bar or mouth of Saint John's River good oysters are obtained, though of a very salty taste. They are eaten locally, and sent now and then to Jacksonville by the fishermen. Jacksonville, however, is supplied chiefly by Cedar Keys and Apalachicola, the latter, in my opinion, sending the best oysters sold in that city. Saint Augustine gets her supply from the immediate vicinity, and many parts of the great system of estuaries which extends from the upper end of Indian River down to Bay Biscayne yield edible mollusks of large size and flavor.

The whole of the lower end of the peninsula on both sides is bordered by tangled, ever-increasing, and commercially worthless reefs of small and densly clustered oysters. Among these certain "rocks" have become known which yield a more edible kind, furnishing local markets from Key West to Cedar Keys. At Cedar Keys the sources of supply are Cragin's bars, exposed at low tide, 5 miles south of the village, and a still better locality to the northward. The Cedar Keys oysters are usually of large size, have a different taste from anything I have experienced elsewhere, and one which will commend itself to those who like a saltish oyster.

Apalachicola is favored by the proximity of beds of good oysters, scattered among the hundreds of the "coon-reefs" that barricade the shore swamps and impede navigation at the mouths of the rivers, and at Saint Andrew's Bay, where the water is unfreshened by any large influx, oysters lie in beds distributed all over the upper parts of East, North, and West Bays, and are most abundant in the deep and open water. Choctawhatchie Bay, next westward, contains very few oysters, but the large shell heaps there show that formerly they were taken in vast numbers. Now, the few that are got are found scattered over grassy shoals. At Pensacola the banks lie in Escambia Bay, and are scattering and very poorly stocked—not so well as formerly. The absence of shell heaps on the adjacent shores show that the Indians did not resort to this for a supply of molluscan food to any extent. The coast of Alabama, Mississippi, and the adjacent part of Louisiana, is bordered by our mollusks, the gathering of which supports a large number of men. The same is true of the western coast of Louisiana, where it may be said that the barricades to the encroachments of the sea erected by the oysters are all that preserve that amphibious region from submergence.

3. HISTORY OF THE DECLINE OF NATURAL RESOURCES.

Men went for food, at first, directly to nature, as the lower animals yet do. Afterward they learned to store food materials against future scarcity, and at last attempted to control and increase the supply. By so doing a great improvement was often effected in its quality, its nutritive power was increased, and thus far more than a mere augmentation of quantity was gained.

This is the history not only of agriculture, but of several edible products of the water. Mankind had eaten mollusks a very long time before anything like their cultivation was thought of in the Old World, while the practice is many centuries more recent in the New.

The red men procured their shell-fish by wading out and picking them up at low tide, or by diving. This was mainly the work of the women and children. The shells were opened, ordinarily, by being thrown upon beds of coal, or by being cracked. At Wellfleet, Mass., I dug from a shell

heap a rough stone tool which exhibited signs of long use both as a hammer and as a wedge or knife with which to pry open the valves. Any of their stone knives or smaller hatchets would have been eminently suitable, but an implement in the possession of Dr. R. C. Chapman, of Damariscotta, Me., appears to have been made expressly for this service, and would accomplish the matter as deftly as our modern knives. Stone tools, supposed to have been designed for this use, are mentioned by C. C. Jones and others, among the antiquities of the southern sea-board.

Civilized man, however, ever chary of using his naked fingers, centuries ago devised the ingenious oyster-tongs, modifications of the general pattern of which are shown in accompanying illustrations. In Virginia a truer tongs (since it is single-pointed) is used under the very proper name of "nippers," an illustration of which is also appended.

In addition to these instruments, oysters are taken in some localities by a large, stout, very long-handled rake, with teeth a foot long, sometimes only gently curved; in other patterns so much bowed as to describe more than a half-circle in their curve. The concavity of the bending is, of course, inward—that is, toward the person using the instrument. Dredges also are used in gathering oysters, with various kinds of hauling tackle and windlasses.

Let us begin again at the northern limit of the oyster's range, and see how it has withstood the attacks of civilized man.

Gulf of Saint Lawrence.—The oysters of the Saint Lawrence were among those first utilized by white men in America. Charlevoix mentions the practice of tonging through a hole in the ice, and describes the familar instrument. Oysters once flourished all around Prince Edward Island and skirting the mainland from Cape Breton to the Bay of Chaleur. Part of these beds became extinct in prehistoric ages—so long ago that in many cases they are overlaid by several feet of silt. Many other beds have ceased to produce within historical times, apparently for no other reason than that the natural process of growth has built up the deposit until it has come too near the surface. In a large number of places, once well stocked, production of any importance ceased through the inordinate and vicious methods of oystering, with other injurious practices to help it on. There is room for an entertaining discussion upon the influences affecting the decline of these northern fisheries.

Causes of the extinction of oysters north of Cape Cod.—Turning to the Gulf of Maine, an interesting inquiry arises in accounting for the extinction of the oyster-life which, as I have shown above, once flourished extensively north of Cape Cod. What killed it?

Beginning with those beds whose extinction seems to have been prehistoric, several theories are at the service of the reader. One is, that the elevation, which the geologists tell us has been proceeding steadily for many centuries, brought about conditions fatal to this sedentary mollusk in certain localities. Another theory charges it to climatic changes, by which the temperature of these waters has been seriously and rapidly lowered. It is the opinion of some students of the physics of the ocean* that the Gulf Stream is gradually bending to a more southerly and easterly course, wedged farther and farther from the North American coast by the inner Arctic current. If this is so the increase of the chilled water pouring into the Gulf of Maine would account for the fatal effects under examination, since the oyster and its co-extinct associates require comparatively warm waters, and, under the influence of the Gulf Stream, flourish at much higher latitudes on the coast of Europe than here.

Except perhaps at Damariscotta, where the space was so limited, I do not think the Indians can be held responsible for the extermination of any of these oysters.

* See a pamphlet by C. A. M. Taber, "How the great Prevailing Winds and Ocean Currents are Produced." Boston, 1882.

One of the first acts of white settlers on the forested coast of Maine, where every stream affords good water-power, was the erection of saw-mills. These mills began at once to pour great quantities of sawdust into each stream, which was carried out into the bay or river below, where it soon sank. At the same time woodmen were clearing the forests and draining the swamps, and farmers were breaking the turf. Each of these operations tends to the carrying away by rain of a far greater amount of silt than under natural conditions. The oysters thus found their clear, salt home freshened by an unusual influx of rain-water, the currents always roily, and themselves gradually smothering in a sediment of sawdust and earth. This, with steady depletion, would put an end to any of the isolated beds like those at Thomaston and Damariscotta, to both of which, tradition asserts, sloops used once to go and get loads of the bivalves for sale in neighboring colonies.

In the Sheepscot River they had a little better chance, and have disappeared only within the last twenty years.* Tradition has it that no more than a century ago vessels used to go to Great Bay, New Hampshire, heretofore alluded to, to be loaded with oysters, the surplus of the home demand. The lagoon became depleted, however, so long ago that the people of the vicinity generally forgot that these mollusks had ever existed there. Hence it was looked upon as a "discovery" when, in 1874, the Coast Survey announced that oyster beds still flourished in Great Bay. At first little was done to make this knowledge available. The following year, however, witnessed great activity. For several months a dozen boats, with two or three men in each, were raking every day, the average take being about five bushels to the man. They used not only tongs and rakes, but in winter they would cut long holes in the ice, and dredge the beds by horse power, stripping them completely. It was seen that this rash and wholesale destruction would speedily exterminate the mollusks, and protective laws were passed by the State, one of which forbade fishing through the ice. This was the most needed, for, as in New Brunswick, the ice-rakers were accustomed to pile upon the ice the débris of dead shells, &c., to all of which young mollusks were attached, and were thus destroyed by freezing instead of being returned to their nursery. But these beneficent restrictions came too late, and the business of oystering is now of no consequence.

History shows that the oysters naturally growing along the upper coast of Massachusetts were all valuable to the early settlers, who quickly exhausted them, not only through use as food, but by digging up the shells to be burned into lime, and by pouring sawdust and sediment into the waters that surrounded them.

So valuable a property were the oyster beds about Boston deemed by the Pilgrims, yet so ruthless were the drafts upon them, that before the end of the seventeenth century the colonies (especially Plymouth) passed restrictive laws, taxed every barrel exported, and prohibited outsiders from fishing.

Natural beds in Massachusetts Bay persisted longest, however, at Wellfleet, near the extreme end of Cape Cod. There originally they were widespread, and, with other shell-fish, a blessed food-resource in the early struggles of the Pilgrim colonists against starvation. It appears that they continued to be fished until about 1775, when a sudden mortality occurred which ended the matter.

* Speculation has been indulged as to whether this little colony of oysters is a natural one or not. There seems to be good evidence to show that it was planted designedly by the Indians, before the advent of white men, with mollusks brought from the Damariscotta beds. The position and condition of the colony; the fact that the banks of this river were thickly populated by Indians, who might be supposed to know enough to save themselves the trouble of going 4 miles every time they wanted oysters, by transplanting them to their own stream; the fact that no more distant stream has them, although no good reason can be discovered for their absence, and the fact that no shell-heaps of any account exist to attest ancient use of the bed, all seem to confirm this supposition.

Until their termination the Wellfleet beds supplied natural oysters sufficient for the trade of Boston, Portsmouth, Portland, and the other shore towns.

BUZZARD'S BAY.—How extensive was the native growth about Buzzard's Bay has been noted. As early as 1775 Wareham forbade any oysters or oyster-shells being taken out of the town. This checked excessive fishing, but gradually it became a dead letter, and the beds of the whole neighborhood so suffered in amount of yield, as well as in the quality of the oysters, that further and severer laws were enacted. Now the Wareham district gives little else except "seed," that is, young oysters intended to be transferred to other localities where they may pursue their growth under more favorable conditions, a subject to be entered into on subsequent pages. On the eastern side of Buzzard's Bay, in Monument River, at Pocasset, and one or two other points, excellent native oysters, growing under protection of good laws, are still obtained of marketable size and of remarkably fine quality.

The earliest voyagers were pleased to find shell-fish abundant, and the English settlers, three or four centuries later, record their thankfulness on similar grounds. From time immemorial, then, oysters have been natives of this district, and legal measures were early adopted looking toward their preservation. These have been successful, and until within the last thirty years "Somersets" (as these oysters were called, after the principal settlement) grew to a large size and held a high place in the New England markets. Latterly, however, they have lost greatly, and assumed a green stain, which has so prejudiced the people against them that the whole trade of the river is devoted to the production and sale of seed.

NARRAGANSETT BAY.—When the people of "The Colony of Rhode Island and the Providence Plantations" felt sure of future stability, they applied to King Charles II for a charter, which was granted in the year 1683. This charter was a wonderful document for those days, because of the well-nigh perfect liberty it embraced, and its hospitality to every conscientious belief. Among the privileges, the right of free fishing in every shape was jealously preserved for public benefit. In 1734–'35, for instance, the first session of the assembly at East Greenwich was distinguished by an act for the preservation of oysters, which the thoughtless inhabitants were burning in large quantities for lime; and, in October, 1766, an "act for the preservation of oysters" was passed, forbidding them to be taken by "drags," or otherwise than by tongs, under a penalty of £10. In the constitution no clause was so scrupulously worded against evasion as that declaring that the rights of fishing should remain precisely as decreed in the old charter. Despite this early vigilance and the elaborate laws which have long been in force for regulating oystering, Narragansett Bay has almost ceased to yield marketable oysters of natural growth, and is steadily declining in the amount of young growth available for transplantation. At only a few places does a breed of oysters, or a "set," as it is termed, occur with any regularity, or of any consequence—a dearth only to be ascribed, I believe, to the antecedent disappearance, through persistent raking, of all old native oysters.

There remains one river, nevertheless, where, under protection, the oysters are able to reproduce regularly every year. This is the Seekonk, which flows down past Pawtucket and Providence, with East Providence on its left, and numerous bridges and small shipping to worry its swift tides. The Seekonk has always been a favorite home of our bivalve, and year by year the river contributes its quota to the tongers, through a space from the Wicksbury pier to nearly 5 miles above. This is due largely to the fact that the oysters of the Seekonk, like those of the Taunton River, are vividly green,* and hence are not subjected to an exterminating drain for marketing. No better reason can be assigned than in the former case, and, like the others, this seed, when trans-

* The Bulletin of the U. S. Fish Commission, Vol. III, 1883, and the annual reports for 1882 and 1883, contain detailed information upon this peculiarity and its causes.

planted for a few months, entirely loses its verdant tint. Seekonk oysters, therefore, never go to market, though their color, due to the same harmless coloring matter as that which tints the leaves of trees, and which is absorbed from the food, has little effect upon the taste, and none upon the wholesomeness of the mollusk.

Long Island Sound.—Passing to Long Island Sound, the decline of the native fisheries for direct marketing is quite as marked as in Rhode Island. In the early days the cup-shaped, rather small, flinty-shelled oysters of the Pequonock River, and the plentiful rock oysters of the Thames were highly esteemed in local markets. In Norwich, especially, a large business was carried on with "natives" until quite recently, but this has almost wholly ceased. Breeds at Saybrook, Clinton, and Guilford, once highly productive, are no longer so—in the last-named case manifestly through over-raking, in defiance of law. Native oysters of large size, but with a tendency to grow in bunches, were always to be had scattered among the Thimble Islands, but at Branford, where primitively the river was one great oyster bed, the supply is now wholly exhausted. The whole shore of Connecticut, east of New Haven, does not now yield more than 1,000 or 1,500 bushels of uncultivated oysters fit for market.

The western half of the State, however, has always been more productive, and in coming to New Haven Harbor with the Quinnipiac and its other tributaries, we find the first of several large fields of natural production, the history of which shows the influence of civilization in a very marked manner. For many years the upper part of New Haven Harbor has been the scene of oyster operations. Shell-heaps along the banks of the Quinnipiac show how the aborigines sought in its waters, season after season, the best of bivalves, and the earliest settlers followed their example. Natural beds of oysters were scattered over the bottom of the whole river for 3 miles, and at intervals along the eastern shore of the harbor. The result was that the raking of oysters in this river, and along the eastern shore of the harbor at its mouth, which was a free privilege, was early adopted as a business by many persons who lived near the banks, and a considerable retail peddling trade was thus kept up throughout the neighborhood, in addition to the home-supply. Wagon-loads of opened oysters in kegs traveled in winter to the interior towns, even as far as Albany, and thence westward by canal.

In colonial times not only, but up to the last quarter-century, and therefore long subsequent to the beginning of oyster culture there, wild, uncultivated stock formed an important part of the marketable oysters at New Haven; and the persistence of these "natural beds" here and elsewhere to the southward (as well as in Buzzard's and Narragansett Bays), have formed a fruitful source of embarrassment between the cultivators and the outside public, and the occasion of endless legal tinkering in trying to compromise between new interests and alleged rights and privileges derived from antique laws, a long usage, or, strongest of all, originating in ignorant conservatism.

It was admitted very long ago that some rest was required by even so bountiful grounds as lay under the Quinnipiac, and a law prohibiting fishing in midsummer has been generally regarded for a century or more, yet gradually the oysters became more rare and coveted. The same history is substantially true of all the harbors on the north shore of Long Island Sound.

The East River.—At Norwalk the sound narrows rapidly into the East River, and thence all the way to New York oysters once grew in the greatest profusion on both shores, and in many places in the channel, wherever it was possible for a bed to maintain itself. Most of those localities in shallow water known and raked by the early colonists have long been abandoned or destroyed; but new places were continually originating or being discovered, so that until the beginning of the present century the supply gathered full-grown from their native waters was quite equal to the demand. The principal points for market-catching were Norwalk, Stamford,

Port Chester, and City Island, on the north shore, while the region about Great Neck was the center of the south-shore interest. On Long Island, however, oysters grew in great abundance in every bay and inlet as far east as Port Jefferson, beyond which the bold coast of shifting sand is unsuitable, until the long-ago exterminated colonies inside of Orient Point, at the eastern end, were reached. From Port Jefferson westward a good many native oysters are still taken to market, and once in a while a deposit is found which has lain undisturbed long enough to bring to salable maturity a considerable quantity; yet no one makes much account of these, and the natural beds are devoted almost wholly to seed-producing. Harlem River and Gowanus Bay were both noted in primitive times for the excellence of their oysters.*

South side of Long Island, New York.—A similar fate has overtaken the once highly-productive grounds in the Great South Bay, on the southern shore of Long Island. Originally oysters in this sound were confined almost wholly between Smith's Point and Fire Island—practically to the waters east of Blue Point, known as Brookhaven Bay. This was the home of the famous celebrity, the Blue Point oyster, which was among the earliest to come to New York markets. The present oyster of this brand is small and round, but the old "Blue Points," cherished by the Dutch burghers and peak-hatted sons of the Hamptons, who toasted the king long before our Revolution was thought of, was of the large, crooked, heavy-shelled, elongated kind with which one becomes familiar all along the coast in examining relics of the natural beds. Now and then, a few years ago, one of these aboriginal oysters, of which two dozen made a sufficient armful, was dragged up and excited the curiosity of every one; but the time has gone by when any more of these monsters may be expected. As early as 1679, according to Watson's Annals, this bay had become the scene of an extensive industry. In 1853 the New York Herald reported that the value of all the Blue Point oysters, by which name the Great South Bay oysters generally were meant, did not exceed yearly $200,000. "They are sold for an average of ten shillings ($1.25) a hundred from the beds; but, as they are scarce and have a good reputation, they sell at a considerable advance upon this price when brought to market. At one period, when they might be regarded as in their prime, they attained a remarkable size; but now their proportions, as well as their numbers, have been greatly reduced." The people did not take alarm soon enough. When, a few years later, they did become frightened at the threatened extirpation of their resources, their efforts were all but too late to save the beds from total annihilation. As it is, only transplanted oysters are now sent to market from that district. Between Fire Island and New York Bay no natural beds of any consequence ever grew, so far as we know, but large interests in planting have arisen. Inside New York Bay, however, the oysters formed a very important item in enumerating the advantages of the new country.

How greatly this mollusean abundance was valued by the first colonists is plainly shown in the early descriptions of the country. In 1621 "very large oifters" were too common at "Nieuw Amsterdam" to find a market, everybody being able to supply themselves without charge. "Oysters are very plenty in many places," asserted the traveler Von der Donk in 1641. "Some of these are like the Colchester oysters, and are fit to be eaten raw; others are very large, whereiu pearls are frequently found, but as they are of a brownish color they are not valuable. The price for oysters is usually from 8 to 10 stivers per hundred." The inference is, that every man could easily gather for himself all he wanted. That a few years of this sort of thing greatly enhanced their value, however, is shown by the fact that in 1658 the Dutch council, in making an ordin-

*A list and description of the natural beds, at present recognized by law in the waters of the State of Connecticut, is given in the third annual report (1884) of the shell-fish commissioners of that State. The areas, eight in number, aggregate nearly 5,500 acres, and none of any note lie east of Milford.

ance against the cutting of sods in and about the town, found it necessary also to enact a law forbidding "all persons from continuing to dig or dredge any oyster-shells on the East River or on the North River, between this city and the fresh water." This "fresh water" was the pond which is now occupied by the leather district of the city, of which Spruce street is the center.

The digging of shells was for the purpose of making into lime, and also for the purpose of paving the streets (Pearl street received its name from such paving), and in the course of dredging for them great quantities of young living oysters were wasted.

Up to the beginning of the eighteenth century everybody took advantage of this public storehouse of food without "heed for the morrow." But the fame of Carteret's "great plenty and easy to take" had spread abroad, and so many aliens sailed into the placid bay to rake upon the "vast banks," that at last the colonists became alarmed for the continuance of their precious supply. Thus it arose that as early as 1715 was passed the first colonial law in relation to oysters, calculated to protect the beds and save their speedy extermination. New Jersey co-operated, and in 1730 and again in 1737 the two colonies made stronger and stronger enactments to the same end, which had an immediate and favorable effect.

Prof. S. S. Lockwood estimates that, including the waters inside of Staten Island, not less than 350 square miles of rich oyster banks were open to the people dwelling about New York Bay at the time of its first settlement. This resource was deemed inexhaustible, and perhaps might have proved so, or at least have longer delayed its decadence, had not incessant removal of oysters been supplemented by the covering up of the beds or the killing of their occupants by impurities in the water, which more and more increased as population grew and civilization advanced upon the neighboring shores. No doubt the clearing away of the forests and the drainage of so many towns and factories have produced an increase of sediment and pollution in the Hudson River, quite sufficient to put an end to most of its more exposed oyster beds, even had they never been touched; and certainly this is true of the harbor itself.

New Jersey coast and Delaware Bay.—Moving down the coast of New Jersey a similar decadence of the natural resources we are studying is to be seen. In Barnegat Bay the oyster growing region is at the northern end, and is about 10 miles long by 2 wide, where the bottom is gravelly. These are called the Cedar Creek grounds, and once yielded the famous Log Creek brand. It is one of the great sources for seeding planting-grounds southward, but is steadily declining through heedless treatment. For many years few salable oysters have gone from this district direct to market, because none are permitted to reach adult size.

All of the sedgy inlets at the mouth of the Mullica River, behind Brigantine, and behind the other beaches southward, contain more or less native oysters, and are the scene of cultivation in a small way by the farmers who live near the shore. Great Egg Harbor, River, and Bay, with their tributaries, have long been proverbial for the plenty of their oysters and clams. The oysters formerly grew in great ridges of astounding fecundity. Incessant tonging by a great number of men through many years has served to spread these reefs, and the oysters are now more thinly dispersed over a wide extent of bottom. This makes their getting slower and more laborious; but the conditions are so favorable that probably there is quite as great a supply of young oysters now in these waters as formerly. A like story could be told of Dennis and Cape May, as far around into Delaware Bay as Maurice Cove.

The oysters of Delaware Bay were prized by the first settlers, and there are frequent allusions to this resource in the early narratives. The Jersey (eastern) shore is bordered by extensive marshes, through which innumerable small creeks find their way from the interior, and which contain many open places called "ponds." Throughout these creeks and ponds, in the tide-ways

and along the edges of the sedge-plats and islands, oysters have always grown in great profusion. In addition to this the bottom of the bay and of the Delaware River, from Cape May beach clear up to and a little above Cohansey Point, at the southern end of Salem County, a distance of not less than 50 miles, is everywhere spotted with oyster beds. The same is true of the opposite (western) shore, which will be considered on another page. These oyster beds are not confined to the shallow waters near shore, or to the sedge-plats, but are apparently scattered over the whole bottom of the bay. Even the ship-channel, 90 fathoms deep, contains them, as experimental dredging shows. On the western, or Delaware shore, the natural beds of oysters—"rock oysters" is the local term—are confined practically to the shore between the mouth of Mahon River and Bombay Hook. Though formerly far more productive, probably, than now, it is from an area of little, if any, greater width that Philadelphia, and the States of Pennsylvania and Delaware generally, have always obtained their oysters. Only portions of this bottom, which extend over about 16 miles, are now productive when dredged, however, and the area is not increasing. Though at all the little ports, and especially at Maurice Cove, a certain number of persons find indolent employment in cruising about the marshes or tonging certain shallows after natural oysters of marketable size, this supply is small, and probably does not exceed 10,000 bushels for all of Delaware Bay, where a great business in cultivation of oysters has grown up.

Chesapeake Bay.—It is not until the Chesapeake Bay has been reached, therefore, that the enquirer can learn that the original wealth of oyster growth is still available for consumption and export. Everywhere northward it has utterly disappeared, or else has been depleted to that extent that its existence is preserved, only by legal protection, and its utility has been degraded to the furnishing of "seed," which must undergo development on the planter's submarine fields before it is fit for sale.

The condition of the oyster beds and the conduct of the fisheries on both shores of the Chesapeake is very fully discussed on subsequent pages, and need not be descanted upon here. It appears, however, that despite the almost immeasurable extent of the original "rocks," the favorable conditions of climate and situation, and the influences which have tended to spread the area of oyster growth, there has been a steady decline in the fisheries, taken as a whole, ever since the civilization of the country began; and that those who understand the matter best see that the practical destruction of the Chesapeake oyster fisheries is only a short distance off, unless less wasteful methods speedily take the place of existing customs. Already the principal use made of Chesapeake oysters is as small seed, a matter not of preference or superior profit, but due to the difficulty of getting oysters in marketable conditions and the growing demands of northern planters for half-grown stock.

North Carolina and southward.—In regard to the coasts of the Southern States I need add little more in this place than was suggested on preceding pages. From North Carolina to Savannah the local trade, conducted largely by wagoners, who cart loads of oysters into the interior, is supplied by men in skiffs, who tong full sized oysters from the natural "rocks,"—a lazy occupation lazily followed. In Georgia, especially in the neighborhood of Savannah, much planting is carried on, and the native growth is therefore gathered more for seed than for market, sloops being employed as well as canoes and skiffs. Fernandina gets all the home oysters it uses from beds over towards Saint Mary's, 10 or 15 miles distant, whence they are brought in small boats by the negroes. On the west coast of Florida each settlement has its local bed, and no transplanting is necessary; but complaint is made at Cedar Keys, whence a large amount is sent inland, that the best beds are becoming exhausted. The people attribute this to cold weather, but it is doubtless the effect of excessive persecution within a too limited area.

There is little complaint, as yet, of depletion of oyster rocks in the Gulf of Mexico, save in certain localities of limited extent, closely adjacent to Mobile or New Orleans, whence favorite brands have been drawn in large quantities.

THE PACIFIC COAST.—On the Pacific coast, however, great scarcity of local oysters has come about, and that region would long ago have been left without this food resource had not successful planting remedied the defect. The principal source of former supply for California and Oregon was Shoalwater Bay, on the coast of Washington Territory, whence fifteen years ago not less than 200,000 bushels of fair oysters, gathered from the natural banks, were brought to San Francisco alone, besides a large quantity supplying Oregon and the Puget Sound towns. Now this has almost wholly ceased, and not one-tenth of the former catch is possible. To what this sudden failure is due I cannot say. In the Gulf of California there is as yet an excessive abundance of the small *Ostrea conchophila*, but this is considered scarcely edible, nor have any operations for its improvement by transplanting been entered into on an extensive scale.

4. NORTHERN "BEDDING" OF CHESAPEAKE OYSTERS.

ORIGIN AND OBJECT OF THE INDUSTRY.—I have now shown that before civilized man began to encroach upon the boundaries of nature in North America oysters grew abundantly along both coasts of the United States and Mexico. It also appears that during the three centuries of occupation of the continent by civilization the natural growth of oysters has completely disappeared in many districts, while it has everywhere been so reduced that almost no oysters are now furnished to the markets, except after some intermediate process intended for their improvement; furthermore, that the natural oyster beds remaining are profitable almost entirely as nurseries of seed to be transplanted, and that even these nurseries are saved from ruin only by legal protection. It will be my next task, therefore, to examine the various methods practiced in the United States by which oysters, naturally poor, are made marketable, or are cultivated upon artificial beds. These methods are of three kinds:

(1) Full-grown oysters are transferred from their beds to another place and left to retain their life, or, if possible, to improve in vigor, size, and quality for a time, not to exceed one season of warm weather.

(2) Oysters which have attained a few months' growth, but are not yet ready for market, are transplanted to new beds and placed under more favorable conditions for prosecuting their growth to a marketable age.

(3) Oysters may be bred from eggs, arrangements for producing and saving which, together with the preservation of the embryos, form a part of the oysterman's plan and process.

I propose now to describe these processes as they appear in America, taking up at the beginning the first named and simplest operation, the transplanting to new beds, for improvement only, of oysters nearly, or quite, in marketable condition.

This began in the economical custom of using leisure hours to bring in supplies from outer beds and deposit them near shore, where they would remain in good condition and be easily accessible. Oysters thus moved, broken apart from hampering clusters, and given more room, gained greatly in size and quality after lying on the new ground a few months, and on Cape Cod it began to be adopted as a regular preparation for market quite a century ago.

This operation was called "planting," but it is a misuse of the word, and the other popular phrases, "laying down" or "bedding," express the fact more truthfully. It is not oyster-*culture* at all as the word is to be used later, but only a device of trade to get fresh oysters and increase

their size and flavor, which adds proportionate profit in selling. It is neither intended nor desired that they shall produce eggs and start a new colony.

The same plan is still pursued in many places where natural beds flourish and a market is handy, especially on the southern coasts in New Jersey and Delaware.

When the native resources began to be insufficient at Wellfleet, schooners were sent, as early in the season as cold weather would permit, to buy oysters of more favored localities. These went first to Buzzard's and Narragansett Bays, but speedily extended their purchasing trips as far as Connecticut, Long Island, and finally to Great Egg Harbor, New Jersey, their charterers annually extending their beds in Wellfleet Harbor, until a large business had developed.

When a vessel arrived home from one of these trips she anchored in the district channel and unloaded her oysters into dories—the well-known skiffs of the New England fishermen—putting 50 bushels into each one. At high tide these proceeded to the grounds, already divided by rows of stakes into rectangles a few rods square, and deposited a load of 50 bushels in each "square." In order that the oysters might be distributed as evenly as possible over the bottom, the dory was rowed to the center of a square, and anchored at both ends. The dorymen then threw out the oysters with shovels into all parts of the square, intending at low tide to go over them again with rakes for respreading. The ground chosen was the hard surface of the flats in the western portion of the bay, where the oysters would be left dry about two hours at each low tide. They had very little fresh water near them, and the growth was variable. In a favorable season 100 bushels put down in April would fill 300 bushel-measures when taken up in October, but the percentage of loss was probably never less than one-quarter, and now and then amounted to the whole bed. Drifting sand, sudden frosts when the beds were exposed, disease, and active enemies were the causes that operated against complete success; yet enough success was had to make a very important item in the prosperity of that neighborhood whose subsistence was chiefly derived from the summer fisheries, because it added fall and spring work for both sailors and shore people.

Increasing prices of oysters in Connecticut and elsewhere, owing to the adoption there of similar methods, caused the New England people, early in the present century, to try sending their vessels on the long voyage to Chesapeake Bay after small stock, to be "bedded," as they had long been accustomed to do in winter for the direct supply of northern markets.

This experiment met with success. The strangers grew with great rapidity and found ready buyers, so that on Cape Cod the business of bedding southern oysters soon attained great dimensions, entirely superseding the use of more northern seed stock. At its height, between 1850 and 1860, from 100,000 to 150,000 bushels were laid down in the harbor annually, which, if a fair proportion survived, would yield 300,000 or 400,000 bushels when taken up in the fall. The breaking out of the war of the rebellion, however, so interfered with the getting of oysters in the Chesapeake and so increased the expense that the business began to decline. After the war had closed it revived, but now could not compete with other localities under new phases of the trade. Thus Wellfleet ceased several years ago to bed more oysters than sufficed to meet the local demand.

Meanwhile many other ports along the coast had acted upon the same idea, and the "Virginia trade," as it came generally to be termed, became, and has continued, a recognized and important part of the oyster industry.

At present the principal points are the upper end of Narragansett Bay, R. I., New Haven, Conn., Staten Island, N. Y., and the western shore of Delaware Bay.

THE METHODS EMPLOYED.—The methods in all these places are substantially alike. Fish-

ing or coasting vessels are chartered to go and get the oysters, which the captain buys from the tongers in Maryland or Virginia, who surround his vessel the moment he anchors, and rapidly pass up their measurefuls, receiving cash in payment. As soon as loaded he sails away homeward. The round voyage takes from twenty-five to thirty days between the Chesapeake and Providence, and a proportionately shorter time to nearer ports. The vessels sailing to Rhode Island, and many of those to Connecticut shores, belong to the Cape Cod mackerel fleet. Those serving Staten Island are chiefly owned in New York. Those which bring oysters (via the canal) into the Delaware are mainly a smaller, ruder class called "wood-droggers."

Vessels sailing to northern ports carry from 2,500 to 5,000 bushels at a cargo; but the Delaware boats not more than a quarter or third as much, the larger part of which is carried on deck, a practice not permissible in the case of the others, since upon their outside trips they must often encounter heavy gales and severe cold. Steamers have never been used in this traffic.

When the vessel has arrived at her destination her crew is re-enforced by as many additional men as can conveniently work upon her decks. Where feasible, she simply cruises back and forth across the designated ground and the oysters are shoveled on board by means of six-tined, shovel-shaped forks. In other cases her cargo is expeditiously unladen into flat-boats, from which it is thrown broadcast upon the beds, while the schooner is hastening back on a second voyage. As a rule one vessel is chartered by several planters, each of whom pays in advance his part of her expenses and purchasing fund, and receives a proportionate share of the cargo. The captain should be a man of experience in order not to be outrivaled by his competitors in a variety of ways when buying his cargo. Many captains are themselves planters, or at least special partners in the enterprise and are therefore excellent judges of oyster "seed."

Extent of the business.—In the Narragansett Bay about half a million bushels of these oysters are bedded and fattened annually, and it has therefore been the most profitable branch of the oyster business. What part of the Chesapeake Bay furnishes the best oyster for these waters is a question that has received much attention, and upon which diverse opinions are held, but the general verdict seems to be in favor of those from James River, Virginia. These show the largest growth at the end of the season, developing a hard, flinty shell and white meats; on the contrary, at New Haven, James River oysters cannot be used at all. But many cargoes are planted, the precise southern home of which is unknown, sometimes, I am sorry to say, because they are procured in violation of law. A still older headquarters for this trade is Fair Haven, a suburb of New Haven, Conn. This was among the first places in New England to import oysters from New Jersey, and then from Virginia, to be transplanted for additional growth. Twenty-five years ago, a large fleet of Connecticut vessels was employed in this traffic every winter, and some stirring traditions remain of perilous voyages during that icy season. They were better oysters that came in those days, also, than now. A quarter or so of the whole season's importation from the Chesapeake was regularly bedded down in April and May, to supply the summer and fall demand. The favorite bedding-ground then, as now, was "The Beach," a sand-spit running off into the harbor for more than a mile from the Orange (western) shore. This is bare to a great extent at low tide, but covered everywhere at high tide, and is the best possible place for its purpose. The ground on this beach rents from 2 to 5 cents a bushel, according to location. Those men occupying the beach each year—about twenty-five in number—form themselves into a mutually protective association, and provide watchmen who never leave the ground. This Virginia trade began at Fair Haven fifty or sixty years ago and soon became very profitable. Branch houses were established in the larger inland cities, and the great Baltimore packing business (as will be detailed on a subsequent page) was an offshoot of Fair Haven operations. Little competition was

exerted by other ports on Long Island Sound, at none of which has this branch of trade ever flourished extensively. Many or all of the old dealers, or their heirs, continue to bring and bed down southern oysters, which they offer for shipment in the autumn and winter. In 1880 the year's importation amounted to about 450,000 bushels. Those from the Rappahannock were the favorites for winter use, and were imported almost exclusively; for planting purposes, however, Rappahannock oysters were undesirable, and those from Fishing Bay, Saint Mary's, and Crisfield preferred. The great success, however, which has followed the cultivation of native oysters, at New Haven (and elsewhere in Connecticut), particularly on the deep-water farms, has caused a continual diminution of the receipts of "Virginias" there, not only for bedding but for immediate sale in winter. Several men who regularly used them in 1880 had completely ceased to do so by the season of 1883–'84, and during the coming season (1884–'85) probably not more than half the amount named above, or say 250,000 bushels, are likely to be brought to New Haven. Though the prices fluctuate, the general tendency is toward an increase of the cost of this stock.

In the lower part of New York Bay immense plantations of southern oysters (there called "soft," or "fresh," in contradistinction to the "hard" and "salt" stock native to the locality) have been carried on since 1825. The central place is Prince's Bay, Staten Island, and about 300 bushels are bedded there annually.

The methods of work, beginning in March, are not different from those pursued elsewhere and need not be redescribed. Rappahannock and York River stock seems to have been preferred always in this district, and a large number of sloops and schooners run each spring to and from those rivers. The crews of these vessels are not only native Jerseymen or Staten Islanders, but often Chesapeake men, who come up for a brief season's work and then return to their homes.

"They are required," says an account written in 1853, "in the transplanting of a bed, to heave the oysters overboard, to clean the bed about once a year, and perform various other work of a like description. The cleaning of the beds takes place generally every fall, and is accomplished by means of 'scrapers,' singular looking instruments, somewhat resembling scythes, with this exception, that at one side of the blade a large bag, constructed of iron ring-work, like many purses we have seen, is attached. Into this all the scourings of the bed, cleaned off with the front of the blade, fall, and the whole is hauled up at regular intervals and deposited in the boat, to be afterward thrown into the current. In this manner the whole floor of the bed is scraped quite clean, after which it is considered fit for the reception of the oysters." I doubt if this could be observed now. A similar effect is produced by the process of taking up the oysters in the fall, which begins with the first cool days of September. This is done by tonging from small boats, near which a sloop anchors upon the bed, in which the men are quickly carried out and home again, and easily transport their load. Thus the larger part of the harvest is gathered, until the oysters become scarce upon the ground. Then a dredge is thrown over from the sloop, which cruises back and forth across the ground until it is wholly cleaned up. Tonging over the side of a skiff is hard enough work, and requires sturdy, broad-chested men; but dredging is a still more terrible strain upon the muscles, when it comes to dragging the heavy iron frame and bag up from the rough bottom, and lifting it and its load over the rail onto the deck of the vessel. Many of the newer and larger sloops are now provided with a windlass, specially adapted to dredging (see illustration), which relieves the crews to a great extent of the old hand-over-hand back-breaking labor. Drag-rakes are also used very frequently on these grounds, having very long, limber handles. In Connecticut steamers are being used to a greater and greater extent in taking up the harvest, and this dredging, by whatever method, scrapes and cleans the bottom of filth, dead shells, and débris very advantageously.

After the harvest is finished not a few oysters will yet remain on the beds. The grounds of many of the owners are then given up to the laborers who have worked them on hire. Under a new impulse these men go over the grounds again with tongs and dredge. In some cases they work on shares, paying to the owner of the beds one-half or one-third of the results, which makes a really handsome thing for the gleaners, whose work in this way lasts from two to three weeks, making three or four days a week, each man often clearing as his portion from four to five dollars a day.

In Delaware Bay the scene of bedding southern oysters is altogether on the western, or Delaware shore, where 700,000 or 800,000 bushels are laid down every spring, to be taken up for marketing in Philadelphia each fall.

5. THE TRANSPLANTING OF "NATIVE SEED."

REVIEW OF THE INDUSTRY.—The cultivation of oysters transplanted when young (termed "seed") from the natural reefs where they were spawned to inshore, proprietary grounds, or "beds," and yielding a salable crop after several years' growth, under watchful attention, has long been followed in the United States, and is now to be considered. The practice began everywhere as soon as the natural supply of marketable oysters diminished, and at some points has constituted a very large industry. The inquiry is hence an extensive one, but it is restricted to a comparatively narrow compass.

In the Gulf of Maine the few attempts made have not been encouraging, on account of cost of seed, unfavorable climate, and living enemies.*

For similar reasons there are no important planting interests in the remote South. In the Gulf of Mexico almost nothing of the sort is called for, except at Mobile, where 3,000 or 4,000 bushels are annually transplanted; these are obtained from salt water between Mobile Bay and Biloxi, Mississippi, and are deposited in front of each oysterman's land, toward the head of the bay. A permanent colony of oysters usually follows such a deposit, so that little new stock need be added, until the crowding and the concourse of enemies have destroyed its good qualities, when a new foundation is selected. Though these "plants" exceed in quality and price the best wild oysters sent to Mobile market, the industry is subject to many uncertainties, and produces only 15,000 or 20,000 bushels yearly.

Florida shows no oyster culture worth mention, but at Savannah an old planting interest flourishes, situated mainly at Vernonburg and at Thunderbolt, but now spreading elsewhere through the salt marshes under a protection of a liberal State law. The seed used is gathered in the neighborhood, by crews of men in bateaus, who at low tide pick it by hand from the "coon bars," or sometimes by tonging in deep water, where oysters lie on the bottom singly or nearly so. Not more than two years' growth is allowed the beds, and all the methods are crude, yet the product, though ill-looking, has a fine taste.

Save a small amount in North Carolina, no oyster planting is to be met with northward of Savannah until Chesapeake Bay is reached. From Norfolk, Va., to Baltimore, Md.; in the Delaware Bay; on the seaward side of New Jersey; in New York Bay; Great South Bay; Long Island Sound; Rhode Island and southern Massachuetts, however, planting is followed in the most systematic manner, and the product is worth several millions of dollars annually.

* Yet it was talked about in colonial days, and perhaps tried even in prehistoric times; for, as I have ventured elsewhere to suggest, the oyster-beds in the Sheepscot and George Rivers may have been planted there by the Indians, who carried over from Damariscotta, by paths yet traceable, a quantity of full-grown oysters, and placed them in those streams, in order to keep them alive conveniently near home. If this supposition is correct, it is probably the earliest instance of oyster-culture in North America.

THE CHESAPEAKE REGION.—Planting in Chesapeake Bay is confined almost wholly to the Virginia shore. Previous to the late war the oystermen of Virginia were composed of negro slaves, working for their masters, and of a rough class of whites; but at the close of the war the demand for oysters was very great, and many persons who had been reduced to poverty were glad to avail themselves of this chance to make a support. When the trade revived the beds were well stocked with large finely flavored oysters. Men from nearly all occupations, representing all classes of society, eagerly entered the business, and soon there were hundreds of oystermen where formerly there had been but a dozen or so. Many of the most extensive farmers in the tidewater counties found that the condition of labor had so greatly changed that to make a living it was necessary for them to devote all spare time to the oyster trade. This is still done to a considerable extent by those whose farms border on salt water; but the great bulk of the trade is in the hands of a rougher class, and in certain parts of the State it is almost monopolized by negroes. A very noticeable fact is the almost total absence of foreigners, or of men from other States.

The law of Virginia forbids dredging upon the natural beds or "rocks," and general sentiment discourages, to the extent of practical prohibition, the use of the dredge upon private ground. The planted beds are staked off with poles, sometimes fifty to a hundred yards apart. The dredgers sailing over one bed can scarcely, even if so disposed, keep from crossing the line which separates adjoining beds, while a door is opened to dishonesty. The gathering of seed oysters is therefore done by tonging. Where the business is carried on in a small way, the planters and their assistants go in skiffs and canoes to the banks and load as fast as possible. Larger planters, or those who have a greater distance to travel between the seed beds and the planting-grounds, as is the case especially with the planters of Chincoteague, Lynn Haven Bay, and the Hampton Roads, send sloops and small schooners to be loaded partly or wholly by buying of the local tongmen.

Oyster-tonging involves great exposure, hard labor, and some risk, and the men engaged in it are mostly adult males in the vigor of health. The injury to health from exposure is so great that few ever reach old age. The death rate among oystermen, as compared with other trades, is very great. Nor does oyster-tonging give returns in proportion to labor expended. The element of chance is a large one. A clear, smooth water, with its opportunities for "coveing," permits the fisherman to gather in one day what he may not realize by a week's exertion in stormy and tempestuous weather. The influence of these uncertainties upon the habits and thrift of the men is plainly marked, particularly in dislike of steady industry. Few of them ever pretend to work on Saturday, Sunday, or Monday, and, as a rule, they are poverty-stricken to the last degree. The Tenth Census enumerated nearly 12,000 tongmen in Virginia, besides 2,000 more engaged on larger vessels. The average earnings of these were placed at about $200 annually. Between four and five thousand skiffs and canoes were in use, and about thirteen hundred sailing vessels, the most of which were connected with planting operations.

The most productive region for procuring seed is the James River, which is almost paved with a native oyster growth from its mouth nearly to Jamestown. Certain richer tracts, often measuring some hundreds of acres, and denominated shoals, form centers of tonging-work; and on these, in the fall, and again in the spring, will gather a crowd of canoes and a fleet of the sail-boats sent by distant planters to buy the products of the canoeman's daily labor. In midwinter, when the heavy planters are busy marketing their crops, the tongmen are idle, or are attending to their own little cove-beds, and culling out a few bushels a day for sale. Here comes in the art of "coving," a word which arose from the fact that in old times the finest oysters were found in the little sheltered bays or coves that indent the shores. These were single and, having grown under favorable circumstances were of large size and good quality. On days when the water is clear and smooth

enough to permit them to be seen at from 4 to 7 feet of depth, the oysterman goes in search of these extra-fine specimens into bays, creeks and old planting-grounds, and picks them up, one by one, with a pair of single-tined tongs, appropriately called "nippers."

The scene upon one of the James River shoals at the height of the seed-tonging season is an enlivening one. There will be perhaps a hundred small boats on 500 acres, each containing two or three men. Most of these boats are dug-out canoes, pointed at both ends, and so narrow that should a novice step into one it would most probably be overturned; yet the oystermen work in them all day long in smooth weather, and sometimes in pretty stormy weather, and apparently keep them properly balanced without any effort. To propel them through the water they use a long paddle, wielded at the stern, which also serves as a steerer by a skillful turning of the blade. The tongs employed are of three sizes, 24, 32, and 36 inches in breadth of "head," the size used depending upon the abundance of the seed.

Under the excitement of the competition the oystermen wield their heavy tools with great energy, and rarely bring them up empty. As soon as a load has been obtained, they go and deliver it, if they are working for hire, or proceed to sell it to some sloop, at whose mast-head a basket has been hoisted to show that it had come to buy. Some of the seed is sorted over, and only the living oysters in good shape are reserved; but the greater part is accepted by the planters just as it is brought from the bottom, and includes all the dead shells, trash, and injurious vermin that may happen to come out with it. This "run of the rock" may be had for 5 or 10 cents a bushel, while picked seed costs from 10 to 40 cents.

As soon as a boat is loaded all haste is made to get to the planting-grounds, where the cargo is at once tumbled overboard on the private bed. The expense of carrying and planting is from 8 to 10 cents a bushel—an item little if any larger for first-class culled seed than for the mass of trash, only a portion of which represents living and healthy oysters.

The southernmost, and one of the most famous localities for oyster-planting in Virginia, is at Lynnhaven, just inside of Cape Henry. Lynnhaven River, as described to me by Col. Marshall McDonald, of the U. S. Fish Commission, is simply a branching arm of Chesapeake Bay. It is fed by very little surface-drainage, the rain waters of the back country finding their way into it by percolation through the porous subsoils that form the banks. When the tide is out the fresh water flows out on all sides by infiltration, and dilutes the salt water in the coves and all along the shores. When the tide is at the flood the saltness is in a measure restored. It is to these incursions of fresh water twice in twenty-four hours that the extreme fatness and flavor of these oysters are probably to be attributed.

Oysters for planting are obtained from Back Bay and Linkhorn Bay, tributaries of Lynnhaven River, and from spawning-coves in the river itself; those from James River and other localities have not done well. The seed-oysters are carefully separated and planted evenly and thinly over the bottom, by a careful sowing, broadcast, with a shovel. Any bottom will suit, provided it is not sandy, so as to shift with the action of the tide and bury the oysters, and is not too soft to bear their weight. They remain in the beds six years or more, and are then sent to the market, where they bring the highest price on the list, and are consumed almost wholly, in the shell, by hotels and saloons as "fancy" stock. It is said that 200,000 bushels are now laid down at Lynnhaven, yielding 25,000 bushels for sale annually. All the coves of the river and a greater part of its bed are occupied by plants, and it is feared that the capacity of the river has been overtaxed.

The next most important planting-grounds probably are at Chincoteague, on the ocean side of the peninsula, between Chesapeake Bay and the Atlantic. Oyster cultivation was begun here twenty years ago, and proved extremely profitable. The whole bay is now staked off in small

plats, which are always salable should the owner desire to retire from the business of planting. Seed is derived mainly from the James River, and allowed to lie from eighteen months to two, or sometimes even three years. The latter occurs when, as sometimes happens, a bad, or several successively bad seasons for growth and flavor afflict the locality. Thus previous to 1879 the trade there had seriously declined, but the winter of 1879 and 1880 proved so prosperous that Chincoteague again became prominent, and contributed largely to the European exportations. Chincoteague's dealings are almost exclusively by railway with New York and Philadelphia, and in favorable years the production exceeds 300,000 bushels, much above the average in quality, so that most of the population of a large shore region depend upon it altogether.

A large proportion, also, of the people of Elizabeth City County are oystermen, and extensive areas of its coast are planted, chiefly in Mill Creek, back of Fortress Monroe; on Hampton Flats, between Newport News and Hampton Creek; in the Hampton Creek, on the edge of the channel, and in Willoughby Bay, back of the Ripraps, and up James River. On all of these grounds together perhaps 100,000 bushels of planted oysters are now growing; but, though limited spots appear to have been filled beyond their capacity, thousands of acres of exeellent planting ground remain unvailable through the prejudicial effect of the State laws. This feature calls forth remarks by Colonel McDonald, which explain the situation: "The Hampton Flats," he writes, "furnish a notable example of a condition of things that is beginning to prevail extensively in Virginia waters. Formerly they were covered with a natural growth of oysters that had great reputation and commanded a high price in the markets. They lay right at the doors of Hampton, and gave profitable employment to her fishermen; now these flats are exhausted, and though possessing a productive capacity of nearly half a million bushels annually under judicious planting, the law of the State, prohibiting planting upon 'oyster rock,' keeps them barren, when an annual income of not less than $125,000 is possible. There are not now, nor is it likely there ever will be again, any natural, wild oysters growing there. Yet 2,500 acres of fine planting-ground, at the very doors of the oystermen, are compelled to lie idle through shortsighted prejudice."

Back River, dividing Elizabeth City County from York, and Poquosin River, a few miles to the northeast, in York County, both contain wide oyster beds, seed for which is derived mainly from the upper shoals in James River. The natural oyster-rocks of York River, a broad arm of the Chesapeake, 30 miles or more in length, are now insignificant, compared to former days, and most of the oystermen who formerly worked on this river every season now go to the Rappahannock and the James. Relatively the oyster-planting interests are of greater importance, yet are insignificant now compared to what they were ten years ago. At that time the high price of oysters caused overplanting, which led to the impoverishment of the planting-grounds, while the sudden fall in prices ruined most of those who were engaged in the business. The larger part of the seed at present is brought from the Potomac, and costs 15 or 20 cents "laid down." About 350,000 bushels are raised annually for the northern market by fifteen or twenty planters, who receive an average of 35 cents a bushel.

In the Rappahannock it is an indubitable fact that the natural beds are rapidly being destroyed, oysters are becoming scarcer, prices are increasing from 20 to 25 per cent. each year for "plants," and much discouragment is felt. The planting-grounds extend along the flats on both sides in a narrow strip from Ware's wharf or Russell's Rock, which is about 8 miles above the light-house, to the mouth of the river. The seed comes chiefly from the natural beds in the Rappahannock and Potomac Rivers, with a few from elsewhere. The planters are estimated at about a thousand, most of whom do a very small business; and about 400,000 bushels are taken from the beds annually, to be sold to northern captains, as detailed on previous pages.

This concludes the account of oyster-culture in the Chesapeake so far as at present developed. It will be seen that its processes are crude, its growth hindered by many adverse circumstances, and its extent limited. No doubt it will grow amazingly in all respects during the next decade; but before it does many laws must be modified, and much opposition arising from ignorant prejudice must be swept away.

PLANTING ON WESTERN SHORE OF DELAWARE BAY.—Crossing from Chesapeake to Delaware Bay, we meet with a more systematic oyster-culture, and find that the product sells for more than twice as much money, bushel for bushel, although it still must come into competition at home with oysters of natural growth, and enjoys only a small advantage in its own market in the matter of nearness over the Maryland and Virginia fields.

The two sides of the bay, being in different States, under different laws, and affected by different circumstances, present too great diversity to be treated as one.

On the western shore of the bay, in the State of Delaware, are laid down every spring a vast number of half-grown oysters from Virginia, as has been explained; but in addition to this there is an almost equal business in the raising of oysters from local seed.

The planting-grounds lie chiefly opposite the central part of the State, the villages of Little Creek Landing and Mahon's Ditch, close to Dover, being the homes of most of the oystermen. The beds are chiefly so near shore as to be in less than 10 feet depth of water, though some are as deep as 15 feet at low tide. Various sorts of bottom occur, but stiff mud is preferred. In the course of a dozen years' planting on such a spot, the mud, by accumulation of shells and refuse, is converted into a solid surface. It thus is made suitable for the deposit of spawn and the growth of young oysters, which, proceeding continuously, replaces the formerly barren bottom with a genuine natural bed, or "oyster-rock." The title to the plot is not disputed, however, as it would be in some districts, because of this change, and the ground becomes extremely valuable, since it forms a natural nursery. This title is derived from the laws of the State, which allow any one to appropriate for planting purposes not to exceed 15 acres of bottom within certain limits (and excepting all areas where oysters have previously grown naturally), upon the payment of certain fees annually, in addition to which the boats employed by the planter must be licensed, the charge being made at a higher rate than for a license simply to gather wild oysters from the public banks. In return the State gives to the property of the planter beneath as well as above the waves, not only the protection of rigid and plain-spoken laws, but of an efficient police.

As all taking of oysters in public waters is prohibited in summer, the oysterman's year of labor begins on the 1st of September. It is in the fall that he procures nearly all the native seed that he proposes to plant, and his time is very fully occupied at that season. Though continual dredging is pursued on the home-beds, where natural oysters grow, by no means sufficient seed is gathered there to supply the demand. The inshore creek beds of the State furnish about 40,000 bushels of seed which would count 800 to the bushel. The off-shore beds, in the deeper waters, but within State limits, yield about 170,000 bushels. In addition to this there are planted about 160,000 bushels of seed that grew on the New Jersey side, the procuring of which is an evasion of the New Jersey law which prohibits taking any seed from her beds to be planted outside of the State. This evasion and its methods are perfectly well understood by everybody concerned, and if there is a way to put a stop to it (the extreme desirability of which does not appear) no one exerts himself to do so—at least, no one on the Delaware side. The seed is roughly culled.

It is the custom here to allow native oysters to lie two winters before sending to market. There are occasional exceptions, but to dispose of a native bed at the end of a single year's growth

is generally condemned, and with wisdom. Under this arrangement, however, a large part of the plantation must lie idle every alternate year, and in view of this many of the Delaware men complain with much reason that the limit of 15 acres is too small.

The harvesting of the marketable crop begins in September. It is calculated (and generally realized) that as much by measure shall be taken up each year as has been put down—at present about 300,000 bushels. By count, however, there will not be more than half as many, showing that half of the young perish. The profit, then, is almost wholly on the growth; but as, after from eighteen months to two years' waiting, the stock which cost put down, say, 25 cents, sells, bushel for bushel, at from 75 cents to $1.25, the return is a very fair one.

In the process of taking up a bed of oysters here each dredgeful is culled immediately on board, and all the "trash," that is, undersized oysters, shells and refuse, is saved, and at the end of the dredging is taken to the "idle-ground," where a field of seed is growing, and emptied upon it. Much of this trash is alive and will mature. When, six months (or perhaps not until eighteen months) later, this idle-ground is overhauled and culled out for market, it will be found to have been considerably reinforced by the "trash." A second most excellent effect of this system is that it thoroughly cleans the ground from which the season's salable crop is gathered.

The capital which carries on the oystering in the Delaware waters is almost wholly derived from Philadelphia, and most of the men employed belong there.

Planting on eastern shore of Delaware Bay.—The New Jersey shore of the bay is bordered by extensive marshes, containing innumerable creeks, and many open places called "ponds." Throughout these creeks and ponds, in tide-ways and along the edges of the sedge-plats and islands, oysters have always grown in great profusion. In addition to this the bay and the Delaware River, from Cape May beach clear up to and a little above Cohansey Point, at the southern end of Salem County, a distance of not less than 50 miles, are everywhere furnished with oyster-beds, not confined to the shallow waters near shore, or to the sedge-plats, but apparently scattered over the whole bottom of the bay. Even the ship-channel, 90 fathoms deep, contains them.

The center of the present great planting industries on the New Jersey shore is at Maurice Cove. So important had the oyster fisheries in this region become thirty years ago, that they were the subject of much special legislation, which appears in the revised statutes of 1856, and has been little changed. By these laws the planting areas are defined, and county commissioners were authorized to survey and map the bottom of the river and cove, and rent to the highest bidder subdivisions for planting purposes, no one man to own more than 10 acres, and no company more than 30 acres; nor could possession be retained more than five years, at the end of which the land is again put up to be bid upon at a new rent-rate. The commissioners were also enjoined to carry out the general laws relating to shell-fish. Supplements to these laws made stricter provisions against trespass and night fishing, put license-fees upon all boats according to tonnage, and set on foot a peculiar institution in Maurice Cove, called the Oystermen's Association. This association consists of all persons "growing oysters in Maurice River Cove." Once a year it decides by a two-thirds vote what tax (not more than $1 a ton) shall be laid upon all boats of over 5 tons in the association, in addition to the State tax, and it elects an officer empowered to collect this tax and to see that the laws of the locality are not violated.

The main object of the association is protection to property and honest industry, and the chief outlay of the funds derived is the maintenance of a watch-boat and police crew, which shall guard the beds in the cove against thieves and arrest all boats that do not show, by a number in the middle of the mainsail, that they have a license. Many of these home-delinquents would rather

take the chances of arrest than pay the cost of membership in the association. In all about three hundred boats are licensed by as many planters, and some 6,000 acres of ground are cultivated, all in the vicinity of Maurice Cove.

The seed used in this planting is procured almost entirely in Delaware Bay. From the inclosed river and ponds, and also from the outside waters of the bay southward of Egg Island, great numbers of large-sized and sweet oysters have always been taken and sent to market or peddled through the neighborhood. When planting-beds were so greatly increased in Maurice River Cove, the shore people found that the diligent search for young oysters through the marshes, and the persistent dredging during three-fourths of the year, were sensibly diminishing the supply of marketable oysters attainable by the small open boats. Of these there are fifty or more owned along the shore. They are too small to come under the association's tax; do not belong to planters, but are owned by men who live near the shore, and gain a large part of their livelihood by tonging and hand-dredging. These people, owing to misfortune or improvidence, are too poor to plant, but can do well if they are allowed to catch all the year round in the southern part of the bay, where all the oysters taken are of marketable size. For the protection of this class, involving perhaps a thousand families, the legislature of 1880 prohibited all catching of oysters for planting in the southern part of bay.

Though large quantities of seed are furnished the planters from the creeks and marshes by men who pick it up, using small boats, yet the main supply necessarily comes from dredging by the large boats, properly fitted with improved windlasses and deep-water apparatus, on the isolated areas in the upper part of the bay. Six or eight fathoms of line is the ordinary amount used, but successful dredging has been done in all parts of the southern half of Delaware Bay, even where the water is more than 500 feet deep. This deep dredging is unprofitable and not practiced; but that oysters exist there has been shown by experiment, as I was positively assured by Daniel T. Howell, esq., of Mauricetown, who gave me many interesting notes upon this region. Most of the boats are of good model and build, some exceeding 40 tons burden. They employ, as crews, during ten months of the year, no less than fifteen hundred men, all citizens of New Jersey, and nearly $500,000 must be spent annually by the owners of Maurice Cove beds in the operation of their fleet, while nearly 2,500,000 bushels of seed oysters are taken from the natural rocks and spread upon inshore grounds each year, to be left, as a rule, two years. As near as can be ascertained, 1,600,000 bushels, worth $1,600,000, are at present sent to market in assorted cargoes. A large amount of Philadelphia capital is invested in this region, and I do not know a more generally prosperous oystering community than Maurice Cove seems to be.

THE OCEAN COAST OF NEW JERSEY.—On the outer, or ocean coast of New Jersey lies a long series of sedgy lagoons and inlets, protected by outer beaches, extending with little interruption from Cape May to Barnegat, and again in the rear of Sandy Hook. In almost every one of these local oysters have been transplanted to private beds for additional growth, and at some points a large success has been attained. In Cape May and Atlantic Counties nearly every farmer is also an oyster-planter, getting his seed in the immediate vicinity. The center of this district is in the neighborhood of Atlantic City, where the muddy bottom of Lake's Bay and other noted inlets largely supply the Philadelphia markets.

Many of these planters go in their own sloops after the seed to The Gravelling, a shoal several miles square lying in the mouth of the Mullica River, at the head of Great Bay, N. J. There seems little diminution of the supply of young oysters in this piece of water, which is given by law a summer-rest, and not a few marketable oysters are tonged up every season. Hither, also, resort a host of planters from towns northward, and at the opening of the season, on October 1,

lively work is done. During all day of September 30, and during the night, schooners, sloops, cat-boats, sail-scows, trim yachts, and shapeless, ragged tubs, have gathered there, chosen a spot out of what was left of the space, and anchored. Once the anchor down, no movement elsewhere can be made. Each sail-craft tows behind it one or two small scows, termed "garveys," and has upon its deck one or more small skiffs, or perhaps those ingenious ducking-boats peculiar to this region, called "dinkies." So massive is each year's growth that the first day's work is likely to yield 100 to 150 bushels of seed to the man on the most favorable ground, but by the end of a week most of the tongmen have found it no longer worth their while to work. The owners of the extensive planting interests in Barnegat Bay do not come here, but supply themselves mainly from the Cedar Creek beds, nearer home.

A crop approximating 250,000 bushels is harvested every year from the planting of this home seed along the ocean-shore of New Jersey, but the arrangement and meager care of the beds call for no special remark. The growth is, in general, rather slow, and the product not yet, on the average, of so high a quality or cash value as that of either the Delaware or Raritan shores of the same State.

THE RARITAN DISTRICT.—Passing northward to the Raritan district, we shall find beds of transplanted native oysters maturing upon the shallows all the way from Sandy Hook to Perth Amboy and half engirdling Staten Island; and that there, as elsewhere, this branch of the business is gradually superseding the growing of southern "plants."

But this planting of native seed-oysters in New York Bay is an old industry. In 1853, for example, it was stated there were at least one thousand men employed in cultivating "York Bays" for the purpose of shipping them. "The hardness of their shell and the peculiar saltness of the meat render them better adapted for shipping than any others, and they are, therefore, used almost wholly for the western trade. The boats employed in transporting them from the North River and Newark Bay to the artificial beds are open, and are each generally manned by three or four men. * * * These men work in sloops and skiffs owned by themselves. The owners of each boat are also proprietors of one or more beds planted by themselves. There are about two hundred boats, altogether, each of which is valued at an average of $800."

It is added that one-third of all the seed planted at that time came out of the North River, from beds "which extend at intervals from Piermont to Sing Sing," where the growth was said to be exceedingly quick and abundant. Now the chief source is Newark Bay and Raritan River, though the North and East Rivers and Long Island Sound are drawn upon. A considerable quantity of seed is also brought from as far away as Fair Haven and Blue Point. In most cases the planters themselves gather what they use, by going after it in their own sloops, taking a small boat and a man to help. Not a little is procured at home, especially in the vicinity of Keyport. This grows on soft mud and in sedgy places, and hence is long, slender, crooked, and ill-shaped. Planted in from 10 to 15 feet depth of water, purer, salter, and upon a better bottom than before, it rounds out into good shape, and grows with considerable rapidity in good seasons. The best bottom is a thin layer of mud overlying sand, and the best time for planting is in March, April, and May.

By the end of May all work upon the beds ceases, beyond taking up an occasional boat-load to supply the weak summer demand. The condition of the beds is watched closely, however, by the anxious owners, since it is the midsummer months that determine whether the oysters will report themselves "good" in the fall, or the reverse; which means a profitable business, or the opposite. If the season is hot, equable, and reasonably calm, all is expected to go well. Heavy

storms and great freshets in July and August, on the other hand, produce thin and poor oysters, which will not bring a good price.

Early in the spring, however, before the planting of new seed begins, the oystermen of this district hire help to carry on another feature of their business, the "shifting." As soon as the weather gets fairly settled the "natives," intended to be sent to market the following fall, are taken up from the place where they lie, culled over, and cleaned, if needful, and relaid more thinly on a new bed. Usually this is a movement from a soft to a harder bottom, and sometimes to a region of fresher water. At Perth Amboy, however, oysters shifted are placed farther down the bay. It operates advantageously in two ways: by repressing the tendency to spawn, which is undesirable, and by giving them the benefit of a change of water and food. Moreover, on the sand they will tend to grow round and shapely beyond their ability to do so when crowded in the mud, while the fresher water will make them fatter. The actual result, nevertheless, is sometimes disappointing, particularly if there be no current over the new bed to bring a steady supply of fresh water.

The man who has only a few hundred bushels will do this "shifting," as it is termed, himself; but for the large planters it is usually done by a contractor, either for a lump sum or for an amount of pay based upon an estimate of the quantity, or at the rate of 10 to 15 cents per bushel, according to the density of the oyster-beds, and hence the time to be consumed. In either case the cost is about the same. One gentleman told me he paid $1,300 to have 11,000 bushels shifted under the first named arrangement. While this is going on the southern cargoes are being laid upon the beds, and at Keyport a score or more of negroes from Norfolk annually appear as laborers, returning, at the end of the work, to their homes.

The growth of oysters transplanted to these New York Bay waters is reasonably rapid, though not as fast as occurs in the Great South Bay of Long Island. The usual expectation is to leave the beds undisturbed for three years, then shift in the spring and market in the fall. As planting of seed occurs both spring and fall, the crop of every year is thus the first of a series of six. All "naturals," that is, local oysters, planted will outgrow other seed, doubling in size in a single season. The oysters from the sound, however, have been used largely for European trade for the last two or three years, and have acquired a high reputation. These do not require to lie three years, since they are wanted of small size.

Most of the planters here, as on Long Island and in the East River, are themselves merchants of shell fish in New York, or in partnership with merchants.

THE SOUTH SHORE OF LONG ISLAND.—On the south shore of Long Island oyster planting is carried on very extensively, and is subdivided into a great number of small holdings. At the western end of Long Island Sound is a series of interlacing channels, through a great marshy lagoon, protected outwardly by Longbeach from the Atlantic, and separated from Hempstead Bay, east, by large islands. This confusing net-work of shallow, tidal creeks, ramifying in all directions through an immense expanse of sedge, lies on the eastern side of the township of Rockaway. West of the town spread the more open waters of Jamaica Bay. In both these waters oysters are grown in great quantities, and as every village, beach, inlet, and channel in the whole region has the name Rockaway attached to it in some shape, it is not surprising that these oysters should take the universal name, too, in the New York markets, whither they all tend. Under closely protective local laws, nearly every family in the town is engaged in oystering. Rockaway men get their seed from Brookhaven and Newark Bay, but prefer East River seed to any other, and use the largest quantity of it. It is brought to them in sloops. Rockaway itself owns few large sail-boats; its channels are too shallow and devious to admit of easy navigation, but every man has a skiff, and all the planters flat planting-boats. Virginia oysters have been tried, but now

none are planted. The growth of Rockaway oysters is extremely rapid. The mud in the bottom of these marshy channels, which is only sufficiently compact to hold the oysters from being smothered, seems to be full of nourishment, and the oysters are always large and fat.

The same story applies with more or less truth all along the shore to Babylon, where a promising industry, for which there is room for great development, has been begun in the neighborhood of Oak Island. The growth of oysters transplanted to Oak Island waters is extremely rapid. They have been known frequently to double their size in a single season, and are often sent to market at the age of fifteen months; that is, the second fall after their birth. This rapidity of growth is attributed to the freshness of the water, but undoubtedly is due to the excess of confervoid and other food in the water. I know no place where it is more abundant, and it is quite possible that the fishermen are right when they attribute the circumstance that oyster-spawn never catches west of Nicoll's Point, except around the mussel-beds in the inlet, to the great prevalence of slime in the water; for this "slime" is the vegetable and hydroid growth that furnishes so much nourishment to the adult oysters, and everywhere covers the bottom with a slippery growth and deposition. The chief drawback to success is the devastation sometimes wrought by moving ice.

This brings us to the Great South Bay, an inclosed space of quiet water behind Fire Island and other beaches, some 30 miles long. It is only at its eastern (Brookhaven) end, however, that oysters grow naturally in any amount, or that oyster-culture has been carried on apart from the Oak Island beds. Very complicated regulations exist as to the legal right of the planters in their grounds, and I must refer the reader to my census monograph* for the particulars. How vast were the natural beds of oysters in the eastern part of Great South Bay has already been noted, and also the way it was exhausted by incessant drafts, not only for plantations on the neighboring shores, but by men who came in sloops from Rhode Island and Massachusetts, Rockaway and New Jersey. Planting interests thus became a necessity a quarter of a century ago, and though the home beds are not yet quite exhausted, they have so decreased, in spite of protective legislation, that the planters there are obliged to bring as much as 100,000 bushels of supplementary seed every year from Newark, North River, or the Connecticut shore. I have discussed this matter, and expressed my opinion as to the decline of the seed-producing power of this district, at great length in my report to the census above referred to. In a word, the oysters are taken up faster than they can multiply—the banks are over-raked.

The center of the planting interest of the Great South Bay is at Patchogue, and there are about 1,000 acres of bottom under cultivation in front of the town. This area includes all the coast from Patchogue to Bayshore, thus taking in the settlements and railway stations, Bayport, Youngport, Blue Point, Sayville, and Oakdale. A part of these lie in the town of Islip and the rest in Brookhaven, and thus come under slightly different regulations, but otherwise they form together a homogeneous district, and the oysters they raise go to market under the general brand-name of "Blue Points." The artificial beds upon which these oysters grow are all near shore, and in water rarely more than 2 fathoms deep, and often less. The bottom varies, but, as a rule, consists of mud overlying sand. The preference is in favor of water 6 to 10 feet in depth, which is deep enough to escape ordinary gales, and is not too expensive to work. The oysters fatten better there than in shoaler water, one planter said. The seed consists of the native growth, eked out by cargoes from New York Bay, the East River, and elsewhere. The experiment of planting Virginia oysters as seed has proved a failure; they develop a shell closely resembling the native, but the moment the oyster is opened the difference and inferiority of the meat is apparent, both to the eye and the taste. Southern oysters will survive the winter in this bay, grow, and emit

* The Oyster Industry, by Ernest Ingersoll: Department of the Interior: Tenth Census, Washington, 1881.

spawn; but planters consider that they tend to reduce the quality and price of the native stock, and hence have almost ceased to bring any.

No less than five hundred sail-boats are to be seen every spring and fall between Moriches and Blue Point gathering seed, carrying it away, and buying it for outside planters. To every one of these five hundred sail-boats, mainly well-built sloops and cat-boats, three men may be counted, so that fifteen hundred men are probably employed in this industry alone at these times. How much seed is procured each season it is impossible to state, but I should judge it to be not less than 100,000 bushels, or twice that amount for the annual yield. The poorer seed caught is sold to a great extent in the rough—stones, shells, dead stuff, and all—just as it comes, since on much of it there are oysters clinging too small to be detached. Much, however, is culled, boys going in the boat and picking the tongfuls over as fast as they are poured out upon a board placed across the middle of the skiff from gunwale to gunwale; for this service from 40 to 60 cents is paid. The buyers are planters at Bellport, Patchogue, Blue Point, Sayville and the towns farther west, and occasionally a man from Rhode Island or Connecticut, who wants this seed to work up into a particular grade on his home beds.

Home seed is preferred to any from a distance, but it is conceded that oysters taken from the eastern to the western end of the bay grow more rapidly than those not changed. The ordinary amount of small seed put on an acre is 500 bushels, chiefly laid down in the spring. In the fall the owner goes over them and thins them out, finding a great many which are large enough for market, though no bigger than a silver dollar. The rest remain down longer, and meanwhile constant additions of seed are made alongside.

As you go westward to the extremity of the "Blue Point" district, in the neighborhood of Bayshore, you find a feeling of discouragement. The oysters there do not grow as fast or become as finely flavored as those to the eastward, and all the seed must be bought or poached stealthily from Brookhaven. Large quantities of ground there are not taken up, although with the help of capital it might be made productive.

The crops gathered from the beds of the Blue Point district amount in the aggregate to something over 200,000 bushels annually, while the western part of the shore, from Babylon to Coney Island, sends about twice as much to market.

The East River and Long Island Sound.—Going around into the East River, or eastern end of Long Island Sound, we find the mouths of all the rivers and the shallows of nearly every one of the many coves that indent the rocky coasts on both sides occupied by private beds of oysters, each held under local regulations. On the Long Island side the principal points are Great Neck, Port Washington, Oyster Bay, Huntington Bay, and Port Jefferson, with many minor points between; and the annual aggregate yield of the whole north shore of Long Island is between 350,000 and 400,000 bushels, but the average price is less than $1 a bushel.

On the Connecticut shore, also, every sheltered indentation has its planted oyster-beds, especially at City Island, Greenwich, Rowayton, and South Norwalk.

I do not know that the methods differ from those already described, except that no "shifting" is praticed, and in most cases less attention and care is given to the cultivation of the beds than at Staten Island and Patchogue.

The obtaining of the seed is worthy some mention, however. The smaller planters in the eastern part can get nearly enough close at home for their purpose, and are to be seen in great numbers tonging and raking all along between Great Neck and Hell Gate. The best ground is directly in the steamboat channel, where the cinders falling from the innumerable steamers that pass daily furnish a capital "cultch" for the oyster-spat to attach itself to. This ground is gradu-

ally extending itself into a productive tract half way to Norwalk, and the scraping of the bottom with the big, deep-cutting, dredge-like clam-rake undoubtedly contributes to the growth of young oysters as well as young clams there, by preparing the ground to retain the spawn, which is at that very season floating about.

Planters who require large supplies, and nearly all those who live east of Great Neck and City Island, either buy their seed from others or go after it themselves to the public oyster-grounds up the sound, where a large fleet of oyster vessels may be seen during the proper season, gathered from New York, New Jersey, Rhode Island, and the Great South Bay, as well as from the town, along both shores of the sound.

From City Island (the oldest artificial beds in East River) eastward oyster-beds are planted with this seed, annually, at every favorable spot as far as Port Chester and East Chester. The business is of small account, however, though many persons are engaged in it in feeble fashion. The coves about the harbor of Greenwich, Conn., are occupied by planters, who raise perhaps 35,000 bushels annually. Stamford has seen better days than the present in the oyster business, and the same is true of Darien, just beyond.

At Rowayton, or Five-Mile River, the next shore-town, however, very important planting interests are owned, and excellent oysters are raised for the New York and European markets. The little creek-mouth is filled with oyster-sloops, and the shores are lined with the warehouses of the planters, who are prosperous and enterprising, harvesting probably 75,000 bushels annually. Like all other parts of the East River, the oysters are sold here wholly in the shell, and almost always by the barrel or bushel, the selling "by count" belonging to the region farther west and to the Long Island shore. Just eastward of Rowayton lies the city and harbor of South Norwalk, one of the most important oyster-producing localities in Long Island Sound, as well as one of the "oldest." The bay at the mouth of the Norwalk River is filled with islands, which protect the shallow waters from the fury of the gales, and their sheltered coves began to be utilized for oyster planting about 1850. Now the business has grown to such proportion that more than one hundred families get their whole support from it, and the annual yield approaches 100,000 bushels, produced by about fifty planters, who occupy 2,500 acres of ground, the right to which they would not sell for less than $8,000 or $10,000. From $50,000 to $75,000 a year are reinvested in the beds at Norwalk, counting the time of the planters as so much money. Few can afford to hire help, except occasionally, for a few days at a time. Wages, in that case, are from $1 to $2 per day. Many of the planters here, and at Rowayton, are also concerned in operations on the opposite shore of Long Island.

At Westport (to move another step eastward) the first efforts at planting were made in the mill-pond east of the village, a pond of salt water about 40 acres in extent. The bottom of this pond is a soft mass of mud; not barren, clayey mud, but a flocculent mass of decayed vegetation, &c., apparently inhabited through and through by the microscopic life, both vegetable and animal, which the oyster feeds upon. Although the young oysters placed there sank out of sight in this mud, they were not smothered on account of its looseness, but, on the contrary, throve to an extraordinary degree, as also did their neighbors, the clams and eels, becoming of great size and extremely fat. Fifteen years ago oysters from this pond sold for $3 a bushel; and for one lot $16.50 is said to have been obtained. Before long, however, a rough class of loungers began to frequent the pond, and the oysters were stolen so fast that planting there has almost wholly ceased, and prices have greatly declined.

Similarly the planting-beds at the mouth of the Saugatuck, where a quarter of a century ago Westport men used to lay down a large part of the 50,000 bushels of small oysters annually

gathered in their populous river-channels, are now almost abandoned, owing to exhaustion of the natural growth in the river.

At Bridgeport something over 100 acres are rented from the town for oyster-culture, and a considerable business is growing up under favorable circumstances. The same may be said of the Milford shore, but probably the total yield from native plants at Westport, Bridgeport, and Milford together will not exceed 15,000 bushels a year, worth $15,000.

I have already spoken so fully of the harbor of New Haven, the next locality, and the seed gathering at its upper end, on previous pages, and shall have so much to say of it hereafter, that it would be a waste of space to go into details here. None or few of the New Haven men plant exclusively native seed oysters, while all use more or less of this kind in connection with their raising of Chesapeake stock and their deep-water spawn catching. All available land on both sides of the harbor is occupied, and it amounts to many hundreds of acres. The seed is gathered in the sound, and large quantities are resold to Rhode Island and other planters. While it is impossible to discriminate between the yield from transplanted small seed and that produced by the deep-water beds (see subsequent pages), I suppose that 75,000 bushels are annually raised in the former way. The methods of transplantation do not differ essentially from those pursued elsewhere, except that rather more care is exercised than in the East River.

Oyster seed is transplanted to inshore beds at Branford, Stony Creek, Guilford, Clinton, Saybrook, and New London, but the business is small in each locality, and the total yield of marketable oysters from this source does not exceed 40,000 bushels.

NARRAGANSETT BAY.—Our next point of inquiry is Narragansett Bay, Rhode Island. Here, as already stated, little remains of the natural wealth of oysters upon which the early planters, half a century ago, could draw to what seemed an unlimited extent. Now the seed used must be imported almost entirely from other States. The planting-grounds of Narragansett Bay and its tributaries lie in the Kickamuit, Warren, Barrington, and Palmer Rivers, on the eastern shore. These are clear streams, with strong tideways refreshing inner basins, shallow and quiet. Rumstick Point separating Warren River from the bay, is a favorite planting point. Beyond this, along the eastern shore of Providence River, come next the planting areas at Nayat Point (Allen's ledge) and Drownville, an important and busy place.

Reaching back into the country north of Drownville, and protected from the outer bay by Bullock's Point, is Bullock's cove, a shallow estuary, by many regarded as the very best place to plant oysters in the whole State. The only reason I have heard assigned is, that the bottom has many springs in it, supplying constant fresh water. Above, ground is planted as far as Field's Point on the western side. Southward, from Field's Point to Starvegoat Island, runs a reef nearly dry at low tide. This reef was among the earliest tracts taken up by the veteran oysterman, Robert Pettis. When, about 1861, the star-fishes were depopulating the beds all over the bay, he alone was so situated that he could get at them at low tide and destroy them, and his good luck was the occasion of great profit to him. Formerly natural oysters grew abundantly all over this part of the river, but the main deposit was just south of Starvegoat Island, in the center of the tract of 160 acres now known to oystermen as Great Bed. This, in old times, was the great scene of oyster-raking, and it is more than thirty years since these beds were wholly exhausted. Every square rod of this area is now utilized, and large planting tracts also exist at Patuxent, Gaspé Point, Canimicut Point, and, to a slight extent, in the harbors of Wickford and Westerly. There is a constant tendency to enlarge this area, which, in 1880, comprised about a thousand acres, by extension toward deeper water; but it must not be forgotten by the reader that a larger part of

this ground is devoted to the growing of Chesapeake oysters than to the raising of the "native," or northern seed, to which we are now attending.

The seed used, as I have hinted, comes almost wholly from outside waters. Besides small quantities from the Kickamuit and Warren Rivers, the Seekonk, at the head of Providence Harbor, is the only remaining home locality of any account where small oysters may be gathered. The history of this river I have given elsewhere.

The remainder of the seed-oysters planted in Narragansett Bay come from the Connecticut shore, East River, Fire Island, and the Great South Bay, Somerset (planted chiefly by those owning privileges in Taunton River), and from various parts of Buzzard's Bay. I often asked which was best, but could never get evidence of much superiority in any one kind. The success of a planting does not depend on the kind of seed put down so much as it does upon a thousand circumstances of weather, water, and bottom. The seed which would do excellently in one cove would behave badly in the next, and *vice versa*, individual preferences being founded upon these varying and unexplained experiences. The seed from the south shore of Long Island used to be cheapest of all, and good; but a Boston demand ran up the price beyond the pockets of Rhode Island planters. In general, it may be said that any seed transplanted to Narragansett Bay develops into a better oyster than it would have come to be if left in its native waters.

Similarly, it is hard to tell what has been the outcome of a particular planting—that is, how much profit is made—because it is inextricably mixed with various other work. Native seed put down and ready to grow has cost on an average about 60 cents a bushel. To estimate profits on it is out of the question until the oysters are all sold, nor even then. If all does well, treble value is calculated upon in three years' growth.

It is not even decided whether it pays best to grow "natives" or fatten "Chesapeakes." The first year you plant a piece of ground the oysters do the best; the next year poorer; the third year they fail. Consequently, the oystermen try not to plant the same area continually, but shift their oysters around to allow the old ground to be revived by free contact with the sea.

Buzzard's Bay.—The oyster-planting operations in Buzzard's Bay, supplied almost wholly by local seed, with small additions, principally from Somerset, are widely distributed but not of great importance. There was formerly a very large oyster business in the Wareham River, but this has been unprofitable of late. The Monument River and the shores near its mouth are probably the points of greatest importance at present. More or less planting is carried on also on the Cape Cod shore at the entrance to Buzzard's Bay, while experiments at Wellfleet are having a profitable outcome.

METHODS OF GATHERING SEED OYSTERS IN LONG ISLAND SOUND.

Seed gathering in Long Island Sound.—Before dismissing this subject it will be proper to give some brief account of the seed-gathering in Long Island Sound, which is the source of nearly all supplies east of New York City. Midsummer is the season devoted to this work. In gathering seed near shore, and somewhat otherwise, tongs and occasionally rakes (those with long curved teeth) are used; but in deep water, where all work of consequence is done, the oysters, young, old, and refuse together, are brought from the bottom by dredges of various weights. In the case of all the smaller sail-boats, the dredges having been thrown overboard and filled, are hauled up by hand—a back-breaking operation. The oysters themselves are very heavy, and frequently half the amount caught is composed of shells, dead oysters, winkles, and other trash, which must be culled out, thus compelling the oystermen to twice or thrice the work which they would be put to if there were nothing but oysters on the ground. The work of catching the oysters by any of these methods is, therefore, very tiresome and heavy, and various improvements

have been made, from time to time, in the way of labor-saving, from a simple crank and windlass to patented complicated power-windlasses, similar to those commonly used in the Chesapeake boats. (See illustration.) When a proper breeze is blowing, dredging can be accomplished from a sail-boat, with one of these windlasses, with much quickness and ease. In a calm, or in a gale, however, the work must cease, as a rule.

Under these circumstances, and as the business increased, it is not surprising that the aid of steam should have been enlisted; nor, perhaps, is the controversy which has ensued to be wondered at, since the introduction of novel or superior power into some well-traveled walk of industry has ever met with indignant opposition.

The first utilization of steam in this business, so far as I can learn, was at South Norwalk, about 1870. This was followed by others, until, in 1880, seven dredging steamers were operating in Connecticut waters. In their report for 1884 the shell-fish commissioners of the State enumerated no less than thirty-one, having an aggregate carrying capacity of 27,225 bushels, while several new and larger ones are building.

The growth of this fleet has been regarded with enmity by the great body of shoremen, who looked askance at the rapidity and comprehensiveness of the work performed, and early began to attempt to form public opinion and secure legislation tending to repress this dangerous competition. The first result of this was restricting steam-dredging on public seed ground in the sound to two days of each week. Not satisfied with this, however, laws were sought which, if they did not prohibit the use of steam altogether, should at least restrict it to the designated planting-ground of the owner. The controversy which ensued then was long and bitter. At the time that my special monograph on the oyster was written for the Census Bureau the discussion was at its height, and I gave at length the arguments for and against, together with comments, to which the reader is referred if he desires to go deeper into the question. A strong prejudice still exists, so far as the employment of steamers on public ground is concerned.

OYSTER PLANTING AT SAN FRANCISCO.

One of the most interesting phases of the transplantation of oysters is that by which San Francisco Bay has been stocked from the Atlantic.

The first experimental shipments were made about 1870, on the Alameda side of the bay, with young oysters received by rail from New York. Though the growth was rapid, and the flavor unimpaired, so that success seemed assured, it was not until 1875 that any San Franciscan dealers felt justified in ordering large quantities, but in that year large shipments began, which have been continued with regularity and slowly increasing amount every since, until now something like $600,000 worth (adding freight to first cost) are annually transported across the breadth of the American continent—an almost unexampled movement of living food. The shipping season is from the middle of October until the middle of November, and again from March 15 to the middle of May. The oysters sent to California are all procured from beds in the neighborhood of New York, and are of two classes: first, those of marketable size and designed for immediate use; and, second, those intended to be planted.

For the first purpose stock is selected from York Bay, Blue Point, Staten Island Sound, Rockaway, Norwalk, and occasionally from Virginia, and from Egg Harbor and Maurice Cove, New Jersey; but the whole amount of this class constitutes less than one-fifth of the total shipment. These oysters are either placed on sale at once in the California markets, or are "bedded down" for a few days, to await a favorable sale.

The class of oysters sent as "seed" is entirely different, and is derived chiefly from Newark

Bay and the North River, stock from there standing the journey better than the East River oysters, which otherwise seem preferable. Besides these, seed is sent from Raritan River, New Jersey, and Prince's Bay, Staten Island. This seed is so small that a barrel holds from 3,000 to 5,000; this number, of course, includes even the "blisters," or oysters so young that you cannot easily detect the double character of the shell, which looks like your finger-nail. Although the average time of passage is only eighteen days by the fast-freight lines, it is expected that about one-fourth of each barrelful will prove dead or too weak to survive transplanting at the end of the journey. The "blisters" will be found to have died far more frequently than the larger oysters, none of which, however, are older than a few months and larger than a silver quarter. The cars in which they are carried are double-walled, so as to preserve an equality of temperature so far as possible, and 22,000 pounds is the limit of the cargo allowed by the company. The freight charges at present are about $10 a barrel. This makes it unprofitable to import any seed except that which is very small, and which by growth can add very greatly to their size and consequent value.

The planting beds are situated in various parts of San Francisco Bay, and nearly all go dry at low water. Some of the localities mentioned are: Millbræ, Saucelito, Alameda Creek, Tomales Bay, Belmont, Oakland Creek, and San Leandro. Sheep Island, I believe, is no longer planted. The State owns the bottom and sells it by auction to the highest bidder, the purchaser being given a patent title in perpetuity. The State's nominal price was $1.25 an acre, but most of the suitable ground was taken up long ago, and must now be bought at second-hand. Portions of it have been sold thus for $100 an acre. The growth is extremely rapid, fully three times as rapid as ordinarily takes place in eastern waters, and this growth tends toward the fattening of the flesh rather than to greater weight of shell, a result highly desirable; but the mollusk is not considered so hardy here as at the East. The seed remains on the beds from two to four years before selling.

All attempts to make these eastern oysters fructify and propagate, however, have failed, so far as any commercial benefit is concerned, the oysters dying, seemingly from over-growth, as soon as they have arrived at an age when they might be expected to spawn. This is the local explanation.

It is, however, a fact that a few young eastern oysters are now and then found. The excessive fatness is no doubt due to the thick nutritiously muddy water of the bay, but I should say that this had only a secondary effect on the spawning, which was repressed first by the shock of the long railway journey, and secondly by the unnatural coldness of the water to which they are transplanted. It is a parallel fact to the failure to spawn in the case of southern oysters carried to northern waters on the Atlantic coast. The summer temperature of the water at San Francisco is much lower than that of the water around New York, although the mean winter temperature may be higher.

6. CULTURE OF OYSTERS FROM THE SPAWN.

ORIGIN OF OYSTER-CULTURE.—As the natural wealth of marketable oysters upon the ancient beds began to be exhausted, and the various methods of transplanting to new ground, and of raising oysters from transferred young, began to be practiced, men became more and more studious of the habits of this profitable mollusk, and observant of the conditions which facilitated its health and increase.

Attention was turned most zealously to its spawning and the habits of the young, and thus the main outlines of what is now scientifically known in respect to its reproduction were long ago ascertained by the fishermen. Thus it had been a matter of common observation for many years, before practical advantage was taken of the fact, that any object tossed into the water in summer

became covered at once with infant oysters. Sedges along the edge of the marshes, and buoys, stakes and wharf-piles were similarly clothed. If the circumstances were favorable this deposit survived the winter, and the next spring the youngsters* were large enough to be taken and transplanted. The imagination of the oystermen (at that date not so far astray in many localities as it would be now) filled the waters of the whole offing with drifting eggs and embryos of oysters and clams, and fully half a century ago men began to discuss the possibility of saving some of this wasting spawn. The immediate and logical suggestion, of course, was to place in the shallow water, in places where naturally there was nothing upon which they could "set," objects to which the embryos might attach themselves. A few months later, after they had attained the size suitable for "seed," they could be transplanted at slight expense.

The next question was, What would best serve the purpose? Evidently nothing could be better than the shells which, year by year, accumulated on the shore from the season's opening-trade. They were the customary resting-places of spawn, and at the same time were cheapest. The City Island oysterman, therefore, began to save his shells from the lime-kiln and the road-master, and to spread them on the bottom of the bay, hoping to save some of the oyster-spawn with which his imagination densely crowded the sea-water. This happened, I am told, more than fifty years ago, and a short time afterward, under protection of new laws recognizing property in such investments, planters went into it on an extensive scale along the sound and on the south shore of Long Island. It was soon discovered, however, that uniform success was not to be hoped, and the steady, magnificent crops reaped by the earliest planters were rarely emulated. Many planters, therefore, decried the whole scheme, and returned to their simple transplanting of natural-bed seed; but others, with more consistency, set at work to improve their chances, by making more and more favorable the opportunities for an oyster's egg successfully to attach itself during its brief natatory life, to the stool prepared for it, and afterward to live to an age when it was strong enough to hold its own against the weather. This involved a closer study of the general natural history of the oyster.

The first thing found out was that the floating spawn would not attach itself to, or "set" (in the vernacular of the shore) upon, anything which had not a clean surface; smoothness did not hinder—glass bottles were frequently coated outside and in with young shells—but the surface of the object must not be slimy. It was discovered, too, that the half-sedimentary, half-vegetable deposit of the water, coating any submerged object with a slippery film, was acquired with marvelous speed. Thus shells laid down a very few days before the spawning time of the oysters became so slimy as to catch little or no spawn, no matter how much of it was floating in the water above them. This taught the oystermen that they must not spread their shells until the midst of the spawning season; one step was gained when they ceased spreading in May and waited until July. Now from the 5th to the 15th of that month is considered the proper time, and no shell planting is attempted before or after. This knowledge of the speed with which the shells became slimy was turned to account in another way. It was evident that the swifter the current the less would there be a chance of rapid fouling. Planters, therefore, chose their ground in the swiftest tideways they could find.

By and by another point was gained, resulting from many failures to get the plenteous "set" anticipated. The supposition among the earliest experimenters was that the water every-

*There is no word in the Northern States for infant oysters, except the terms "set," "spat," "spawn," &c., all of which belonged originally to the eggs or spawn of the oyster, yet are confusedly applied as well to half-grown mollusks. In the South the name "blister" (referring to its smooth, puffed-up appearance) is given to the infant oyster, and serves to distinguish it from "seed," "culls," and "oysters," which represent the successively larger sizes and stages of growth. This expressive name is worthy of general adoption.

where upon the coast was filled, more or less, with drifting oyster-spat during the spawning season, whether there were any beds of oysters in the immediate neighborhood or not; in other words, that there was hardly any limit to the time and distance the spat would drift with the tides, winds, and currents. As a consequence of the opinion, it was believed that one place was as good as another to spread shells for spawn so long as there was a swift current or tideway there. But this view was fallacious, and many acres of shells never exhibited a single oyster, simply because there was no spat or sources of spat in their vicinity.

Having learned this, planters began to see that they must place with or near their beds of shells living mother-oysters, called "spawners," which should supply the desired spat. This is done in two ways, either by laying a narrow bed of old oysters across the tideway in the center of the shelled tract, so that the spawn, as it is emitted, may be carried up and down over the breadth of shells waiting to accommodate it, or by sprinkling spawners all about the ground, at the rate of say 10 bushels to the acre. Under these arrangements the circumstances must be rare and exceptional when a full set will not be secured upon all shells within 20 rods or so of the spawners. Of course fortunate positions may be found where spawn is produced from wild oysters in abundance, or from contiguous planted beds, in which the distribution of special spawners is unnecessary; yet even then it may be said to be a wise precaution. The experience of old planters in Brookhaven Bay, Long Island, has been steadily confirmatory of this.

PREPARATION OF GROUND.—It was not long before a scarcity of suitable ground was felt at the principal centers of production for the carrying on of this new oyster culture. Planters then began to turn their attention toward preparing muddy bottoms by forming over them an artificial crust as a basis for the "stools" or "cultch."* In Rhode Island the planters prepare unsuitable ground by paving it. This is done early in the spring, 10,000 bushels of shells, say, being thrown on, at an expense of from $250 to $300. Then, in June, when the shells have settled well into the mud and formed a strong surface, more clean shells are scattered with a quantity of large living oysters just ready to spawn—100 bushels of "mothers" to 3,000 or 4,000 bushels of shells. Great success in several instances has followed this plan, particularly in Greenwich Bay and Apponang Cove. One planter told me that he put down, in 1877, about $125 worth of stools and mother-oysters at the latter place, and calculated that he obtained, in a few weeks, $10,000 worth of seed; but a little later it all died—why, he is unable to guess. Another gentleman, at the same place, in 1879, put down 1,600 bushels of shells and 60 bushels of spawning or mother oysters. In the immediate vicinity of these he got a good set; but on a closely adjacent bed, where there were no "mothers," not a young oyster was to be seen. He had had the same experience in the Kickamuit. On the other hand, the simple tumbling over of shells in the hope of catching drifting spawn has proved almost universally a failure here.

DEEP-WATER OYSTER CULTURE AT NEW HAVEN.—This new system of deep-water oyster culture has been carried out more systematically at New Haven, Conn., however, than at any other point on our coast.

By 1870 the business of catching and cultivating native, home-bred oysters at New Haven had grown into a definite and profitable organization. It was not long before all the available inshore bottom was occupied, and the lower river and harbor looked like a submerged forest, so thickly were planted the boundary stakes of the various beds. Encroachments naturally followed

* This word, often shortened into "cutch," is an importation from Europe, and has undergone changes. In the glossary of my monograph I defined it as "material placed in the water to catch the spawn of the oyster." That is the way in which it is used in New England; but in Europe it is the *spawn* itself, and not the stool to which it fastens, that is called "cultch." The latter is evidently etymologically correct, and our American signification is an erroneous and perverted use.

into deeper water, and this proceeded, until finally some adventurous spirits went below the light-house and invaded Long Island Sound.

Incessantly swept by the steady and rapid outflow of the Quinnipiac and Housatonic (whose currents flow eastward), the hard sandy bottom of that part of Long Island Sound is kept clean throughout a considerable area, beyond which is soft, thick mud. There are reefs and rocks scattered about, to be sure, and now and then patches of mud; but over large areas extends only a smooth, unencumbered bottom of sand or gravel, peculiarly adapted to ostreaculture.

This unlooked-for expansion of the business caused considerable excitement. It was seen, in the first place, that existing statutes would not fit all exigencies, and alterations and amendments rapidly followed one another, in which the conflicting interests of the heavy deep-water cultivators and the small inshore owners were sought to be harmonized. Although recognized by law and acknowledged by clear heads since the earliest times, the rights of proprietorship under the water, and the notion of property in the growth and improvement ensuing upon ground granted and worked for ostreaculture, have hardly yet permeated the public mind and become generally accepted facts. Cultivators of all grades found many and many instances in which their staked-out ground was reappropriated, or the oysters upon which they had spent a great deal of time and money were taken, upon some flimsy pretext, by their neighbors even, who angrily resented any imputation of stealing.

One plea under which a vast amount of this sort of stealing and interference with proprietary rights granted by the State was perpetrated or sanctioned by the majority of the watermen was that the locality in question was "natural ground." At the same time any definition or restriction of such ground was impracticable and was resisted by these complainants. The only resource for the man who had invested money in oyster culture, and wanted the opportunity to develop his investment, was to declare that no "natural oyster ground" existed in New Haven Harbor, and that designations past and to come were valid, even though the areas so designated might once have been natural oyster beds. This checkmated the men who "jumped claims," yet refused to be considered thieves; but it caused a tremendous howl against the movers.

Under these rapid and far-reaching developments the New Haven oyster business soon expanded beyond the limits of shallow water, until now the hopes of all cultivators of any consequence are centered upon the deep-water ground, to which the inshore tracts are held as subsidiary, being largely used only as nurseries wherein to grow seed for the outside beds.

The process by which a man secures a large quantity of land outside has been described. It is thought hardly worth trying unless at least 20 acres are obtained, and many of the oyster farmers have more than 100. These large tracts, however, are not always in one piece, though the effort is to get as much together as possible. He obtains the position of the ground, as near as he can, by ranges on the neighboring shores, as described in his leases, and places buoys to mark his boundaries. Then he places other buoys within, so as to divide his property up into squares an acre or so in size. In this way he knows where he is as he proceeds in his labors. Having done this, he is ready to begin his active preparations to found an oyster colony.

The bottom of the sound opposite New Haven, as I have said, is smooth, hard sand, with occasional little patches of mud, but with few rocks. The depth varies from 25 to 40 feet. This area is almost totally void of life, and no oysters whatever were ever found there until "dumps" were made outside the light-house by the dredging boats which had been cleaning out the channel and deposited many living oysters along with the other dredgings in the offing. These dumps very soon became, in this way, oyster beds, supplying a considerable quantity of seed, which was public

property, to be had for the dredging, and furnishing their share of bones of contention in the incessant controversies.

The preparation for an oyster farm here is different from that in Rhode Island. Except within the harbor no great spaces of mud require coating over, and no spot where there is not a swift current is considered worth the trouble. Coarse beach sand is used for pavement, when needed, 200 tons to the acre, which can be spread at the rate of five sharpie-loads a day, at no great expense. The sand forms a crust upon the mud firm enough to keep the oyster from sinking, and it need not be renewed more than once in five years. In some cases, also, the ground, though hard, may be infested with vermin, coated with viscous slime, or for some other reason be in in bad condition. It is then thoroughly cleaned by dredging.

These preliminaries accomplished, the planter is ready to found his new colony. His first act, late in the spring, is to scatter a quantity of full-sized, healthy, native-born oysters, which he calls "spawners." From 30 to 50 bushels to the acre is considered a fair allowance. The bed is then left untouched until the second week of July, at which date the spawners are ready to pour out their ripened eggs. The planter now employs all his sloops, and hires extra men and vessels to distribute broadcast, over the whole tract he proposes to improve that year, the many tons of shells that he has been saving all winter. These shells are clean, and fall right alongside of the mother oysters previously deposited. The chances that they will secure the lodgment of spawn are good.

Sometimes the same plan is pursued with seed that has grown naturally, but too sparingly, upon a piece of uncultivated bottom; or young oysters are scattered there as spawners, and the owner waits until the next season before he "shells" the tract.

The expense of this whole proceeding is not very great, while there is a chance of almost fabulous profits. I was given an account of the cost in three cases. In one, the founding of a "farm" of 50 acres cost $1,650; in another, 60 acres cost $2,255.30; and in a third, 25 acres were fully prepared for $1,240. I think it would not be unfair to average the cost of securing, surveying, and preparing the deep-water beds at about $40 an acre, or about $4,000 for 100 acres. To this must be added about $2 an acre for ground surveys, buoys, anchors, &c.

It was long ago understood that when artificial beds for the capture of spawn were proposed to be prepared, the substance of the stools did not so greatly matter as their position and condition at the time of spawning. Just what makes the best lodgment for oyster spawn intended to be used as seed has been greatly discussed. Oyster shells are very good, certainly, and as they are cheap and almost always at hand in even troublesome quantities, they form the most available cultch, and are most generally used in America, where they are regularly saved for the purpose, and command a market price above the reach of the lime burner, who formerly consumed almost the whole accumulation at the opening-houses. Nevertheless, a more fragile shell, such as a scallop, mussel, or jingle (*Anomia*), is certainly better, because the growth of the attached oysters wrenches the shell to pieces, breaking up the cluster and permitting the singleness and full development to each oyster that is so desirable; or, if the old shell does not break of itself, the culling of the bunch it supports is far more easy than when the foundation is as thick and heavy as an oyster's or clam's shell. To aid this same end tiles have been used as collectors of oyster spat, covered with a certain composition which easily peels off, but is firm enough to hold the young. The anchoring of an old seine at the bottom, the suspending of scallop, cockle, or other thin shells in the water by stringing them from stake to stake a little way under the surface, or the copying of the French *fascines*, would be other means to the same end, advisable especially where it is intended to move the young to new beds. Small gravel has been tried on parts of the Connecticut

coast with great success, the advantage being that not often more than one or two oysters would be attached, and therefore the evil of bunchiness is avoided. "On the Poquonock River, near Groton, white birch bushes are stuck in the river mud about spawning time, in 14 or 15 feet of water at low tide. To these the spat adheres in great quantities. They are left undisturbed eighteen months, by which time the set becomes good sized seed. * * * The average yield is about 5 bushels to the bush. The grounds are so soft and muddy that no other method is feasible. About 50 acres [1881] are under this kind of cultivation, and the area is rapidly extending. The bushes are grappled out of the mud by derricks."

One of my correspondents in Long Island suggests inclosing small beds of oysters, just before spawning, by a high board fence, "with plenty of shells or scraps inside to catch the spawn, which thus could not float away." This idea is substantially followed in France, where stakes of wood are driven into the bottom in a circle around a pyramid of oysters placed on stones in the center; and on the Ile de Ré dikes are built of open stone work, so as to divide the bottom into beds, each of which is owned by a private proprietor; other stone partitions or walls are run across, and upon these stones the spawn fastens. Experiments have been made by Mr. John A. Ryder, of the U. S. Fish Commission toward artificial propagation of oysters in Chesapeake waters after a similar process, and have met with success*; but as yet no practical trial of it has been made on a commercial basis, of which any report has been made public.

The mere manner of spreading the shells is also found to be important. The proper method is to take them from the large scow or sloop which has brought them ashore, in small boat-loads. Having anchored the skiff, the shells are then flirted broadcast in all directions by the shovelful. The next boat-load is anchored a little farther on, and the process repeated. Thus a thin and evenly distributed layer is spread over the whole ground. Just how many bushels a man will place on an acre depends upon both his means and his judgment. If he is shelling entirely new ground he will spread more than he would upon an area already improved, but I suppose 250 bushels to the acre might be considered an average quantity.

By testing early in the fall the planter can tell whether his stools have caught any or much of the desired spawn. The young oysters will appear as minute flakes, easily detected by the experienced eye, attached to all parts of the old shell. If he has got no set whatever he considers his investment a total loss, since by the next season the bed of shells will have become so dirty that the spawn will not take hold if it comes that way. Supposing, on the contrary, that young oysters are found attached in millions, as often happens, crowding upon each old shell over the whole 20 acres; this is a good promise, but the planter's anxieties have just begun. The infant mollusk, when first it takes hold upon the stool, the merest speck upon the surface of the white shell, is exceedingly tender. The chances in its favor in the race against its numberless adversaries are extremely few. The longer it lives the better are its chances, but the tender age lasts all through the autumn and until it has attained the size of a quarter dollar piece; after that it will withstand ordinary discouragements. It often happens, therefore, that the "splendid set" proves a delusion, and Christmas sees the boasted bed a barren waste. "I reckon I had what 'nd a' made more 'n 10 bushels on that ground last fall, and now there's nary an oyster left worth speakin' on." That is a tune you hear sung over and over.

The vicissitudes through which the young colony must pass are many and trying. On the coast of Connecticut and Rhode Island the autumn gales are often exceedingly destructive, not only killing small oysters but obliterating boundaries and sweeping away old beds. Some parts

* Further experiments have since been very successfully made by the U. S. Fish Commission at the Wood's Holl Station and elsewhere, accounts of which are given in the Bulletins and Reports since 1883.

of New Haven Harbor are peculiarly liable to disasters of this kind, while in other parts the drifting of mud and sand causes large losses. It is believed by many that the beds in the sound, in water more than 25 feet deep, are safe from disturbance from gales; but others decline to put their faith in any depth thus far planted. Frequently oysters cast up by storms, if attended to immediately, can be saved and replanted with profit. Now and then great tracts of promising young oysters will die from no apparent cause. The true explanation probably is that they have starved to death, some evil current turning aside their food. Lastly, there is the constant warfare made upon oysters, young and old, by the active enemies that swim in the waters above them or creep on the bottom beneath.

Granting escape from catastrophes, there must of necessity occur, under the most favorable circumstances, a great waste in the process of growth of young oysters left undisturbed on the artificial beds. Leaving out all other adversities, this will arise from over-crowding. More "blisters" attach themselves upon a single egg than can come to maturity. One or a few will obtain an accession of growth over the rest, and crowd the others down, or overlap them fatally. Even if a large number of young oysters, attached to a single stool, do grow up together equally, their close elbowing of one another will probably result in a close, crabbed bunch of long, slim, unshapely samples, of no value save to be shucked. Notwithstanding this fact is well known, it is the general custom to leave the beds untouched (unless a portion of the bed is raked at the end of a year, to be sold as miscellaneous "seed" to eastern planters) until it has attained the age of three, four, or five years. Then it is worked, at first, probably, with tongs and rakes, getting up the thickest of the crop. This done, dredges are put on, and everything that remains—oysters, shells, and trash—is removed and the ground left clean, ready for a second shelling, or to be planted with seed, perhaps right away, perhaps after the area has lain uncovered to the rejuvenating influences of the sea for a year.

The more advanced and energetic of the planters, however, pursue the following plan: When the bed is two years old, by which time all the young oysters are of sufficient age and hardiness to bear the removal, coarse-netted dredges are put on, and all the bunches of oysters are taken up, knocked to pieces, and either sold as "seed," or redistributed over a new portion of bottom, thus widening the planted area, and at the same time leaving more room for those single oysters to grow which have slipped through the net and so escaped the dredge. The next year after, all the plantation, new and old, is gone over and suitable stock culled out for trade, three-year-old East River oysters being in demand for the European market. This further thins out the beds, so that the fourth year the main crop of fine, well-shaped, well-fed oysters will be taken. During the succeeding summer, or perhaps after a year, the ground will be thoroughly well cleaned up, and prepared for a new shelling.*

* In my report for 1880 I made the following remark as to the extent of the deep-water oyster farming at New Haven: "Out of the 7,000 or 8,000 acres 'designated' in New Haven Harbor and its offing, only from 3,000 to 3,500 are in actual use as yet. The largest possession is Mr. H. C. Rowe's; he operates upon about 1,200 acres. Several other planters have from 200 to 600, while many have 100 acres under cultivation." This has been enormously increased during the four years since elapsed. In the third report (1884) of the shell-fish commissioners of that State a statistical paragraph is given, which I quote, though it applies to the whole State: "The total area of cultivated ground in Connecticut in 1882, under State jurisdiction, was 9,007 acres, according to the tax-list of that year. The area then cultivated under town jurisdiction is not known, but an average of the various estimates would make it at least 2,000 acres. This would make the whole area of Connecticut in 1882 equal to that of Rhode Island in 1884 [elsewhere given as about 11,000 acres, yielding annually 1,000,000 bushels, worth $1,500,000]. During the last two years, however, our area has been largely extended, and there are probably not far from 20,000 acres under cultivation to-day. There were two hundred and sixteen owners in 1882 against two hundred and ninety in 1883, and the number increased annually. Of these owners only five have 5 acres and under apiece, twenty-two have between 5 acres and 20 acres apiece, and the remaining two hundred and sixty-three have 20 acres or more apiece."

Obstacles and fatalities.—The obstacles to oyster planting are many, the difficulties often recurring, and the fatalities to which the planted beds are subject are incessant and diverse. The uncertainty and narrowness of laws, the prejudice and dishonesty of his fellow-men, the growing scarcity and increased cost of seed, are preliminary difficulties which have been hinted at. If the attempt is made to catch a "set" of spawn on artificial stools, many an accident may prevent a successful issue. The chill of a storm, a rough gale, or a wayward current may destroy or deviate the embryos that otherwise would have made a fortune for the planter.

But if this crisis is safely passed, and the shells laid down at the proper day are loaded with young, many an evil occurrence may blight the whole. If in shallow water they may be caught up by a deep-moving storm and cast in windrows on the beach; may be smothered in sifted mud, or buried under heaps of moving sand; or the whole colony may die from some indiscernible cause, perhaps lack of food.

Surviving these risks, the young oysters, whether sowed as "seed" or raised from a "set," are exposed to the ravages of a host of enemies—fishes, crabs, star-fishes, mollusks, and worms, not to speak of human thieves and mischief-makers. It is not worth while here to go into this list, or discuss methods of prevention. Full information on the point may be found in my monograph, and still further information, with illustrations of many pests, in a book published by Harper & Brothers, New York, named "Country Cousins: Short Studies into the Natural History of the United States." The catalogue might appal the stoutest heart did he not see the other side and know that, despite all these drawbacks, from unwise legislators down to star-fishes, oysters can be and are raised with success all along our coast.

7. THE MARKETING OF OYSTERS "IN THE SHELL."

I have already alluded to the removal of oysters from the beds, to be sold. This process is nowhere marked by any specially noteworthy features beyond those already mentioned. The season of "catching up" begins early in September and lasts until May. Merely getting the oysters, however, does not make them marketable. In the first place they must be "culled," that is, picked over, separated from one another when they are united in clusters, freed from trash and small ones, and cleansed of mud. They may or may not be further assorted by the planter into the various grades recognized by wholesale merchants.

Freshening the oyster.—As they come from their beds in the salt water these oysters are likely to have a flavor not quite their best. Nearly everywhere, therefore, they are placed for a few hours in fresher water. At Providence and some other points this is done by immersing the sloop-load on great rafts called "floats," anchored in the river near the owner's wharf. The Fair Haven men value highly their inshore lots in the Quinnipiac, because of their utility in this respect. Amboy and Staten Island find conveniences near Rahway, N. J. At Keyport, a small creek running through the town (see illustration) is daily crowded with freshening floats, the "skiffs" peculiar to the locality, and other implements of an oysterman's occupation. It is a scene of extraordinary activity, which may be witnessed here in autumn every day, as the oysters are being culled and prepared for sale. The planters of southern New Jersey have contrived an ingenious labor-saving method of "giving their oysters a drink," as they say, by building what are termed "platforms" or "board-banks." In some cases these are nothing better than a mere plank floor, set in the bank in such a way that a boat-load of muddy oysters may be floated alongside at high tide, and the oysters shoveled overboard upon it. The receding tide leaves this bare, and at the same time opens sluice-gates, which allow a stream of fresh water from the land to cover the oysters, under the genial influence of which they rid themselves of the distasteful brine contained

within their shells, and also puff out their forms to an appearance of fatness very pleasing to the epicure.

Frequently, however, an elaboration of the platform is constructed, which is worthy of special note. The bank is dug into and piles are driven, until a floor can be laid at a proper level below high-water mark. Over this a tight shed is built, sometimes 75 feet long by 25 feet wide, and of considerable height. On one side of this shed a canal is dug, into which a boat may run, and its cargo is easily shoveled through large openings in the side of the shed onto the floor within. On the opposite side of the shed, both within and without, run floors or stages above the reach of high water, where the oysters can be piled after freshening, packed in barrels and loaded on boats or drays for shipment. When the tide goes down it leaves the oysters upon the platform within the shed nearly bare, a depth of 8 or 10 inches of water being retained by a footboard at the seaward end of the shed. An arrangement of sluices now admits the fresh water, and the freshening begins. Over the space devoted to the platform or vat, at a sufficient height to let a man stand underneath to shovel up the oysters for packing, in which work he uses a dung-fork, is a broad shelf or garret, where barrels, baskets, boat-gear, and other small property can be safely stowed, since the whole shed, platform, oysters, and all, can be locked up. I have given an illustration of one of these houses at Smith's Landing.

The object of this "drinking" is to allow the oyster to become cleansed and freshened in taste. Finding themselves again in the water after their temporary absence, the oysters all open and "spit out" impurities clinging to the edges of the mantle and gills, and they do this at once, so that usually a single tide is a long enough time to leave them in the fresh water. Moreover, imbibing the fresh water causes them to change in color somewhat, making the flesh a purer white; and it bloats them into an appearance of extreme fatness, which is very appetizing. Most persons believe this to be a true increase of substance and weight, but it is no more than a puffing up.

The main crop has been gathered by the time Christmas is near, but many scattered oysters yet remain, that have escaped both tongs and dredges. In some districts the grounds are then given up to the laborers who have been employed during the summer and fall, and under a new impulse these men go over the grounds again with tongs and dredge. They work on shares usually, returning to the owner of the beds one-half of the results, which makes a really handsome thing for the gleaners, whose work, in this way, lasts from two to three weeks, making three or four days a week, each man often clearing as his portion from $4 to $5 a day. At any rate, such generally is the practice, with its results, at Keyport, N. J., "where for many years the principle of the good old biblical rule of not forgetting the gleaners is almost religiously observed in the last gathering of this harvest of the sea."

Methods of selling.—The disposal of their crops by the producers is according to various methods, depending largely upon the utility the oysters are to serve. If as seed, the buyers come after them in sloops, and are loaded from the boats of the oystermen. If to go into the city markets, buyers may come after them, or the owners may take them to the city.

In New Orleans some peculiar customs have grown up. To the Old and New Basins (chiefly the former), in the rear of the city, reached by canals from Lake Pontchartrain, come the boats from the eastward, bringing "lake" and "reef" oysters, generally of inferior quality, and intended to be sold to the canning establishments, or to be opened for cooking purposes. The price of the oysters—frequently measured out in quarter-barrel boxes similar to those in use in Mobile—depends upon the state of the market as governed by the supplies received from the west, and often goes down to 50 or 60 cents a barrel, at which price there is no profit, and the oystermen stop running until a rise occurs. At the levee opposite, or just below the famous old French

market, is the other and greatest oyster landing-place, mustering about two hundred and five lateen-rigged boats, with six hundred and fifteen men or more in the foreign-looking crews, making a most picturesque scene. The estimate of annual receipts there in 1880 gave 50,000 barrels, or 125,000 bushels, sold at $2 to $3.50 per barrel. All of these come from westward of the delta, and being large and fine are, as a rule, bought by the saloons and restaurants, and served to their customers on the shell. A peculiar feature of the business on the levee consists of an organization of wharfmen, who form a species of close corporation to do the work of carrying the oysters from the boats to the wagon of the purchaser, who pays them 15 cents a barrel for the service. The boatman having sold his cargo, he then has no further concern, his boat being taken in charge by the carrier, who might be called a 'longshoreman, and who delivers all the oysters, then sweeps the vessel and puts her in proper condition for the crew. While there is no society of these carriers, strictly speaking, they manage to make their business a close corporation, since no one is allowed to discharge a cargo of any kind from the luggers—oysters, oranges, or fruit—except one of the members of the body. There is a man who is called the foreman, who receives all the money for the carriers and who divides the proceeds equally among the different carriers, but just how this is regulated, as well as many other of the details of this quasi-organization, is kept as mysteriously secret as possible. The body is an old one, and now consists of about fifty men in all, mostly Sicilians and low-grade Italians, and the annual receipts for the carriers amount to about $35,000, levied on the oysters, oranges, melons, and various fruits. The system is beginning to be felt as an unwarranted incubus on the trade, and doubtless it will soon be broken up.

Gulf of Mexico to North Carolina.—Though there is a planting interest at Mobile, Ala., most of the oysters on sale are of native growth and tonged in a part of the bay called the "gully." These are termed "reefers," and are slightly inferior to those artificially grown; some however, growing separately, and distinguished as "sharpers," from the fact that the ends of their shells are unusually sharp, are of very large size, averaging 8 or 10 inches long, and of superior flavor. "Sharpers" are always in demand, though there is some objection to them on account of their being so hard to open. "Reefers" and "sharpers" are caught by men who follow no other pursuit, and who are a quite distinct class from the oyster-boatmen. They have small, flat-bottomed skiffs, of the roughest description, in which they go "a-tonging," two men occupying a boat and taking turns at tonging and culling. As fast as the stock is culled it is placed in shallow oblong boxes, holding one-fourth of a barrel each, and in these measures is sold to the boatmen or carriers at the rate (during the winter of 1880–'81) of 10 cents a "box," or 40 cents a barrel. The carriers having obtained a load for their sail-boats, proceed at once to the city and deliver them to the dealer by whom they are employed to buy or with whom they have contracts. The measure in this transaction is the same box as before, but the price has nearly doubled.

"If the tide is very low," writes Mr. Silas Stearns, of the neighborhood of Appalachicola, "as is the case during 'northers,' the boat is run aground on an oyster-reef, a gangway plank is placed over the side, and the oysters are picked up by hand and carried aboard in tubs. Oystering in this manner is said to be harder and slower than tonging them." I saw the same thing in lower Florida. Great quantities of these oysters are often spoiled by delay in shipping to the interior, so that the wages of this labor are small. At present the year's trade will not amount to more than $5,000 or $6,000, but it is growing.

Nothing need be said in respect to marketing methods at other Southern ports, except that in Florida and parts of Georgia wagoners make a business of carting loads of oysters back into the country from the coast, following regular routes on certain days. This custom reappears in North Carolina, but is going slowly out of vogue.

CHESAPEAKE BAY AND ITS TRIBUTARIES.—In respect to Chesapeake Bay and its rivers much has been said already pertaining to this subject, since a very large proportion of the oysters annually gathered there is sold to Northern captains, or to the Eastern Shore and Lynnhaven planters, who go to the tonging grounds in their schooners for the sake of buying seed as soon as it is caught. Nevertheless there is an immense number of bushels of oysters taken in the shell each season to Norfolk, Crisfield, Washington, and Baltimore for immediate consumption, either in the markets, or in packing-houses and canneries as described further on.

Very strict protective laws have been enacted by both Maryland and Virginia, but the ignorance and temper of the oystermen is such that the enforcement of these laws is almost impossible. In 1868 Maryland commissioned an oyster police force, and furnished a steamer and several fast sailing sloops and schooners, each of which carried cannon and small arms. The police-boats were required to be constantly cruising in search of violators of the oyster laws, who, when caught, were taken before a magistrate for trial. Battles with illegal dredgers, who also go well armed, used to be very common, but are becoming less so, as the effect of the police-boats is good, notwithstanding the fact that the laws have never been in satisfactory shape for the operations of the force, and uncertainty, confusion, and positive hinderance in the carrying out of their obvious intentions have often arisen. The dredging licenses, fines, &c., collected exceed the cost of the force by about $25,000 a year; but the State would find it necessary to maintain this institution should it fail to pay for itself. "Disband the force, and in a few weeks the bay would be a battle ground for tongers and dredgers."

The chapter in my census monograph upon this region was written by Mr. R. H. Edmonds, a most competent observer, and I present herewith an abridgment of his remarks. After lamenting that the beds of all Chesapeake Bay are fast being destroyed, he adds: "Dredging in Maryland is simply a general scramble, carried on in seven hundred boats, manned by fifty-six hundred daring and unscrupulous men, who regard neither the laws of God nor man. Some of the captains and a few of the men may be honest and upright, but it is an unfortunate fact that such form a very small minority. * * * It is now rarely the case that a dredger can be found who will admit that he believes there is any wrong in disregarding the oyster laws, and such a thing as being disgraced among his fellow-workmen by imprisonment for violating the laws is totally unknown. In the above facts will be found sufficient reasons why it has been impossible for the oyster police, since its first organization, to enforce the laws. Seven hundred well-manned, fast-sailing boats, scattered over such a large space as the Chesapeake Bay, are rather difficult to watch, and especially at night."

Mr. Edmonds continues in his hard, but, I believe, entirely just, judgment upon his fellow-citizens, as follows:

"All blame for violating laws does not, however, attach to the boat-owners, as some of them are prominent gentlemen of the most upright character. It is the misfortune of such men that their captains have often been trained by less honest employers, and having once acquired a love of ill-gotten gain it is difficult to keep them from continuing in the same course. As he usually has a share in the profits, it is of course to his interest to make his trips as quickly as possible; and while the boat-owner may be opposed to breaking any laws his captain may think and act otherwise.

"The unscrupulousness of the captain is well assisted by the character of his men. These men, taken as a class, form perhaps one of the most depraved bodies of workmen to be found in the country. They are gathered from jails, penitentiaries, work-houses, and the lowest and vilest dens of the city. They are principally whites, many of whom are foreigners (almost every Euro-

pean country being represented), unable to speak more than a few words of English. When a crew, which usually consists of about eight men, is wanted, the vessel-owner or captain applies to a shipping agent, who then gathers these men wherever they may be found, drunk or sober. As one large boat-owner expressed it to me: 'We don't care where he gets them, whether they are drunk or sober, clothed or naked, just so they can be made to work at turning a windlass.' The shipping agent having placed the crew aboard is then paid $2 for each man furnished. With such a crew as this, who neither know nor care for laws, the captain is of course able to work wherever he desires to. As may be supposed, the life led by these men on board of the vessels is of the roughest kind. When sleeping, surrounded by vermin of all kinds; when working, poorly clad and with every garment stiff with ice, while the wind dashes the fast-freezing spray over them, hour after hour winding away at the windlass, pulling a heavy dredge, or else stooping, with backs nearly broken, culling oysters. Returning from a trip, the men take their little pay and soon spend it in debauchery, amid the lowest groggeries and dens of infamy to be found in certain portions of Baltimore. It is a gratifying fact, though, that even amid such surroundings as these there are some few who are respectable and honorable men. This is more especially the case on the boats owned in the lower counties of Maryland. The crews of these are often gathered from the surrounding neighborhoods, and even as a class are not as degraded as those on Baltimore vessels.

"There are two ways in which these men are paid, the one most generally adopted, at present, being to pay them a stated amount per month, although payment is usually made at the end of each trip, the amount, of course, being proportioned to the length of the trip. The other plan is to allow the crew a share in the profits. When this is done, the vessel at the end of each trip first pays the 'grub bill,' wharfage, and commission merchant's charges; then, of the balance, one-third goes to the owner of the vessel, and a small bonus, usually about $20, to the captain; after which captain and crew all share alike, except the cook, who receives something less than the others. When the first plan is adopted, the men receive their board and from $10 to $12, and occasionally as high as $15, a month. Those working on shares will, during the season, average about the same as those who are paid a certain amount. A fair average of the amount made by each man would be $11 a month, making $77 for a season of seven months. Computing on this average, it will be seen that during an oyster season the four thousand nine hundred dredgers receive about $377,300, and the seven hundred captains, whose wages will average $50 a month, about $245,000, making a total of $622,300. It would also be proper to add to this amount the cost of boarding these men, since that in fact forms a part of their wages. This costs the vessels about $7.50 a month for each man, equal to $420 a season for each boat, or $294,000 for the entire fleet. This, added to $622,300, gives a total of $916,300 paid to the dredgers of Maryland during every oyster season. The law requires all boats engaged in dredging to obtain from the State comptroller a yearly license, costing $3 for each registered ton.*

"Dredging boats range in size from 5 to 75 tons, and in value from $500 or $600 to $8,000, some few owned in the lower part of the State being valued as high as $10,000. The boats owned in Baltimore are, generally, in every way inferior to those hailing from the counties. The present value of these boats, basing the estimate upon information obtained from all parts of the State, would be an average of not less than $1,500, and is believed by many to be much higher. At this rate, however, the 700 boats in the trade would be worth, to-day, $1,050,000. In addition to this, the winders, dredges, roller and chains, and dredge lines on each boat may be valued at $100, although costing considerably more. Adding this to the value of the boats, we have $1,120,000

* Not more than a half or two-thirds pay for this license, hence the necessity of the police.

as the amount of capital invested in the dredging-boats. The total tonnage of the dredging-boats being 16,366, and the estimated value of the same being $1,050,000, the average value will be $64.15 per ton. As some tonnage has lately changed hands in Baltimore at $67, the above estimate can scarcely be too great, when the high class of many of the boats is considered. The amount annually expended for repairing these vessels is about $105,000.

"Scraping, which is simply dredging on a smaller scale, both as to the size of the boat and the dredge, is conducted only in shallow water; and, while dredge licenses are issued by the State, scraping licenses are obtained from the counties, and hold good only in the local waters of the county in which issued. Dorchester, Talbot, and Somerset are the only counties in which scraping licenses are issued. In the first two the charge is regulated by the tonnage of the vessel (being $2 per ton), while in the last there is a uniform charge of $10 on each boat, regardless of size. The crews of these vessels average about four men each, the majority of whom are able to return home after each day's work, as the boat does not go out of the county waters, except to make an occasional run to a neighboring market. * * * I feel safe in placing the number of scraping boats at five hundred and fifty, carrying twenty two hundred men. An additional three hundred and thirty boats are working without license. The pay of these men will average about $18 a month each, for the seven and a half months employed, amounting to $135 for the season, and making a total of $297,000 received by the twenty-two hundred men, including the captains, whose pay is of course larger than that of the men. The average value of scraping-boats, including their outfit, is $800, which gives a total of $440,000 invested in scraping About $27,500 is annually expended in repairing these boats.

"Socially and morally the scrapers are somewhat superior to the dredgers. Tonging, although employing less capital and fewer men than dredging, is probably of greater value to the State than the latter, because the men engaged in it are of a better class, are better remunerated for their labor, and are less prone to evade the laws than the dredgers. While this much may be said in the tongmen's favor, it is yet an unpleasant truth that they, like all others engaged in the oyster trade, either as catchers or shuckers, are, as a class, indolent and improvident. The majority of them live near the water, often owning a small house and an acre or so of land (the value of which depends upon the proximity of good oyster and fishing grounds), and a canoe or an interest in one, used in winter for oystering and in summer for fishing. Having secured a house, their ambition seems to be satisfied, and but little time or money is spent in beautifying or improving it. It is too often the case that tongers, especially many of the negroes, who comprise about one-third of the total number, will work only one or two days at a time, and then remain idle until necessity forces them again to earn a few dollars.

"By others, however, tonging is pursued as steadily and systematically as the wind and waves will allow, and when this is done I think it may safely be said that the remuneration is equally as fair as in other trades. Those who pursue tonging in this way form the most intelligent class of oystermen in the State. In some cases farmers and others, holding prominent social positions, may be found oystering during several of the winter months, when their legitimate business does not require close attention. Tonging necessitates very great exposure to the cold, but is, however, hardly as severe in this respect as dredging, and, moreover, the tongers suffer less, from the fact that they are generally better clad than the dredgers, and seldom work either during very cold or very windy weather, on account of the smallness of their boats. From this cause I find that even the industrious ones will lose, on an average, at least two days out of every week, and when the time wasted by the idle ones is taken into account it will be found that one hundred and twenty days out of an oyster season of eight months is about the average length of time for each tonger.

In this actual loss of at least one-half of their time may be seen the cause which prevents the tongers, as a class, from making any improvement in their financial condition, and upon their financial condition depends their social position. * * *

"Tonging, although generally confined to shallow water, is in some of the tributaries of the bay carried on in water varying in depth from 18 to 20 feet.

"Engaged in tonging there are 5,148 men, using 1,825 canoes or other small boats. To obtain even an approximate average of the amount of money made by each tonger is almost impossible, but I think it will be very near correct to estimate it at $225 a season, at which rate the total amount made by the tongers would be $1,158,300. There being 1,825 boats and 5,148 men, the average number of men carried by each boat is a little less than 3. Many of the larger boats are held in joint ownership by two or three parties. * * * The size of the tonging-canoe ranges from 15 or 16 feet to 30 feet or more, the larger ones being called 'bugeyes.' Owing to this diversity in size it is very difficult to estimate the value of these boats, but a fair average is about $100, which would cover the entire outfit, making $182,500 the amount invested in tonging-boats.

"Closely connected with tonging, and each mutually dependent upon the other, is another branch of the trade, conducted by vessels generally known as runners, of which there are owned in this State two hundred, carrying about eight hundred men. The oysters caught by tongers are either sold to these vessels, and by them carried to some market in the State, or they are bought by boats owned in other States and carried to northern cities. The runner will anchor near some tonging-ground, and an empty basket or a small flag will be hoisted to the mast-head as a signal that she is ready to receive oysters. In one or two days she will be loaded, and is at once off for a market. On some occasions half a dozen or more runners may be seen in the same locality, surrounded by forty or fifty canoes. As soon as a tonger has caught as many as his small boat will carry he sells out to the runner and returns to work. The men employed on runners will average about $18 a month, including their board, which, with the pay of the captains (which is about $50 a month), will amount to $166,400 for a season of eight months, that being the length of time that these vessels are engaged in carrying oysters. Reckoning the average value of the runners at $1,500, will give a total of $300,000 in this branch of the trade. About $30,000 is annually spent in repairing the two hundred runners.

"Summarizing the foregoing statistics as to the number of vessels, their value, &c., it is seen that there are [in 1880]:

Boats.	Number.	Crews.	Annual wages.
Dredging	700	5,600	$916,300
Scraping	550	2,200	297,000
Canoes	1,825	5,148	1,158,300
Runners	200	800	166,400
Total	3,275	13,748	2,538,000

"The totals of this table furnish an average of $184.60 for each man. It is utterly impossible to obtain the number of people supported by this $2,538,000. Perhaps not one-half of the dredgers support any family; but with tongers and scrapers it is different. Five is usually reckoned as the average number of a family, but as very many of these men are single it would be too high in the present case. It can scarcely, however, be too much to reckon that for every oysterman there is an average of four individuals dependent upon him. This would give 54,992 as the number of people supported by the catching of oysters in this State. In addition to this there are hundreds dependent indirectly, as shopkeepers and in other ways, upon the oystermen.

"Invested in oyster-boats, the summary is: 700 dredgers, at $1,500, $1,050,000; outfit of same, $70,000; 550 scrapers, at $800, $440,000; 200 runners, at $1,500, $300,000; 1,825 canoes, at $100, $182,500; total 3,275—$2,042,500."

In respect to oystering in Virginia waters (the preceding paragraphs, quoted from Mr. Edmonds, all refer primarily to Maryland), I have given all needful details in the chapter on The Virginia Trade. My summary for the yield of Virginia in 1880 was as follows:

Packed in the State, 1,622,130 bushels; shipped out of the State in shell, 3,315,190 bushels; used for local consumption in the cities of the State, 275,000 bushels; used for local consumption in the small towns and counties of the State, 1,625,000 bushels; total, 6,837,320 bushels.

The average value of these oysters from first hands would be about 27 cents a bushel, or a sum total of $1,846,076.40.

Nearly the whole catch of Maryland and Virginia oysters, not sold as seed, is devoted to the "packing," either raw or cooked, which will be considered below on pages 559–562. Probably the total amount sent to market in shell for immediate consumption in the several towns along both shores will not exceed half a million bushels annually, and this forms an important item of daily food, the year round, with all "tide-water" people. Baltimore is the greatest market. "In Baltimore," says Mr. Edmonds, "the city trade is monopolized by a number of commission houses, which handle all the oysters taken for local use, with the exception of the receipts by steamers. From the books of these firms it was ascertained that the sales of oysters from September 1, 1879, to May 1, 1880, for consumption in the city and suburbs, amounted to 793,680 bushels. Add to this 25,000 bushels received by steamers, and the total retail trade is found to be 818,680 bushels. The average price paid for shucking raw oysters is 15 cents a gallon; these, being all of fine quality, will open a gallon to a bushel, and hence the amount paid for opening 818,680 bushels would be $122,802. Estimating the average amount made by the shuckers at $6 a week, or $192 for the season, it is seen that there are six hundred and forty men steadily employed for nearly eight months of the year in opening oysters for local consumption in Baltimore. There is, in addition to these, a large number of men who sell oysters around the streets; others who rent a cellar room and sell from there; some engage in driving oyster-carts, and a few are employed only during the oyster season in restaurants as extra help. As near as can be ascertained, the number of these may be placed at five hundred, with wages and earnings amounting to $96,000. Of these eleven hundred and forty men about eight hundred are negroes."

In addition to its own stock, Baltimore and also Washington annually use a large quantity of "fancy" oysters from northern cities.

Oyster trade of Philadelphia.—Passing to Philadelphia, we find that city an oyster market for a region entirely different in its conditions from the Chesapeake region, which extends from Barnegat around to and including the whole of Delaware Bay. The transportation to the city from New York and the Atlantic coast of New Jersey, and to some extent from the Delaware Bay shore of the same State, is by rail, and amounted, in 1880, to nearly 300,000 bushels, while 200,000 bushels more came from Baltimore and Chesapeake points by rail and steamer. By sail-vessels from the eastern shore of Delaware Bay came about 1,500,000 bushels yearly, while the western shore of the bay produces nearly another million. Lastly, in winter, about 250,000 bushels are taken by sailing-vessels through the canal from the Chesapeake to Philadelphia, for immediate use. A summation of the supplies from all these sources gives, as the total quantity annually handled in Philadelphia, 2,680,000 bushels, or more than 800,000,000 oysters, worth, in round numbers, not less than $2,500,000 at wholesale.

But, of course, only a portion of these oysters are consumed within the limits of the city of

Philadelphia. A large part is distributed widely throughout a region which includes the Delaware Valley, the State of Pennsylvania, and to some extent the West, competing in the shell-trade with New York and Baltimore. Philadelphia has no packing establishments, and ships very few opened oysters.

The total wholesale trade of Philadelphia is now divided, so far as can be ascertained, among about fifty firms. Most of these dealers are also planters, furnishing the capital with which their partners plant upon ground outside of Pennsylvania. A large part of all the floating and shore-property credited to the shores of Delaware Bay, and estimated in a preceding chapter, is really owned, therefore, in Philadelphia; perhaps a million dollars is invested in the oyster business in the city itself apart from this outside capital and liabilities.

Dealings in oysters in Philadelphia are chiefly carried on at the foot of Spruce street, at the foot of Vine street, and at the Brown street wharves. In each case the locality is determined by the presence of a large provision-market, and the business in general fishing centers near it. At Brown street there is an association of the owners of boats selling there for mutual protection on questions of wharfage and the like. Most of the business is done at Spruce street, where the Jersey boats chiefly go, and where some of the heaviest dealers have their offices. Estimates as accurate as possible give from three hundred to three hundred and fifty families supported by the wholesale business in the city, and between three and four thousand persons who make their living out of the retail trade.

The New York market.—The common market for all oysters grown in New Jersey north of Barnegat, in New York Bay, on Staten and Long Islands, and in Connecticut as far east as Norwalk, is the city of New York, and the receipts, not only, but the greater part of the deliveries at this center are of oysters in the shell. In my monograph I gave many interesting reminiscences of the early days of the oyster trade in this region, which I have not the space to repeat.

Most of the New York oyster firms are of long standing, and the same names appear which are conspicuous in the oyster annals of City Island and Staten Island, for these two localities have supplied the most of them. Van Name, Houseman, Silsbee, Wright, Burbank, Boyle, Frazer, Woglom, Decker, and others are examples. Many of the gentlemen now conducting the business under these names only succeeded their fathers and grandfathers, who established the trade they enjoy. The growth of the opportunities of business, however, has been very rapid, and has brought in many new men. From being (as it was a century ago in New York) the common food of the poor man, so plenteous and vulgar that no feast ever saw its name upon the *menu*, the oyster become only a luxury for the well-to-do, and the prime feature of holiday banquets. Recovering from the scarcity which had brought this change about, by means of the artificial cultivation of immense quantities, oysters a second time have become abundant as an article of food, enjoyed alike by rich and poor. Those who live in the interior or abroad can hardly appreciate how extensive is the demand and supply in the coast cities. "Oysters pickled, stewed, baked, roasted, fried, and scalloped; oysters made into soups, patties, and puddings; oysters with condiments and without condiments; oysters for breakfast, dinner, and supper; oysters without stint or limit, fresh as the pure air, and almost as abundant, are daily offered to the palates of the Manhattanese, and appreciated with all the gratitude which such a bounty of nature ought to inspire."

Formerly the regular markets, especially Catherine market, were the trading places in shellfish as well as other edibles; but for the last twenty years the wholesale oyster business in New York has been confined almost exclusively to two localities, the trades of which are to a certain extent distinct. One of these centers is at the foot of Broome street, East River, and the other at the foot of West Tenth street, North River, nearly opposite. The method of business at each is

substantially the same, the difference consisting in the character of the oysters handled, none from the East River and few from the south shore going to the West Tenth street market, which is mainly in the hands of Staten Island planter-merchants. In addition to this, a few firms are engaged at wholesale in Fulton market, and three firms near Washington market import oysters, opened, from the South.

All of the dealers on the East and North Rivers occupy floating places of business, known as "scows," "oyster-boats," or "barges," being flat-bottomed boats, made with unusual strength and of the most durable materials, and which closely resemble the conventional "Noah's ark" of the toy-shops and Sunday-school picture-books, except that they have flat roofs. One of fair size would measure 75 feet in length and 24 feet in width.

The deep hold, well floored, serves as a cellar, cool in summer and warm in winter; oysters will never freeze there when the hatches are closed. Over the whole craft, flush with the outside, is built a house, two stories in height. The floor of the first story is the deck of the scow. This is the general business apartment, and gives room for storage, the opening of oysters, and transaction of business. Above is a loft where are stored barrels, baskets, and machinery. In the rear, usually—sometimes in the front end—is fitted up an office. The daily capacity of such a barge is about 700 bushels.

These scows are securely moored, side by side, to the wharf, or rather to the water-wall of the city, and are reached by broad swinging platforms, which allow them to rise and fall with the tide. At the rear end, therefore, they can always be closely approached by the sloops and boats which bring to their owners their stock. Such a barge is worth from $1,500 to $4,000, and, with an annual overhauling and calking, will last as long as a man is likely to need it. There are thirty of these barges, representing at present a value of $75,000. To these barges at the foot of Broome street come the oysters from East River and Long Island beds; also somewhat from Staten Island and Virginia, but to a small extent compared with the west-side business in these two classes.

Three sorts of trade are carried on, as follows: (1) Some dealers are also planters and sell their own oysters; (2) Dealers buy from planters and sell; (3) Dealers sell on commission.

The planting of oysters by the New York dealers is almost wholly by partnership methods, and New York furnishes a large part of the capital which operates beds from Keyport, N. J., to Norwalk, Conn. It is very rare, however, that this planting is done in the capitalist's name. The arrangement between the New Yorker and his rural partner is usually this: The former furnishes the needed money, the latter does all the labor, and the cost of taking up and the profits are equally divided. The reason why the capitalist's name does not appear, which would redound to his credit as an extensive operator, is, that the beds are usually in Connecticut or in New Jersey, while he is a citizen of New York, and in both those States the law forbids a non-inhabitant to plant oysters. The same law holds even in respect to towns, so that a man must live immediately at his beds if he intends to work them himself. But, of course, no legislation can forbid partnership or borrowing money, or hiring out one's services, even if the other party concerned be not a citizen of the State or township.

A large proportion of the oysters handled by these New York firms, however, are bought from planters who own beds on the Connecticut or Long Island shore, in Staten Island Sound, or elsewhere. The owner may load up his sloop and bring his crop to the city to dispose of to him who will pay best; or the dealer may send out his own sloops to the producing-grounds, and, with his business card painted all over the mainsail, cruise about until he has bought a cargo at a satisfactory price. The more usual method, however, is to have it understood beforehand that certain

dealers will take all the oysters certain planters can raise. Often money is advanced upon this understanding, or other help given, so that there is a closer business relation than ordinary between the buyers and the planters—an intimacy (and confusion in the matter of statistics) to which the extensive partnership system lends itself.

The third method—*i. e.*, sales on commission—explains itself. It is not extensively followed, since the planters do not have faith in it, and the dealers do not care to encourage it.

Some dealers are shippers wholly, finding their customers all over New York, Lower Canada, and the Lake States; others restrict their whole custom to the city and suburbs. The former require less men and dispose of larger packages at each order; the latter require many trucks and delivery carts, though most of their customers themselves come after their supplies. I believe the shipping trade is generally thought more desirable. The scene at the barges on both rivers, during the busy months of autumn and winter, is a very lively one. The sloops, very trim craft, bringing oysters to be sold, will sometimes lie a dozen deep opposite the barges, with plank walks across their decks from the outer ones to the shore. The captain and crew attend to the getting up of the cargo out of the hold and putting it into baskets, sorting it at the same time. East River and Staten Island oysters are sold by the hundred or the thousand, as a rule, and must all be counted. An expert man will count them accurately as fast as they can be carried ashore. Long Island stock is generally sold by the "basket," this measure holding somewhat less than a bushel; but some dealers compel the sloops to measure by baskets furnished them, which hold a full bushel, or a trifle over. Even then care is taken not to shake the contents down. Virginia oysters may be measured by the basket, but are paid for by the cargo or fraction of a cargo, except where, as in the case of Staten Island planters, southern oysters, having laid a few months in Prince's Bay or the sound, are brought to the city to be sold.

The carrying of oysters from the vessels into the barges affords employment to a distinct class of men, known as "carriers." There are from twenty-five to forty of these on each river. They do not work on salary, but get 10 cents a thousand for the oysters carried, reckoning seven small and four large baskets to the thousand. This seems very small wages, but they average from $25 to $30 a week during half the year, paid by the owners of the oysters sold. The opening of oysters by the trade in New York is not systematically carried on, and scarcely any is done until after the holidays. I doubt if more than one hundred or one hundred and fifty men are ever employed at once in the whole city in opening for the wholesale trade. All the openers are men, chiefly those who in summer get their living as deck-hands on steamboats and by other marine occupations. The pay is 10 cents a thousand, at which rate about $3 a day is regularly made when work is plentiful.

As to how many persons are concerned in the retail oyster business of the city only a mere guess is possible, since a very large proportion of them are temporarily engaged, or have their business so inextricably mixed with the liquor trade, or the business of selling fish and general provisions, that it is out of the question to define it separately with any exactness. Twenty-five years ago, when the "oyster riots" attracted attention to the matter, the number of persons supported by the restaurant trade in oysters was estimated at five thousand. Whether it is not double that at this time it is impossible to say; but I consider it safe to say that five thousand families, at least, find their chief or exclusive support in selling or preparing the mollusks for immediate consumption in the metropolis and its closely adjacent cities.

The wages vary immensely, depending on employer, sex, age, and capacity of the employed, amount of working time, kind of work, &c. Women receive from $3 to $6 per week; boys and men from $4 to $20. A correct average is almost impossible, and a total approximate summation

of the wages paid out in the course of a year in the retail trade is impossible. In the cooking of oysters the southern kinds are used, because these are cheapest, a special price being charged for a "stew" of northern oysters. For fried oysters, on the other hand, which require to be of larger size to make a show, the "box" size is used, and these are generally "Sound" or "East River" oysters. Oysters sold to be eaten raw may be anything and everything of respectable size; but the old brand names, "Saddle-Rock," "Shrewsbury," "Sound," "Blue Point," "Keyport," &c., the popularity of which was won long ago, are still attached. I suppose, for example, that twenty times as many "Shrewsbury" oysters are sold every season in New York as are raised each year in that river. The largest oyster saloons were formerly in Fulton market, and have a world-wide reputation. Now they are rivaled by up-town establishments.

OYSTER EXPORT TRADE.—One very important feature of the wholesale oyster trade in New York is the export of oysters in the shell to Europe. A barrel or two had often been carried across by steamers previous to an experiment by Mr. George H. Shaffer, of Fulton market, in 1870. The small consignment sent out by him reached England in good condition, sold well, and was followed by others, so that a regular trade was established. Mr. Shaffer, however, enjoyed a monopoly of it (and the large profits which at first accrued) only a short time, for his competitors were wide awake, and also began shipping to Europe, so that almost at a bound the exportation of oysters reached its full strength as a profitable business; that is, about as many were sent as there are now—all the foreign markets will bear.

The kind of oyster required for export is such as has not found favor in this country, where the "Saddle-Rock" and "Shrewsbury" are lauded above all others. The native European bivalve is small, rarely exceeding the size of a silver dollar, and is more popular than the American oyster. The oysters sent abroad, therefore, are all single (since they are to be eaten on the half-shell, and not cooked), small, and round; they are selected from the "cullens" or smallest of the three classes into which our oysters are usually assorted, and have received the trade appellation of "London stock."

Because the oysters, native and cultivated, which are grown at the eastern end of the Great South Bay, on the south shore of Long Island, best fulfilled the conditions, they were the first to be exported to England, and have most largely, perhaps, entered into the trade. They are known both at home and abroad as "Blue Points," and acquired a reputation in England superior to all others up to the season of 1879, when there was a falling off in their quality and a consequent loss of esteem.

Besides the "Blue Points," great quantities of oysters from the East River (particularly Rowayton, Norwalk, and Bridgeport), have been shipped, chiefly through J. & J. Ellsworth; a less number from Rockaway and Fire Island, and large quantities from Staten Island waters, under the brand of "Sounds." These last became the favorites abroad during the past season, the "East Rivers" coming second, and the unfortunate "Blue Points" third; and, inasmuch as they cost less than either of the other brands, money was made upon them liberally, while no one who forwarded "Blue Points" received much if any profit, and many shippers lost money.

The London stock, having been picked out by the planter, is purchased by the shipper on the ground, where he sends his boats to buy daily, or keeps a permanent agent and packer. He culls it a second time, discarding about one-fourth, so that it is estimated that 4 bushels of oysters are caught for every barrel exported, since the barrels (second-hand flour barrels) hold scantily 3 bushels. The useless residue is not wasted, but thrown back upon the packer's own bed to grow further. The number of oysters in a barrel varies from 1,200 to 2,000; the more there are the better the English retail buyer likes it, since he sells them by count.

Packed so as to prevent injurious jarring, and stowed in the extreme forward part of the vessel, where they keep cool, the mollusks cross the Atlantic in excellent shape. No time is lost in getting the oysters, when packed, into the steamer, and many are taken in sloops directly from the producing points to the steamer's wharf, and thus escape the bother and expense of a second or third handling in New York.

Some American firms have regular agents abroad who care for and dispose of the oysters sent to them. In other cases they are consigned by the shippers to commission merchants on the other side. Liverpool has been the great receiving point for Great Britain, because it was the nearest port. It was found that the extra time required, and the port charges on cargoes sent direct to London by steamer, more than overbalanced the slight saving effected in freight over those forwarded by rail from Liverpool. The amount of oysters sent each week, though not large, has sometimes been more than could be disposed of before the next shipment arrived. To provide against loss in this contingency, the largest dealers own spaces of sea-bottom, where the surplusage is thrown overboard to keep in good condition and drawn upon as required. Some thousands of barrels are sent annually, which are intended to lie and grow there from one to three years. American oysters laid down thus in foreign waters have never been known to spawn, so far as I could learn, but the conditions have never been favorable; and no experiment, that I am aware of, has been tried to ascertain whether seed oysters from the United States, properly planted, would not grow into good health, emit spawn, and establish their race upon the European coasts. I see no reason why such an experiment should not prove entirely successful.

The prices received for American oysters sent abroad have been very various, ranging during 1880 from 5 to 40 shillings a barrel. Leaving out the various deductions necessary, it is considered fair to estimate $5 to be the average cash return to this country for each barrel. At this rate the stated total of 63,300 barrels (about 175,000 bushels) would net the United States no less than $316,500 in gold, an amount which would by no other means be brought into our pockets, and which enriches the country by so much, since the value exchanged for it does not, in any degree, impoverish the country, but is a product of labor which would not otherwise be employed, and the disposal of a product not otherwise to be used.

In my monograph I gave precise statistics of exports of oysters from 1864 to 1880. This showed a steady gain. In 1864 the export amounted to only about $85,000; ten years later it was near $250,000, and 1880, over $460,000. Of these almost exactly one-quarter was sent to Canada, leaving about $360,000 worth to be sent to Europe, and, in trifling quantity, to Mexico and the East Indies. Nine-tenths of the whole transatlantic traffic is from New York to Liverpool. In 1880 the total number of barrels exported was 63,300, containing about 190,000 bushels, or, counting 1,200 oysters (a low estimate) to the barrel, no less than 76,000,000 by count. The general opinion at New York is that European demand will increase steadily, while there will not be an overplus of stock here, since the East River beds are slowly failing and are more and more required for a seed supply. The shippers are, therefore, hopeful of profitable prices in future.

Eastern New England.—Passing now to the marketing of oysters in eastern New England, the first point to be mentioned is New Haven, as having anything more than a merely local trade; but here the business is almost wholly that of shipping opened raw oysters, the details of which appear on the next page.* The same is true of New London, Providence, New Bedford,

* "Four grades are recognized by the Connecticut oystermen: 'Cullentines,' two years and three months old; 'Culls,' three years old; 'Boxes,' four to six years old; 'Extras,' five years old and upwards. The first and second are used principally for stews, and are sent to market, without the shell, in cans and kegs. The third and fourth are sent out generally in the shell in bags, boxes, and barrels. Natives are in the greatest demand and bring the best prices. The supply rarely equals the demand. When the stock of natives is exhausted resort is had to the choice Virginia plants that have been a year or more in Connecticut waters." (Rep't Conn. Shell-fish Com'rs, 1881, p. 65.)

and the seaports north of Boston. Everywhere except in New Hampshire and Maine the wholesale dealers are also the planters, and do not sell many oysters beyond what they have raised themselves. At certain points, as for example, Monument River, Mass., the oysters are so fine and large, and the locality comparatively so small, that they are marketed almost wholly in the shell and go to supply the "bench" trade of Boston, *i. e.*, to be sold in restaurants and hotels for eating "on the half-shell." Fishing through the ice with tongs is habitual all winter in that district, yet the oystermen do not complain of it as especially cold or unpleasant work. In order to keep the oysters from freezing, they dip in water the bag which they intend to put them in, and hold it upright until it freezes stiff. It thus stands conveniently open like a barrel, and no wind can blow through its sides to the detriment of the contents.

In winter large quantities of oysters from the Chesapeake are imported by the vessel load, as I have explained, for immediate consumption; these are used for opening and cooking, the higher grade, fresher "native" oysters from New England waters being reserved for the "shell" trade. Formerly enormous quantities of southern oysters were bedded at Boston, but now the encroachments of the building and filling in along the water-front overrun the old limits of the bedding grounds, and even the ancient natural beds. Where the Boston and Maine's car house now stands a leading dealer not many years ago laid down 42,000 bushels in a single season. It was known as White Island at that time. The South Boston flats are being graded up into streets, and the Charles, Mystic, and Malden Rivers, Bird Island, and other places were long ago abandoned because the wharves or the sewerage of the city has destroyed their usefulness to the oysterman. Instead of bedding in his own harbor, therefore, the Boston dealer now rents ground in Buzzard's or Narragansett Bays, and lays down there the Virginia oysters he proposes to use for his summer and autumn trade, or else he has abandoned the practice altogether.

8. THE MARKETING OF OYSTERS "OPENED."

The opening of oysters and shipment of their flesh in water-tight receptacles to customers at a distance is a practice which began at Fair Haven (New Haven), Conn., half a century ago. In the early days the opening was done by the townspeople at their homes, and dealers packed in little wooden kegs, or in square tin cans for shipment to distant points under the protection of ice.

Nowadays this work is done wholly in the dealer's factory on the wharf where his schooners or steamers unload. As soon as the oysters are opened they are placed in a flat pan with a perforated bottom, called a skimmer, where they are drained of their accompanying liquor. From time to time a quantity are dipped out and put into a large colander, placed over a tall cask. Here a stream of water is turned upon them, and they are stirred about until washed clean, after which they are put into wooden tubs for shipment, or tin cans for local traffic. The tubs are all labeled with the name of the owner, and are returned by the customer. Their covers fit with exactness, and lock with rivet and seal in such a way that they cannot be opened on the road without certain discovery. The "shuckers" are mainly girls, who make fair wages.

The expressage of oysters from Fair Haven to the interior of New England is so large that the afternoon trains have one car, and sometimes two, devoted exclusively to the carriage of these goods. Large shipments were formerly made in wagons to Albany and thence to the large towns in central New York. Now these oysters go by rail much farther westward, even to Chicago, Cincinnati, and San Francisco.

At Providence, also, oysters are opened in enormous quantities every winter, the dealers here, as at New Haven, disposing in this way of nearly the whole of their crop and of all the winter receipts by vessel from the Chesapeake. New Haven's trade extends through western New Eng-

land and New York, but Providence supplies Boston, eastern New England, and Canada. All the openers there are men, and call themselves "cutters," using the knife in a different way from either the New Haven or New York methods.

Nearly half a century ago one or two New Haven men of energy conceived the idea of taking their warehouses to the oysters, instead of bringing the mollusks so far to the sales-room. They therefore opened branch houses in Baltimore. Others followed, and the names of Maltby, Mallory, Hemingway, Rowe, and their confrères, long familiar in Connecticut, became equally well known along the Chesapeake. All the great Baltimore firms of old standing originated in Fair Haven, just as Wellfleet, an obscure village on Cape Cod, supplied Portland, Boston, and Providence with its oystermen. The result was the same in both cases; the home interests retrograded when metropolitan advantages began to be used in competition, and at Fair Haven considerable and rapid changes in methods, as well as the results of trade, have come about.

None of these pioneers of the great Baltimore packing concerns was more enterprising than C. S. Maltby. As his business increased he established a line of wagons from Baltimore to Pittsburgh, and was thus enabled to supply the West with fresh oysters long before the Baltimore and Ohio Railroad had stretched out its track to that then distant region.

A few years later Mr. A. Field, also a native of Connecticut, began to sell oysters which he first steamed and then hermetically sealed in tin cans. This preparation was received with favor, and the new trade grew very rapidly. Records furnished by C. S. Maltby inform us that in 1865 1,875,000 bushels of oysters were packed raw in Baltimore, and 1,360,000 bushels were preserved. In 1869 he numbers in Maryland 55 packers, who, at 500 to 2,500 cans per day, put up 12,000,000 to 15,000,000 cans in a season of seven months, using 5,000,000 bushels. Sixty "raw" houses that year employed 3,000 hands, while the packers gave employment to 7,500 persons. Large quantities of canned oysters were annually sent, at that time, by steamship to Havana. In 1872 the same notes record as opening oysters, 2,000 men; making cans, 300 men; box makers, 50 men; clerks and laborers, 300. All these were in the "raw" trade of Baltimore. The profits to be had, and the stress of competition caused fraudulent methods to be introduced by dishonest firms, and the business at Baltimore was threatened with ruin. A combination of reputable firms was formed, under the name of the Union Oyster Company, to protect themselves, but this succeeded only partially, and the "steamed" trade is now in a low condition. "The raw-oyster business," as Mr. Edmonds observes in his account heretofore referred to, "has always been more profitable and less subject to the vicissitudes of trade, although there are many losses from spoilt oysters when the weather happens to turn suddenly warm. Raw oysters, after being opened, are packed in small air-tight cans holding about a quart, and these are arranged in rows in a long wooden box, with a block of ice between each row, or they are emptied into a keg, half-barrel, or barrel made for this purpose. When the latter plan is pursued, the keg or barrel is filled to about five-sixths of its capacity, and then a large piece of ice is thrown in, after which the top is fastened on as closely as possible, and it is at once shipped to the West, usually by special oyster trains or by express. Packed in this way, with moderately cold weather, the oysters will keep very well for a week or ten days. During the most active part of the "raw" season there are daily oyster trains of from thirty to forty cars from Baltimore to the West, where nearly all the Baltimore oysters are consumed. From the shores of the Chesapeake Bay as far as Detroit there is scarcely a city or town (connected with any of the great trunk lines) which is not supplied with Maryland raw oysters. Farther west, and to a considerable extent in European countries, the demand is supplied by steamed oysters. The oysters used in the raw trade are of a finer quality, and consequently command better prices than steamed."

The statistics of oyster-packing in Baltimore in 1880 are given by Mr. Edmonds as follows:

"During the season extending from September 1, 1879, to May 15, 1880, the number of vessels loaded with oysters arriving at Baltimore was 9,543 (or a daily average of 37 for the 257 days), bringing 7,252,972 bushels, which would make the average cargo 760 bushels. In addition to the amount brought by sail-vessels, there were 25,000 bushels received by steamers and consigned directly to hotels and restaurants, making a total of 7,277,972 bushels, of which there were packed raw 3,769,353 bushels, hermetically sealed 2,689,939 bushels, and used for city consumption 818,680 bushels. Engaged in oyster packing in Baltimore there are forty-five firms, with a capital of $2,338,300, occupying, in their business, houses and grounds with an estimated value of $1,360,966. During the summer these firms are generally engaged in fruit packing, and their capital and buildings are thus in active use during the entire year. These firms employ 4,167 males and 2,460 females—total, 6,627; and during the season of 1879–'80 paid to them in wages $602,427. The total number of bushels of oysters packed was 6,459,292, which required 25,546,780 tin cans and 9,9,614 wooden cases. The value of the oysters packed, including shucking, cans, &c., was $3,547,349. For the tin cans $794,919 was paid, and for the wooden cases $102,622.

"Of the 6,179 males [in Baltimore and other packing-houses in Maryland], nearly all of whom are employed in the 'raw' trade, about three-fourths are negroes, the majority of them being comparatively steady workmen, while the whites are more generally disposed to be idle and intemperate. The few whites in the business are generally of a very low class of society. Within the past year a few females have essayed to shuck raw oysters, but their number is still very small, and will probably so continue, owing to the nature of the work. The 2,460 females are all employed in the steam oyster-houses of Baltimore. They are mostly white girls of from sixteen to twenty-five years of age, the proportion of older ones as well as of colored being small. These girls are almost without exception of foreign birth or parentage, the largest proportion being of Bohemian origin, with Irish probably coming next. Few American girls, however poor, will consent to engage in this occupation, as in it both sexes must mingle indiscriminately, without regard to color, class, or condition. Owing to the thorough steaming the oysters are very easily opened, and the amount of physical labor required is comparatively light; but during the busy season the work begins about daybreak and lasts until dark, and is of course exceedingly fatiguing. An industrious hand can make from 75 cents to $1 a day, but from the great irregularity in their work they are probably not engaged over one-half of the time.

"Considering the class of the people employed in the packing-houses, I do not think it safe to estimate more than an average of two individuals dependent upon the wages of each shucker, at which rate there are in Maryland 17,278 people dependent upon oyster-shucking."

In addition to Baltimore, packing is carried on in Maryland at several other points. Mr. Edmonds reports these as follows for 1880: Crisfield, 16 firms, 678 employés, packing 427,270 bushels, worth $165,800; Cambridge, 8 firms, 385 employés, 205,410 bushels, worth $76,658; Annapolis, 8 firms, 315 employés, 156,703 bushels, worth $69,555; Oxford, 7 firms, 156 employés, 108,960 bushels, worth $39,986; Saint Michaels, 4 firms, 91 employés, 37,788 bushels, worth $14,053; Somerset County, 10 firms, 387 employés, 224,817 bushels, worth $86,945; Seaford, Del., also has a packing trade supplied by Maryland oysters. Mr. Edmonds says: "There are at Seaford seven oyster-packing firms, having an aggregate capital of $14,600, and occupying buildings estimated to be worth $28,500. From September 1, 1879, to May 1, 1880, 184,500 bushels of oysters were packed raw, giving employment to 170 males and 45 females, the wages of both for the season amounting to $14,230. The estimated value of the oysters, after being shucked and packed, was $71,350. When shucked oysters are shipped in bulk, the package (barrel or half-barrel) is re-

turned after being emptied, and then refilled. On this account only 1,400 packages, costing $1,000, were bought by Seaford packers during the season of 1879–'80. About 400 persons are dependent upon the oyster trade of Seaford. The local consumption, added to the packing, gives a total of 200,000 bushels handled at Seaford."

The packing trade of Virginia is of much later origin than that of Maryland. About 1859, Mr. Edmonds states, an oyster-packing establishment was instituted in Norfolk; but it was not until 1865 that the trade became extensive, and during the last few years it has developed rapidly, much to the benefit of the town, where now employment is afforded to a large number of new people. The trade in Norfolk (which is in the hands of Boston and New York capitalists) is almost exclusively in raw oysters, and in 1879–'80 its sales reached 1,370,855 bushels, more than all Maryland together, outside of Baltimore, and ten times as much as the rest of Virginia.

A great difference exists between Norfolk and Baltimore, also, in other respects. While Baltimore supplies the inland demand, and has branch houses in Chicago, Norfolk sends her stock northward and along the sea-board through agents in New York and Boston. No less than 250,000 gallons were thus received in Boston alone between September, 1879, and April, 1880. The effect has been very marked upon the trade in these northern cities; whether for good or ill there are two opposite opinions, the general verdict being that this feature works against the best interests of the trade. In their favor, it is said, in general, that these oysters can be sold cheaper than any other, and hence are accessible to the poorer class of people; that they are as good as the cargo oysters, and that in the increased number sold is compensation for the diminished percentage of profit. In opposition it is asserted that their quality is poor; that they are unhealthy; that the losses attending them are greater than with cargoes, and that they unduly cheapen all superior grades of stock. Two grades are brought to Boston from Norfolk, but ten times as many of the "common" as of the "selected." They are often dirty, and are washed again and again until the aroma and delectable flavor is all gone from their lacerated and rinsed remains; hence they are only fit to be cooked in a method calculated to disguise their insipidity by the time Vermont, Maine, or Canada gets them for dinner.

Providence takes a large amount of the Norfolk-opened stock, but New Haven has little reason to do so. In New York dealing in these raw oysters forms the whole business of two or three firms, who disposed in 1880 of about 600,000 gallons, selling chiefly in the city, but also shipping by express to interior points. More or less of the raw oysters from Baltimore and other points in Maryland and Virginia are also mingled with those from Norfolk in this channel of trade, and the trade is increasing. It gives better satisfaction in general in New York than in Boston, both because the stock itself seems generally of better quality, and because the shorter distance and superior accommodations in transit bring the oysters here in better condition. The reshipments are very widely scattered through the country, especially northward. Occasionally, however, orders come from the distant west. Opened oysters have even been sent to Great Britain, and gave good satisfaction there. Long transportation, without harm, has been made possible by various improved and patented contrivances for refrigeration in the shape of barrels, cans, and smaller packages.

At some places on the remote southern coast a packing business has sprung up. Attempts at New Berne, N. C., have proved failures only on account of the utter unreliability of the laborers employed, who could not be persuaded to work with steadiness, no matter how large the pay. In treating a perishable article and meeting a delicate market, such as the oyster packer handles, this obstacle, of course, was fatal to the enterprise. Savannah opens enough for the local demand and a narrow range of shipments in Georgia and South Carolina, Charleston offering little compe-

tition. At Mobile the business is more extensive, and the shipments reach far inland. Mobile is the headquarters of factories for canning the wild "reef" oysters gathered off the coast of Mississippi and eastern Louisiana. These factories employ a hundred or more hands in opening and packing. Their main business is in cooked and canned oysters, which are steamed and sealed in substantially the same way as at Baltimore. One specialty, however, is the putting up of canned fried oysters, after a patented method. Statistics of this are not at hand. The pickling of oysters, formerly practiced largely at Mobile, has gone out of vogue, as it has in northern cities, where it used to be important.

With respect to New Orleans I wrote as follows in 1880:

"The shipment of oysters inland from New Orleans has hitherto been of very small account, and principally of fresh oysters. Now, however, at least two canning establishments have been started in the city, which make a large item in their general preserving business of cooked and hermetically sealed oysters, prepared substantially as in Baltimore. Several brands have been put upon the market with good satisfaction, selling at $2.50 per dozen two-pound cans for first quality, and $1.80 for second, and at $1.10 for one-pound cans. About $100,000 worth of these canned oysters are said to have been put up during 1880, nearly all of which were taken by the trade of the city and immediate neighborhood. The capital invested is, perhaps, $75,000, but is applied to shrimp, lobster, and fruit canning as well as oysters. In these establishments only about thirty male adults are employed, the openers being girls, about one hundred in number, all white and chiefly German and American in nationality, who are paid from 4 to 6 cents for each kettleful, a "kettle" holding two quarts. Work is irregular, because of the difficulty of getting oysters in sufficient quantity and when needed (owing mainly to the indisposition of the oystermen to work in bad weather), and the total earnings of the openers and employés during the "oyster-run" in the factories, will probably not exceed $20,000. These factories have not been long enough in progress to furnish more exact information than is here given. Their capacity is far in advance of their present product, and they anticipate a highly successful future, confident that they can secure the trade of the lower Mississippi Valley, to the exclusion of oysters canned in northern cities."

9. UTILIZATION OF OYSTER SHELLS.

The utilization of oyster shells is extensive and in various directions. They serve as "metal" for roads and foot-paths; as "filling" for wharves, low lands, fortifications, and railway embankments; as stools for new oyster beds; as ballast for vessels; as material for lime, and as manure for exhausted fields, or a component in mixed fertilizers, besides some minor uses, such as food for poultry, &c.

One is astonished, upon first going to an oyster locality, to see the huge piles of shells, and discover what spacious areas have been raised above tide level or otherwise filled in with these animal structures. If there are 23,000,000 bushels opened annually in the United States, an equal measure of shells accumulates, amounting to no less than 243,390,000 cubic feet, which would spread 3 feet deep over a space more than 450,000 yards square. Next to their utilization in filling hollows, the largest portion of the emptied shells are converted into lime. Time was when no other lime was used by the early colonists, and the practice has persisted, several of the New England shore towns supporting mills and kilns grinding nothing but oyster shells. "By the addition of the proper materials, clay and magnesia," it is recorded, "Mr. Kingsley, a lime-burner of Boston, some years ago prepared an excellent hydraulic cement, which is used not only for laying drains, cisterns, &c., but its whiteness renders it suitable for the manufacture of fountains, vases, and ornamental articles, which are to be placed in exposed situations."

The use of the shells as a fertilizer is also an ancient practice. In the Canadian provinces the remains of extinct oyster beds are dredged by huge machines made for the purpose, and spread upon the lands under the name of mussel-mud. Along Pamlico Sound, North Carolina, when the weather becomes warm and there is no other employment for their boats, the fishermen rake up boat-loads of rough "coon oysters" and carry them to the farmers up the rivers to be sold and used as manure, for which from 3 to 5 cents a bushel is paid. In Florida and the Gulf States the best farms and gardens are those located upon the shell mounds, where the finest trees grow; and in the Northern States these old heaps have long been resorted to by farmers as a store house of top-dressing for their fields. The immense banks at Damariscotta, Me., are constantly utilized for this purpose. The shells are first burned, and the remains of various rude kilns exist, one of which greatly excited the antiquarians who first exhumed it, who were sure they had hit upon an aboriginal, prehistoric home, until they found half a brick in the bottom. In fact almost the whole of the lime now made from oyster-shells at the factories is converted into a fertilizer, in composition with other manures, or unmixed.

These and other minor utilizations are disappearing, however, along the northern coast, through the increased value of the shells to spread on the bottom for the founding of new colonies, as has been explained; and before long, no doubt, nearly all the shells accumulated will be saved by planters for this purpose, as a better economy than to sell them.

10. STATISTICAL SUMMARY.

Statistical tables, in 1880, showing, by States, the persons employed, capital invested, and value of products in the oyster industry.

States.	Grand total.			Persons employed.		Apparatus and capital.		
	Number of persons employed.	Bushels of oysters produced.	Value of oysters as sold.	Fishermen.	Shoremen.	Total capital invested in oyster industry.	Number of vessels.	Value of vessels.
Maine	15	.....	*$37,500	5	10	$4,210	1	$3,000
New Hampshire	9	1,000	6,050	6	3	2,400	.....	.....
Massachusetts	896	36,000	405,550	409	487	303,175	56	227,000
Rhode Island	650	163,200	356,925	300	350	110,000	.....	.....
Connecticut	1,006	336,450	672,875	672	3 4	361,200	100	69,000
New York	2,724	1,043,300	1,577,050	1,958	766	1,013,060	426	397,000
New Jersey	2,917	1,975,000	2,080,625	2,605	312	1,057,000	575	530,000
Pennsylvania	.....	.....	*187,500	.....	.....	.....	.....	.....
Delaware	1,065	300,000	687,725	820	†245	145,500	65	50,000
Maryland	23,402	10,600,000	4,730,476	13,748	‡9,654	6,034,350	1,450	1,750,000
Virginia	16,315	6,837,320	2,218,376	14,236	§2,079	1,351,100	1,317	460,950
North Carolina	1,020	170,000	60,000	1,000	20	68,500	90	22,500
South Carolina	185	50,000	20,000	175	10	12,250	10	2,500
Georgia	350	70,000	35,000	300	50	18,500	.....	.....
Florida	166	78,600	15,950	140	26	22,000	.....	.....
Alabama	300	104,500	44,950	250	50	16,000	20	6,000
Mississippi	60	25,000	10,000	50	10	3,000	.....	.....
Louisiana	1,400	295,000	200,000	1,300	100	36,750	45	10,750
Texas	240	95,000	47,200	200	40	17,750	.....	.....
Washington Territory	85	15,000	45,000	75	10	6,550	.....	.....
Total	52,805	22,195,370	13,438,852	38,249	14,556	10,583,295	4,155	3,528,700

Statistical tables, in 1880, *showing, by States, the persons employed, capital invested, &c.*— Continued.

States.	Apparatus and capital.				Products.			
	Number of boats.	Value of boats.	Value of gear and outfit.	Value of shore property.	Bushels of oysters produced.	Value of same to producer.	Enhancement of value of oysters in process of preparation for market ‖	
							Number of bushels.	Amount of enhancement.
Maine	3	$60	$150	$1,000	.....	.....	75,000	$37,500
New Hampshire	5	300	100	2,000	1,000	$800	7,000	5,250
Massachusetts	117	9,485	10,690	56,000	36,000	41,800	514,000	363,750
Rhode Island	100	14,500	5,500	90,000	163,200	225,500	274,300	131,425
Connecticut	563	33,165	19,385	239,650	336,450	386,625	515,000	286,250
New York	1,714	121,700	42,460	451,900	1,043,300	1,043,300	1,065,000	533,750
New Jersey	1,400	110,500	91,500	325,000	1,975,000	1,970,000	237,500	110,625
Pennsylvania	.....	.....	.....	.....	.....	.....	††250,000	187,500
Delaware	300	12,600	10,000	*73,500	300,000	325,000	‡‡834,500	§§362,725
Maryland	1,825	130,520	161,480	**3,992,350	10,600,000	2,650,000	7,653,492	2,080,476
Virginia	4,481	224,050	329,250	‖‖336,850	6,837,320	1,948,636	1,622,130	269,740
North Carolina	800	16,000	15,000	15,000	170,000	60,000	.....	.....
South Carolina	100	2,500	2,250	5,000	50,000	20,000	.....	.....
Georgia	100	10,000	3,500	5,000	70,000	35,000	.....	.....
Florida	116	8,000	2,000	12,000	78,600	15,950	.....	.....
Alabama	42	4,000	3,000	3,000	104,500	44,950	.....	.....
Mississippi	40	1,000	500	1,500	25,000	10,000	.....	.....
Louisiana	120	3,000	13,000	10,000	295,000	200,000	.....	.....
Texas	70	6,750	2,000	9,000	95,000	47,300	.....	.....
Washington Territory	40	800	750	5,000	15,000	10,000	.....	.....
Total	11,930	708,330	712,515	5,633,750	22,195,370	9,034,861	13,047,922	4,368,991

2.—THE SCALLOP FISHERY.

1. THE NATURAL HISTORY OF THE SCALLOP.

The name of the mollusk under consideration is also written escallop (from the French *escallope*, and the Dutch *schelp*, a shell, allied to *scale* according to Skeat) and scollop. Of other common names there are many in various languages, as will appear. The scallops are bivalves, with gills fringed like a comb, or pectinated, a characteristic of the class to which they belong. But in this family the indented, often almost toothed, edges of the shell itself carry out the resemblance to a comb so well, in addition to the internal structure, that they have retained for themselves the name *Pectinidæ*, referring to the whole family, and *Pecten* for the principal and typical genus. They are also called, in Italy, "*cape saute;*" in Holland, "*mantels;*" in Languedoc, "*coquilles large;*" in Brittany and Normandy, "*kofiches.*" In England one hears such names as "fan-shells," "frills," or "queens" in South Devon, according to Montagu; and on the Dorset coast the fishermen call them "squinns." In the north of France one kind bears the name of "*vanneau*," or "*olivette*," and another species (*P. maximus*) is an article of food. Of the latter,

* This quantity represents simply the enhancement, the first cost being included in the Maryland and Virginia statistics.
† Of these, 215 are employed in the canneries at Seaford.
‡ Of these, 8,864 are employed at the various canneries.
§ Of these, 1,578 are employed in the canneries.
‖ This includes, planting, bedding, fattening, and transportation to distant markets in oyster vessels.
* Of this, $28,500 is invested in the cannery interests at Seaford.
** Of this amount, $2,492,350 represents the cash capital invested in the cannery industry.
†† Brought in winter by vessels registered in other States, the men engaged and the value of the vessels being accounted for elsewhere.
‡‡ Of these, 184,500 bushels were packed at Seaford, and 650,000 bushels were planted in Delaware Bay.
§§ Of this, $22,225 represents the enhancement on those canned.
‖‖ Of this, $119,350 represents the cash capital in the cannery interests, and $167,500 the value of buildings and fixtures for canning.

Jeffrey, a British conchologist, says: "If the oyster is the king of mollusks, this has a just claim to the rank and title of prince." In the fish markets of the north of France it is called "*grand-palerine*," or "*palourde*." In the south of England it shares with another species the name of "frill," and in the north that of "clam." Barbet speaks of it as the "dueal-mantle peeten," and says it served the Romans and Greeks as food, and when dressed with pepper and cummin seed, became a medicine. It is this species which is believed to have been designated as the *Kleis* of Xenocrates and Galen. This species (*P. maximus*), Jeffrey says, was formerly "plentiful in Lulworth Bay, on the Dorset coast; but now they are rarely found alive. I was told that the breed had been exterminated there by an epicurean officer of the coast guard. The late Major Martin would permit any conchologist to dredge as much as he pleased in the bays of the Connemara coast, provided he only took useless shells, * * * but all the big clams (*P. maximus*) were reserved for the table at Ballynahinch castle." The high reputation of this species causes it to be much sought after, and it "is a constant visitant of the London markets. Scalloped with bread-crumbs in its own shell, or fried with a little butter and pepper, it forms a very delicious morsel." The deeper shell was formerly employed in scalloping oysters, whence the name of this form of cooking them.

The scallop shell appears very frequently in literature. It is often used in heraldry to indicate that the bearer has made long voyages by sea. It has been the badge of several orders of knighthood, and still figures in many coats of arms. This half-chivalrous, half-saintly significance in heraldry was usually in memory of the Crusades, and marked those who had been attached to those mediæval expeditions, or had been on a holy pilgrimage, either to the shrine of St. James the Great of Compostella, in Spain (whence its name "St. James shell"), or to the Holy Land. Both amounted to the same thing, since the knights and monks of the Crusades in the ninth and tenth centuries adopted St. James as their saint of saints, and, converting the fisherman of Gennesaret into a Spanish warrior, assigned him the scollop shell for his "cognizanee."*

Sir Walter Scott, in his poem "Marmion," refers to this badge, or emblem, as follows:

Here is a holy Palmer come,
From Salem first and last from Rome;
One that hath kissed the blessed tomb,
And visited each holy shrine,
In Araby and Palestine.

* * * * * * *

In Sinai's wilderness he saw
The Mount where Israel heard the law,
'Mid thunder-dint and flashing leven,
And shadows, mists, and darkness, given.
He shows St. James's cockle-shell—
Of fair Montserrat, too, can tell.

[STANZA XXIII.

The summoned Palmer came in place.
His sable cowl o'erhung his face;
In his black mantle was he clad,
With Peter's keys, in cloth of red,
On his broad shoulders wrought;
The scallop shell his cap did deck.

[STANZA XXVII.

And in "The Pilgrimage," written by Sir Walter Raleigh, he says:

Give me my scallop-shell of quiet,
My staff of faith to walk upon;
My scrip of joy, immortal diet;
My bottle of salvation.

* Moule's "Heraldry of Fish."

Several species were worn as pilgrim emblems in this way, but chiefly *Pecten jacobæ* and *Pecten maximus*. This is not the only place these lovely shells have in history and song and art; for, in the days when Ossian sang, the flat valves were the plates, the hollow ones the drinking cups, of Fingal and his heroes. "Distinguished artists," says the conchologist Say, "have judged them worthy of representation on their canvas, and the voluptuous form of Venus* is seen supported on the waves by the valve of a *Pecten* * * * A beautiful species which inhabits a portion of the Pacific is deified by the natives of some of the islands of that ocean."

Ceremonial employment and significance have been found for the scallop among various savage nations, and a few such instances relating to our American Indians were mentioned by Dr. R. E. C. Stearns in a paper in the *Overland Monthly* (April, 1873), as follows:

"The scallops are, and have been, esteemed for food and other purposes by the aboriginal tribes as well as by their civilized successors. In the shell heaps of Florida, among the *Kjækkenmœddings*, or kitchen refuse, we find great numbers of these shells, especially in a heap at Cedar Keys; and the shells of some of the west American species, found in Puget Sound, are now used by the Indians in that neighborhood, for in the ethnological department of the Smithsonian Institution at Washington (specimens 4773–4–5) are rattles made of valves of the *Pecten hastatus*, which were used by the Makah Indians in the vicinity of Neeah Bay in their dances; and another specimen is a rattle made from the convex valves of a larger species (*Pecten caurinus*) and formerly used as a medicine-rattle. These rattles are made by piercing a hole through the valves and stringing them upon a willow or similar twig."

Mr. Stearns in the same essay has furnished a most charming account of the anatomy of the scallop, which I cannot do better than to quote:

"The animal of the fan-shells is exceedingly beautiful. The mantle, or thin outer edge, which is the part nearest the rim or edge of the valves, conforms to the internal fluted structure of the latter, and presents the appearance of a delicately pointed ruffle or frill. This mantle is a thin and almost transparent membrane, adorned with a delicate fringe of slender, thread-like processes or filaments, and furnished with glands which secrete a coloring matter of the same tint as the shell; the valves increase in size, in harmony with the growth of the soft parts, by the deposition, around and upon the edges of membranous matter, from the fringed edge of the mantle which secretes it. This cover is also adorned with a row of conspicuous round black eyes (*ocelli*) around its base.† The lungs or gills are between the two folds of the mantle, composed of fibers pointing outward, of delicate form, and free at their outer edges, so as to float loosely in the water. The mouth is placed between the two inmost gills, where they unite. It is a simple orifice, destitute of teeth, but with four membranous lips on each side of the aperture.

"The mechanism by which respiration and nutrition are secured is elaborate and exceedingly interesting. The filaments of the gill-fringe, when examined under a powerful microscope, are seen to be covered with numberless minute, hair-like processes, endowed with the power of rapid motion. These are called *cilia*, and, when the animal is alive and *in situ*, with the valves gaping, may be seen in constant vibration in the water, generating, by their mutual action, a system of currents by which the surface of the gills is laved, diverting toward the mouth animalcules and other small nutritious particles.

"The shell of the scallops consists almost exclusively, says Dr. W. B. Carpenter, of membranous

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*"Scallope or Venus-cocle" is one among John Josselyn, gent's, "list of rarities."

†A portion of this mantle can usually be seen, showing a finely fringed curtain of scarlet or orange, the mantle itself being of a delicate fawn color, the whole set off with a number of bright, glistening eyes, of an elegant emerald green, encircled with a band of turquoise blue. The finest jewels of our fairest belles can be no brighter than the natural ornaments of this common mollusk.

laminæ, coarsely or finely corrugated. It is composed of two very distinct layers, differing in color—and also in texture and destructibility—but having essentially the same structure. Traces of cellularity are sometimes discoverable on the external surface, and one species (*P. nobilis*) has a distinct prismatic cellular layer externally. As the idea of the Corinthian *capital* is believed to have been suggested to Callimachus, the Grecian architect, by a plant of the Acanthus growing around a basket, it is quite possible that the fluting of the Corinthian *column* may have been suggested by the internal grooving of the pecten shells."

The present writer is compelled to acknowledge his ignorance concerning much of the infancy as well as the habits in later life of this mollusk that he would like to know. In relation to our common commercial species, the *Pecten irradians*, it "occurs among the eel-grass on muddy shores in great abundance in many localities, especially in sheltered places;" but Professor Verrill, whose words I have just repeated, adds that it is "also frequently found living on sandy shores and flats or in the pools."

The spawn (or eggs) is thrown out into the water much in the manner of oysters, clams, and other bivalves, and such of it as escapes destruction by fishes or the hundred of accidents that threaten the life of those delicate objects, catches on stones, seaweeds, and other firm supports, from the sheltered tide-pools down to a considerable depth. This is early in the summer. By the middle of July, in Narragansett Bay, this "seed" is about as large as the head of a lead-pencil, and it does not drop from its support for two weeks or more. The growth is very rapid while the warm weather lasts, so that they attain about half their full size when winter stops, or nearly stops, their further growth. In November the young scallops, spawned the previous June, will be found in great numbers all along the shore, from an inch to an inch and a half in diameter, and moving about very actively.

Where eel-grass grows in quantities, however, as in Oyster Bay, on the northern shore of Long Island, the young keep among it, clinging to the stalks, until by their weight they bend the grass down or break it, when they drift out the bay with the grass when it floats away in the fall. In the spring of 1880 the grass came into the bay, bringing young scallops; thus the abundance that year was accounted for, though there had not been a crop before in that bay since 1874. I have not heard what effect the subsequent severe winter (of 1880–'81) had upon these scallops. When older and free from the need of protection in the eel-grass, they go moving about the bay "until they find the right bottom to live upon," as an experienced Long Islander writes, "when, in sailor phrase, they come to anchor and stay there, unless driven away by heavy storms, as often happens. Under such an accident thousands of bushels are often driven up on the shores of the bay and die there by freezing."

Referring to this point, Capt. S. Pidgeon, of Sag Harbor, says that, if possible, when driven before a storm, they will work to windward, and he has seen them swimming in schools 10 feet deep. North Carolinians report that the movements are all within small limits, and that in those southern "sounds" the scallops prefer the grassy beds in shoal water, but are occasionally found on the sand. Though they increase in size very little during the winter, they are said to begin a second period of growth in spring, and to come to maturity in a single year, so that they frequently produce spawn in the June following their birth, and are in condition for the market the subsequent autumn—that is, when from fifteen to eighteen months old. The rapidity with which they enlarge their size, and particularly their fatness, or the ratio of flesh to shell, estimated by measure, is shown when they come to be prepared for market. At New Bedford, I am informed, a bushel of scallops will yield only 2 quarts of "meats" at the beginning of the season, in Octo-

ber; in November a bushel will yield 6 pints, while a month later a gallon of meat is "cut out" of a single bushel of shells. Exactly similar reports of difference between the first and last of the season were given me at Greenwich. The fishermen call this increase "growing," and it seems to be the fact.

Fishermen believe that scallops never spawn more than once, and die before they reach an age of three years. Mr. Wm. Wilson, an experienced fisherman and dealer in Rhode Island, told Mr. Ludwig Kumlien, of the Fisheries Census staff, that specimens two years old were seldom taken alive, and were "of no account as food." Another fisherman stated that he had captured "only two two-year-olds in the whole season." At Northport, Long Island, I was assured that scallops were tolerably plentiful in that harbor once in five years. The second year following the season of plenty would produce a few, the third year a scattering one or two, the fourth year absolutely nothing. Then would come a sudden accession from some unknown source. Much the same story comes from Port Jefferson, L. I.

If this theory of scallop reproduction be true, it presents a case where the generations follow one another so rapidly that there are never two ranks, or generations, in condition to reproduce their kind at once, except in rare individual instances, since all or nearly all of the old ones die before the young ones have grown old enough to spawn. If such a state of affairs exist, of course any sudden catastrophe, such as a great and cold storm during the winter, or the covering of the water where they lie for a long period under a sheet of ice, happening to kill all the tender young (and old ones, too, often) in a particular district, will exterminate the breed there, since, even if the older and tougher ones survive this shock they will not live long enough, or at any rate will be unable to spawn again, and so start a new generation. It is easy to see, too, how an excessive onslaught of dredging in a particular district might utterly destroy the fishing there until some fortunate, perhaps long-delayed, accident should recolonize the district with a new set of scallops descended from wholly outside stock. This was appreciated when the Cape Cod man remarked, in lamenting the ruin which was being perpetrated by the too greedy pursuit of scallops in the waters south of Barnstable, "scallops live but three years and can be exterminated in one winter by carelessness."

In order to understand how such wholesale ruin is prevented or, rather, how, when it does occur in any locality, the district is restocked, and also such reports of practical observers as that from Northport, we must remind ourselves not only of what I have already said of the drifting of the young, but that the scallop, unlike many of the mollusca, is not fixed to one spot, nor is it even compelled, like others of its class, to glide along the bottom with slow and regular movement; "but locomotion in this genus is rapid, and by a succession of springs or leaps," so that it is often spoken of as the "dancing." The method of the scallop's activity is as follows: When it is alarmed, or wishes to change its location, or regain the water after being left upon the beach by the recession of the tide, it opens and energetically closes its valves, thus expelling the water from the gill-cavity, the reaction shooting the creature backward. The quick shutting of the shells makes a loud snap, which can be heard at a considerable distance. Thus the scallop is able to rise swiftly to the surface of the water by a succession of zigzag, arrow-like dartings upward, and then to slide down again in a wavering inclined line until it reaches the bottom at a distance of several yards from where it started. Repetitions of this comical maneuver in progression, with long rests between, carry it over long distances; and that scallops sometimes do make considerable journeys in large companies is well proved.

"One can scarcely see a lovelier sight than that of a large number of these pretty creatures, with shells of every hue from purple white to black, enlivened with shades of pink, yellow, fawn,

and other tints, darting about in the clear water, up, down, here, there, everywhere. In their flight-like movements, vertical, horizontal, east, west, north, and south, they are more suggestive of a flock of winged animals than of bivalves of which to make a meal."

Lack of a knowledge of this vagabondish trait in the scallop once cost a French merchant dear. Having purchased several thousands of scallops in England, he laid them down in his *parc* at Port-en-Bassin, but found them all gone next tide, for when the water came in they all shot off sternforemost, like *pieuvres*. "Why, I was shrimping down in the bay there once," said a South of England dredgerman, when he heard of this story "and I seen something a shootin' along a front o' me what I'd never sin afore; 'n giv chace to 'n; and he to shoot again, and sich like, on and on—why, for thirty fathoms 'n more, till at last, when he'd a got deeper'n I cared fur to foller 'n, I seen it were a scallop. Aye, they shoots, jist like that, I can tell 'ee; but oysters," said he, "disn't."

It is asserted that they will now and then leap to a small distance above the water. Referring to this jumping power, Mr. Say relates the following: "Mr. Lesson has immersed a basket of Pectens in the water of the sea, within about 6 inches of its rim. The individuals, he says, which formed the superior layer, constrained in their movements by those that were beneath, after many fruitless efforts, succeeded in leaping from their prison. * * * In this way all the contents of the basket disappeared within fifteen minutes. Smellie repeats from Pliny that 'when the sea is calm troops or little fleets of scallops are often observed swimming on the surface. They raise one valve of their shell above the surface, which becomes a kind of sail, while the other remains under the water and answers the purpose of an anchor by steadying the animal and preventing its being overset. When an enemy approaches they instantly shut their shells, plunge to the bottom, and the whole fleet disappears.' We have not heard that this remarkable flotilla has been observed since the time of Pliny."

The young scallops are much more active and swift in all these movements than the adults. Not all scallops possess the activity of our common Atlantic coast species and of some foreign ones. Many of them have a sort of beard (*byssus*), at least when young, by which they attach themselves to rocks, seaweeds, and other marine bodies, as do the mussels, which are also bearded; having anchored thus, they are fixed forever. In general, the youngsters are more active than the older ones.

In the case of our common *Pecten irradians*, I have already given a sketch of the doings of the young. In the autumn there seems to be a migration towards the shallow water of the shore by the older scallops, and then the fishing begins. The grounds where scallops are now dredged are open tracts of sandy bottom, or else places where a thin layer of mud overlies the sand. Reefs of rocks and very soft bottom are both avoided by this mollusk. The same holds good in New York Bay, on the New Jersey coast, and in every locality where these mollusks abound. Information is scanty as to the depth to which they might be found, but it is no doubt considerable. The great bulk of those taken now, however, are dredged in less than a dozen feet of water.

The scallopers will tell you everywhere that the more they are raked the more abundant they become. I heard this from many dredgers myself, and the reports of others contain the same assertion. Raking, they say, scatters the young, and keeps them from crowding one another; in short, it lets them grow. Yet in each locality they will tell you that the yield there now does not compare in quantity with ten, fifteen, or twenty years ago. The splendid large *Pecten islandicus*, which formerly abounded on the coast of Maine and in the Bay of Fundy, is now so nearly extinct that it has become a prize to the conchologist. This came about entirely through an excessive raking and dredging for them. Long Island Sound has now been depopulated of its scal-

lops and the same is true of New York Harbor, the Sandy Hook region, and much of the New Jersey coast. At Greenwich, Conn., I was told that where ten or fifteen years ago one could fill a dredge in a few rods, and a boat would take 50 to 100 bushels a day, now only about 10 bushels a day was the average catch. From one-half to three-fourths of the dredgeful will prove trash. At Hyannis, Mass., they said four years ago that the scallops were disappearing and attributed it to the fact that in culling, the fishermen would not throw back the little ones. Many similar statements for other localities might be given. The irregularity of the present supply is also pointed out. "Some seasons the mollusks are much larger and finer than others. Thus this year they have been small. Last year they were twice the size." That is a report from Peconic, L. I. In 1879 an immense area of young growth was discovered about Crawford's Island, in Narragansett Bay; yet all died off in an incomprehensible manner before fall. Speaking of this subject to Mr. Kumlien, Mr. Wilson remarked: "When they first began catching scallops about twenty years ago in Cowesett Bay there were a hundred bushels to one. I can give no theory for their increase and decrease. One year there may be hardly any at all, and the next year a great plenty. I think the severity of the winter temperature has much to do with it. The year 1879 was a poor season, but this season (1880) young scallops are more plenty than ever before known."

2. APPARATUS AND METHODS OF CAPTURE.

The method of catching scallops everywhere pursued at present is by dredging. This would seem to be the only practicable way, and has been proved so, but early accounts of the fishing show that scoop-nets, usually on the end of long poles, were formerly used. This was speedily condemned, however, because it could be employed only where "scallops are a foot thick and miles in length," as one fisherman expressed it.

Following this came the invention of the small, triangular dredge, intended to be hauled astern of either a row-boat or sailing craft. I have never heard of any steam dredging for scallops. The ordinary scallop dredge holds from one to two bushels, but varies somewhat in form at different points along the coast. That in use in Buzzard's Bay, according to Mr. W. A. Wilcox, consists of an oval iron frame 3½ feet long. In front (or underneath) it is wire-netted but behind (above) is made of twine. Small sail-boats (dories) with a crew of two men fish with from one to twelve of these dredges over at once, sailing with just enough "sheet" to allow a slow headway. As soon as a dredge is felt to be full they "luff up" and haul it in, then empty and go on. If the wind is unfavorable one man will row while the other attends to the dredge.

In Narragansett Bay sail-boats, generally cat-rigged, are used, and the dredges are of special construction, in two shapes. Mr. Ludwig Kumlien reports:

"The dredge for a soft bottom differs from the other in having the 'blade' adjusted to swing in the 'eyes' of the arms in order to prevent its sinking into the mud. This is called the 'kettle-bail' style of dredge. The blade will fly up instead of digging into the bottom when undue pressure is exerted upon it.

"For a rocky bottom a dredge is used which has the blade immovably fastened to the arms; otherwise it does not differ from the 'kettle-bail' and it is known as a 'scraper.'

"In calm weather a small iron-framed dip-net, on a long pole, is employed in shoal water.

"The dredges are simply dragged by the boats until they are full. The large boats haul six to eight at a time; the smaller ones three, four, or five."

The number of dredges thrown out at once depends on the strength of the wind. The boat

sails itself with two reefs in, and is steered by the dredges. When they are full, as can be told by feeling the cables, the boatman "starts up his sheets all round," and hauls in his catch.

A good account in the New York Herald, describing modern operations in Peconic Bay, Long Island, shows that neither tools nor methods differ there from those just detailed.

3. DISPOSITION OF THE CATCH.

Not all of the scallop's flesh, as everybody knows, is fit for food, nor is it edible at all seasons. That portion of the mollusk employed is the firm, yellowish-white mass of that great muscle called the adductor, by which the animal pulls his shells together and is able to keep them shut. Few of the fishermen or dealers, not to speak of consumers, recognize this, however, and call the portion "eye" or "heart" under a vague impression that it is a vital organ of some sort, since when it is injured the scallop opens his shells, an act which, with the uninformed, is tantamount to its death.

"They are good boiled and pickled," says the judicious De Voe, with calmness, "but much better fried; many, however, do not like their peculiar sweetness, which is somewhat like the flavor of a rich soft clam's, but much more cloying and satisfactory." More enthusiasm warms the heart in this: "Broiled and stuffed with forcemeat, and served in his own shells, he not only forms an ornament to the table, but a pleasing variety amongst the fish." But the real, passionate admiration of a *bon vivant* is only breathed in the following, the *credo* of a disciple of Epicurus and a Herald reporter:

"Of—

> All fish from sea or shore,
> Freshet or purling brook, for which was drained
> Pontus and Lucrene Bay and Afric coast,

the crisp, tawny, not overfried scollop is the most delectable. The unctuous morsels cannot be manducated with dispassionate pretenses. A healthy person cannot swallow them with an affectation of not knowing what he is eating, for they possess an indefinable lusciousness not possessed by any fish or fruit, yet approximating to a combination of them all."

To come down to our prose again, I may remind the reader that the opening, as a rule, is done at home. There is little time or opportunity for opening on the boats, and not even as much culling is done there as there ought to be. Moreover, to throw over the offal and refuse (which a Greenwich man called "ganch") onto the ground would be considered bad policy and likely to drive the living scallops away, or interfere with their proper breeding. All the opening is done on shore, therefore, and a large number of persons are given employment outside of the dredgers. No statistics of any such employment are available for Rhode Island or Massachusetts, but an interesting and faithful picture is presented of this industry at New Suffolk (or Cutchogue), Long Island, by a recent writer in the New York Herald, as follows:

"As soon as a load is obtained away go the scallopers for the harbor. The beach at New Suffolk is lined with their houses, no less than eleven of which are to be seen within a quarter of a mile's walk along the sands. The largest of these buildings is 30 feet long by 20 wide. A broad shelf runs along each side, projecting a couple of feet from the walls, and reaching to the waist of a man. Holes are cut in this shelf at regular intervals along its length. Barrels are placed under these holes for the refuse. The scallops are piled up at the back of the shelf spoken of. The openers stand opposite the openings. Dexterity is here seen in the aptitude acquired by long practice. The openers are generally women, of all ages. Apart from the damp floors and dripping surroundings the work is not hard. Some of the young girls work after being married; come regularly in the season to gain a penny or two for those little extras coveted by all. We saw in one house two young wives, with cradles behind them containing less than year-old babies,

opening scollops with their hands, singing merrily some baby song to quiet the young ones, and by an indescribable motion of the left foot rocking the cradles with a gentle motion all-sufficient to keep the nurseling quiet. In another corner was a mother nursing her three-weeks-old babe at an interval in the work.

"A slow opener, at the present rates paid for labor—12½ cents for a gallon of eyes—will earn from 80 cents to $1 a day; a rapid one, one-half more. The fastest we observed was a lad of fourteen, named Patsy McGuire, who opened at the rate of thirty a minute by the watch. It takes 2 bushels of bivalves to make a gallon of eyes. In the work a leather palm is used to protect the hands.

"The motions of the expert opener are but three after the scallop is in hand. The bivalve is taken in the left hand, palm up, with the hinges of the scallop toward the opener's body. The knife—a simple piece of steel, ground sharp and with one end stuck in a small wooden handle—is inserted in the opening of the shell farthest from the breast. A turn is given, cutting apart the shells. The upper eye is severed through by this movement. A flirt at the same moment throws off the upper shell. The second motion cuts the lower fastenings of the eye to the under shell and takes the soft and useless rim off. The last motion throws the shell in one barrel and the soft and slimy rim in another, while the eye is thrown into a basin of yellow stoneware holding a gallon. They are then taken from the basin, thrown into a large colander, thoroughly washed, placed in clean boxes and shipped to New York and Brooklyn. The prices this year [1879] have been high, the shipper realizing $1.50 a gallon. The highest price ever given was $2.50, the lowest 50 cents, which does not pay the cost of the catch."

It is said that each of the eleven shops mentioned employs one boat and two men to catch for them, and from five to fifteen (averaging ten) persons in opening. The total of this is one hundred and thirty-three, the number of persons hired in New Suffolk, Long Island, alone, during the oyster season, besides many independent boatmen and dredgers.* The Herald's review, heretofore quoted, places the whole number of those employed at New Suffolk, scallop head-quarters, as about one hundred and fifty of all ages, from men and women of sixty all the way down to boys and girls of ten and twelve. The carefully ascertained census of Mr. Fred. Mather, made in this same locality and shown in the appended table, nearly coincides with this.

At Greenwich, R. I., the scallops are "shipped loose in small wooden boxes, without ice," according to Kumlien, "as ice spoils their flavor and swells them up. They are obliged to ice those sent to New York in the early part of the season, nevertheless, but the flavor is much impaired by the meat coming in contact with the sweet water."

There is and ought to be little or no waste in the scallop fishery. The oyster-planters of Providence and Taunton Rivers justly regard scallop shells as the best possible cultch for their seed beds and pay a higher price for them than for oyster shells. The same disposal is made of the shells accumulating at New Suffolk, "piles of which to the height of 8 or 10 feet and covering a quarter of an acre were alongside the opening-houses." They are used to deposit on the oyster beds of Long Island Sound, and no less than 50,000 bushels, for which $1,250, at 2½ cents a bushel, was paid, were sold at New Suffolk alone in 1880. One single firm in Fair Haven, Conn., has ordered 25,000 bushels to be saved for them from the scallop-opening in 1881.

The use of a somewhat similar shell, the cockle (*Cardium*), in France in the cultivation of oysters is described by Major Hayes in his report to the English Government on the Oyster Fisheries of France, in 1877. "In examining the channels [at Arcachon]" says Major Hayes, "my

* Thanks are due to Mr. O. B. Goldsmith, of Cutchogue, for information from that region.

attention was directed to a form of collector which I had not seen previously. It consisted of cockle shells strung closely together upon a wire, a hole being made in the shell near the hinge; the wire is run through, and when strung they are placed at the proper time in situations favorable for catching spat. They are kept about 3 inches above the mud by means of pegs placed at intervals, to which the wire is attached, and they appeared to me to succeed admirably."

The Long Islanders are famous for the extent to which they utilize dead fish (menhaden or mossbunkers) and other marine organisms as manure. It is not strange, therefore, to find that they economize the offal of the scallop-opening, which is mixed in the compost heap with the seaweed of the beach and makes a grand manure for the enriching of the growing corn, the fertilizer being placed in the hill instead of being sown broadcast on the land. I presume the same utilization of the refuse is practiced in Rhode Island, though I did not learn the facts there so specifically.

"This multitude of scallops," says a recent writer, "attracts to the waters of Peconic Bay thousands of water fowl. Black ducks, geese, loons, and the common non edible ducks, such as coots, old squaws, and whistlers, are in immense numbers, while the gulls fairly whiten the sand bars when the receding tide leaves the sands bare. Robin's Island has at its north and south ends two sand bars, which are bare at low water for half a mile. On these bars, therefore, are left scallops, razor-fish, five-fingers, and all the minute crustacea that make up marine life. Where food is abundant there will be found something to feed upon it. Hence the crowds of birds on these points at low water reminds one of the fabulous anecdotes regarding bird life related in the stories of a Jules Verné."

But these birds are not the only enemies of scallops. They form the favorite food of many fishes, especially the cod, and its congeners. The small boring mollusks attack them more commonly even than the oyster, whenever they can catch a scallop quiet long enough to get a fair hold upon him; and for the same reason, namely, because their shells are more fragile than the oyster's, many species of star-fish, including some small and weak ones and some living only in deep water, are accustomed to seize upon and devour them. The scallop is very quick-sighted (if not exactly in eye-sight, at least by some other means of apprehension) and active in avoiding his enemies, so that it is able to escape many times when a more sluggish mollusk, no better armored than he, would perish. The compensation for his thin, easily crushed, or quickly bored shells, then, is his sharpness of wit and swiftness of locomotion, and so he is able to hold his own in the fight for existence, which is ever going on among the denizens of the deep, as well as those of the upper world.

4. EXTENT OF THE SCALLOP FISHERY.

A statistical view of the annual production of scallops, so far as I have been able to come at it, remains to be given.

SCALLOP FISHING AT CAPE COD AND BUZZARD'S BAY.—As the common scallop (*Pecten irradians*) is found only in a "rare and local" way north of Cape Cod, we must look to the southward of that great dividing point for any commercial fishery of them. The most northerly locality at which such a fishery exists, as far as I am informed, is at Hyannis, Mass., and during the winter of 1877 many persons of all ages and conditions were employed in it there. One firm fitted up a large house expressly for the business, and employed a large number of openers. Skiffs, cat-rigged yawl-boats, dories, and punts, two hundred in number, and of every size, shape, form, and color were used; most of them were flat-bottomed, shaped like a flat-iron, and therefore very "tender" when afloat. Each boat carried two dredges, locally termed "drags." In that year according

to Mr. F. W. True, each of the two hundred boats averaged about 120 bushels, or 100 gallons, during the season, which would give a total of 24,000 bushels, or 20,000 gallons, for the fleet. The scallops were sent to New York and also to Boston, and an average price of $5 per half barrel was received. In 1876 the price was $7 and in 1878 only $3.50.

Further inquiries show that this spurt at Hyannis had no precedent and has completely died away, so that at present there is no catch there, or at least no shipments.

In the Acushnet River, and all along the western shore of Buzzard's Bay, these little mollusks abound, and their catching has come to be of considerable importance to that locality. Mr. W. A. Wilcox, who sends me notes on the subject, says that it is only eighteen years ago that a fisherman of Fairhaven (opposite New Bedford) was unable to sell 5 gallons that he had caught. But the taste has been acquired, and a local market has grown up to important proportions, so that in 1880 fourteen men and ten small boats (dories) were dredging for scallops in Buzzard's Bay from the middle of October to the middle of January. Mr. Wilcox says: "These small boats will take from 10 to 75 bushels a day." The men are not able or not willing to work every day, however, since the tautog and other fishing calls for their attention, and there is danger of overstocking the market. It therefore happens that the total catch reported for both New Bedford and Fairhaven men will not exceed 6,400 gallons, valued at $3,840, 60 cents being a fair average price in this and the Boston market. The value of the investment devoted to this business at Fairhaven is about $120.

Scallop fishing in Rhode Island.—The next scalloping-ground is in Mount Hope Bay and Cole's River, Massachusetts, on the eastern side of Narragansett Bay, for information in regard to which I am indebted to Mr. Ludwig Kumlien. The best grounds in this neighborhood lie between Gardiner's Neck and Warren's Neck and for a short distance up Cole's River. The number of men employed there was reported at about twenty-five, seventeen of whom were "cutters," or those who open the shells as fast as they are dredged and extract the edible portion. This force was divided among eight boats. The season here begins September 1 and lasts until the weather becomes too cold and stormy for work. The product for the year 1879 was estimated by Mr. Kumlien's informants at 8,000 bushels, equal to 6,000 gallons, which sold at 60 cents, and so realized $3,600, or $150 apiece, on the average, for those engaged. Two-thirds of this catch was sent to New York, the remainder going to Boston, Fall River, Mass., and small neighboring towns. Complaint was made that much of the catch in 1878 had to be thrown away, since there was no market for it. The investment at Cole's River in this business Mr. Kumlien sums up at $1,040, giving $640 as value of sail-boats and $400 as value of dredges and other implements. I think this is too high, however, and prefer to make the sum $800.

This brings me to perhaps the most important scallop fishery at present on the whole coast—that of Greenwich Bay, Rhode Island. There is said to have been some catching near Pawtuxet, in Providence River, but, if true, the fishery has not yielded anything of late to amount to much. The only beds of value, therefore, are to be found in Greenwich or Cowchusett Bay, an indentation of the western shore of Narragansett Bay. There the scallop beds, according to a map furnished by Mr. Ludwig Kumlien, are as follows:

I. About Chippanogset Island, at the western extremity of Greenwich Bay, extending about one-third of a mile from the island-shore. These are considered among the best of all the grounds.

II. On the north shore, the beds begin near the mouth of Apponaug River and extend eastward, reaching out into the bay from a quarter to half a mile for a distance of about 2 miles, then extending southward in a curve as far as the channel, and opposite Spring Rocks, on Warwick

Neck (where the beds seem to stop). The fishing ground lies in the channel to 35 feet in depth. This ground is known as the North Shore or Apponaug grounds.

III. On the south and east shores of the bay are found the most extensive and profitable beds. These begin about one-fourth of a mile north of Potowomut Rocks in about 13 feet of water, extend eastward to the channel, and then curve gently southward, going outside of Hunt's Ledge; in fact, they may be said to take in almost the entire flats west and southwest of the main channel. These beds also extend southward as far as Quanset Point, a distance of about 5 miles, but not south of Pojack Point. The grounds are of little value in comparison to the Greenwich Bay beds proper.

The Chippanogset grounds are considered to be the best, as they seldom give out. When this occurs the remainder are sure to be of no account.

It appears that Greenwich Bay has not always been the home of scallop and scallop fishing. In the East Greenwich Palladium of November, 1867, some quotable statements appeared.

"Only a few years ago Cowesett Bay * * * contained but few scallops or oysters. Clams and quahaugs were from time immemorial abundant along its shores. * * * Some six years ago it was found by a few fishermen that large quantities of scallops had planted themselves upon the sand-bars and grassy flats in the bay, and that they were approaching a size suitable for table. The next year they were taken in small quantities. Subsequently the scallop fishery was carried on extensively, employing, perhaps, fifty boats and nearly one hundred men from September to May. Hundreds of bushels were caught daily, cut out, and sent to order from all points of the compass to market. Many thousand gallons were disposed of last year * * * at prices that well paid the fishermen."

Later it was said: "The scallops have had to retreat from the bay to a great extent. * * * A new bed of 50 acres lying between Warwick Neck, the Middle ground, and the Spindle, in the shape of a triangle, has just been discovered, where the scallops are large and plenty, and where every pleasant day a score of boats may be seen."

My information is, that in the winter of 1879–'80 there were ninety boats in the fleet. But Mr. Kumlien, relying upon the estimates of Mr. William Wilson, a large dealer, gives the number of boats as eighty, and intimates that additional boats from Massachusetts and elsewhere often dredge in the bay. These boats are nearly all cat-rigged, there being only two or three sloops and several small sharpies. At an average valuation of $150, they would sum up $12,000 as a total.

To man these Greenwich boats and "cut out" the meats employs about one hundred hands, twenty-five or thirty of whom are women and girls. This is in 1880; in 1879 less were employed in catching, but nearly double the number in opening for market. The previous year (1878) was an unusually good one in this business, and Mr. Wilson alone employed about twenty hands.

There are several methods of conducting this fishery here. The man who owns the boat may catch for himself or on shares with his companion. Shippers often furnish boats, dredges, &c., and pay various prices, at a certain rate per bushel, from 10 cents upward, according to the abundance or scarcity of the stock. The opening is rarely done in the boats, since the throwing overboard of the offal and waste matter (here known as "gauch") is considered injurious to the beds, and the practice gives an opportunity for fraud under the State law, as is charged against some Providence craft. Moreover, there is sale for the shells to neighboring oyster planters, to be used as "stools" for oyster spat to catch upon.

A law of the State of Rhode Island alluded to, specifies in respect to Greenwich Bay that

not more than 15 bushels of scallops shall be taken by one boat in one day, and only between the 15th of September and the 15th of May. In respect to this law Mr. Kumlien says: "We are informed that certain of the scallopers were instrumental in getting this law passed, in the hopes of raising the price; when they found it did not serve that purpose, they were the first to break it. We are informed the law is of no account at all. Quantities are stolen long before the time allowed, and the majority of the boats take all they can get, as they can fish only when there is a wind." Though I heard dissatisfaction expressed with the law, I was assured, when I was there, that the law was well kept by all the Greenwich scallopers at least, and, indeed, by everybody. Each man's jealousy of his neighbor's getting an advantage over him, a feeling which seems far more strongly developed among the followers of the sea than among any class of landsmen I know of, prompted an incessant watch upon one another's movements, the sharpness of which was increased by the knowledge that to the informant went half the fine levied upon conviction. No one seemed to have any better protective measure to propose, at any rate.

Restricted by this law and the circumstances, the catch of Greenwich Bay during the six active weeks in the autumn of 1879 was closely estimated at 24,000 bushels. Mr. Wilson considers this equal to 24,000 gallons, but I think they would hardly measure so much, and would prefer to say 20,000 gallons. At 60 cents per gallon (which the fishermen consider too low to be profitable or encouraging even) the value of the catch would be $12,000. The bulk of the scallops caught here go to New York, but Providence, Newport, and Connecticut towns receive small but regular supplies. They bear a high reputation in all markets.

To the value of the boats must be added five hundred dredges, at $4 apiece, making $2,000 and about $500 for other accouterments. The total floating capital invested in the scallop fishery here is, then, $14,500.

At Wickford, R. I., there live a few scallopers, and three boats are owned; but these have been included in the statistics of Greenwich Bay, where they do all their fishing.

Long Island Sound.—Though formerly there were an abundance of scallops on the Connecticut coast, as is recorded by the early writers, no catching of them there now is profitable. This is true of all Long Island Sound, apparently, though occasional catches are made at long intervals. At Oyster Bay, Mr. Fred. Mather was told that every few years they had a crop of scallops, and that in 1880 there were large numbers of young, as large as a quarter-dollar, to be seen. The fishermen told him that there were always a few. Hempstead Bay formerly possessed them, but they have now wholly disappeared from its area. Five years ago (1875) these shell-fish were plentiful in Port Jefferson Harbor, being taken by the boat-load. After an almost entire absence, about 250 gallons were caught and opened in 1880. The irregularity of Northport Harbor has already been mentioned. The last occasion when they appeared in force was in 1878, during which year the crop was said to be 10,000 bushels, which would perhaps "open" 7,500 gallons, worth $4,000. I am inclined to think this a large estimate, however. A few years ago, it is said, scallops were common enough off Bridgeport, Conn., but have now wholly disappeared, the few that are caught anywhere in that neighborhood there finding a prompt local sale.

The Scallop Industry at East End of Long Island.—In Peconic and the other bays at the eastern end of Long Island, inclosed by Montauk and Orient Points and Gardiner's Island, is the very important scallop ground and fishery to which I have already alluded as having its headquarters at New Suffolk, or Cutchogue, as it is known to the Post-Office Department and railway people. Here this industry takes the place of an oyster-culture or clam-digging, and ranks high as a means of support to the people along the shore. In October of 1879 the account of this fishery, already quoted, was printed in the New York Herald, which I am glad to copy and con-

dense, since it has been approved as trustworthy by Mr. O. B. Goldsmith and other experienced persons living at New Suffolk:

"New Suffolk, Long Island, situated on the north shore, and midway of the length of Great Peconic Bay, whose waters reach from Greenport, on Long Island Sound, to Riverhead, a distance of 40 miles, is the great fishing-ground. * * * The favorite grounds lie in a line drawn from northwest to southeast across the bay from New Suffolk toward Southampton, on the eastern shore. Here the scallops are always found."

The history of their discovery and the origin of the business has been detailed in a letter to the Census Bureau by Capt. Ira B. Tuthill, jr., of New Suffolk. He says New Suffolk is the chief, and has the largest number of individuals engaged in the trade. "Fourteen vessels, in size from the cat-rigged sail-boat of a couple of tons register to the schooner-rigged vessel of twenty, hail from New Suffolk. The crews run from a man and a boy on the smaller to a half dozen able-bodied men on the larger boats. The work is of the hardest and the coldest sort. No one that has not the constitution of a horse could stand it. No weather is severe enough to keep these hardy, tough men from making a catch whenever a 'bed' is found. The wages are not high—are really low when the exposure incident to the trade is remembered—but the work comes in at a time of year when there is little demand for labor, and hence the men for the work are easily procured. As was the case years ago in the whale fishery, boats are built or purchased for the special purpose. The owner or owners receive such a proportion for interest money, the captain of the boat gets a 'lay' in the profits instead of wages, while the men will average $1.50 a day for their earnings. * * * The largest vessels of the fleet engaged in the scallop trade are as named below:

Names of vessels.	Names of captains.	Port.
Emma Wilson	Frank Acker	New Suffolk.
Mary Beyea	T. Billard	Do.
Maggie	Bryan Hudson	Do.
Flora	Steve Heffern	Do.
Mary	Thomas Edwards	Do.
Cloud	Stacy Webb	Do.
Gypsy	C. Halsey	Do.
Nightingale	Patrick Gowen	Do.
Eva	Benjamin Webb	Do.
Annie Bell	William King	Do.
Blackbird	George Goldsmith	Do.
Three Brothers	Foster Fanning	Do.
Skitterer	Warren Wells	Mattituck.
Horace Greeley	W. Reeves	Do.
Little Maid	A. Overton	Do.
Walter Girard	G. Crouse	Do.
Mary Ann	H. Howell	Do.

The origin of this business in that locality is recent.

The fishing season lasts from October to April, but the catch varies from year to year. In 1877 it seems to have been remarkably high, 80,000 bushels, yielding 40,000 gallons (it is estimated), having gone to New York from this locality. The price, however, ran down as low as 50 cents per gallon, barely paying expenses. In 1878 only 20,000 gallons were produced, or half the previous season's yield, and in 1879 it was lighter yet. In 1857, the sloop Tradesman (40 or 50 tons), of Norwalk, Conn. (the captain of which was afterwards light-house keeper at Norwalk Islands), came over to Long Island in search of scallops. After trying in several parts of Gardiner's Bay without success, they started up the Peconic, and, being oystermen, they had some idea as to

the sort of bottom suitable to the animals they were looking for. After several unsuccessful trials they "hove their dredges off the northeastern point of Robin's Island, opposite New Suffolk, and when they hauled them in found them solid-full of scallops." Anchoring there at night, they renewed work the next morning, and soon had taken up 750 bushels, with which they departed.

A few days later a second large sloop appeared, and after a day's dredging carried away about 1,000 bushels. Scallops had been taken out of the bay and eaten by the people on its shores ever since the first settlement of the region, but only in small quantities, caught by a hand-net or picked up at low tide. What use was to be found for whole ship-loads, therefore, excited much questioning among the bay-men. This resulted in the discovery, by the next summer, that there was a considerable demand for scallops in Norwalk, Bridgeport, New Haven, and other Connecti. ent towns. C. W. Fanning, George I. and O. H. Tuthill of New Suffolk, therefore began to compete with the sloops, which still came from across the sound. Late in the season one of the citizens tried the experiment of shipping to New York, sending 7 gallons in a common nail-keg. The commission merchant in Fulton market to whom they were consigned replied that nobody knew what they were, but that if Mr. Tuthill would send a few in the shell they might be made to go. Accordingly a box of scallops in their jackets were shipped to New York, and in a week $3 was returned as the proceeds of their sale. This was the beginning of a scallop business which now amounts to $15,000 or $20,000 a year. New Suffolk remains the natural center and headquarters, because the facilities to open the scallops are better there than elsewhere, and the village is nearest the most productive grounds, which are on the northern side of Peconic Bay.

The catch in 1879, it is reported, was only about 20,000 bushels, or 12,000 gallons; consequently prices were high, the skippers often selling on the shore for as high as $1.25 or $1.50 per gallon. It is probable, however, that an average of 75 cents would be fully as high as the truth would permit, which would make $9,000 the value of the whole catch.

For the season of 1880, which has been far better, owing, no doubt, in a large degree to the openness of the previous winter, the record of the catch has been very carefully worked out by Mr. Fred. Mather, and I give his figures without change, embodying them in a table which comprehends the scallop-fishing interest of all Peconic Bay:

Statistics of scallop industry of Peconic Bay, Long Island, in 1880.

Places.	Bushels.	Gallons.	Pounds.	Value.	Men.	Women and children.	Estimated investment.
Greenport	2,222	1,111	10,000	$666 60	10	54	
Southhold	8,888	4,444	40,000	2,666 40	2	13	
Peconic	4,000	2,000	18,000	1,200 00	20	50	
Jamesport	1,666	833	8,500	699 60	16	61	
Mattituck	4,000	2,000	18,000	1,200 00	5	17	
New Suffolk	18,000	9,000	81,000	5,400 00	90	110	$20,000
Franklinville	1,776	888	8,000	532 80	4	10	
Sag Harbor	11,110	5,555	50,000	3,333 00	30	100	
Springs	10,000	5,000	45,000	3,000 00	10	40	
East Hampton	888	444	4,000	260 40	2	6	
Bridgehampton	1,776	888	8,000	532 80	4	10	
Totals	54,326	32,163	290,500	19,491 60	193	471	

Amount earned by men, $15,632.04; amount earned by women and children, $3,859.56. Sale of 50,000 bushels of shells, at 2½ cents, $1,250.

Concerning the facts represented by the figures given above, some remarks will be advisable.

Of the 90 men credited to New Suffolk, 70 are fishermen and 20 are openers. Out of the 200 persons engaged in this industry, 8 are Scotch, 12 Irish, 4 German, and 176 Americans. Of the 90 men, 50 are married, and in all 340 persons are dependent, giving an average of about $57

apiece income all round for each season. The fleet averages 100 bushels (in shell) a day, or 18,000 for the past season, each of which will produce half a gallon of meats on the average, or 9,000 gallons in all. The price for opening was formerly 25 cents a gallon; but it came down in 1879 to 15 cents and in 1880 to 12 cents, but if prices are good it is expected to go back to 15 cents. The total earned by the openers at New Suffolk (almost wholly women and children) last season, was $1,080; divided among 110, this gives each one hardly $10, but of course the distribution was far from equal. The average earnings of the 70 fishermen amounted to $97.40. These figures closely represent the average of the whole $19,491 received by the shore people for the scallops sold.

The "rims" or refuse, which was formerly sold at $1 per barrel to the fertilizer factories, is now usually retained by each proprietor for his own land. Some of the scallop-boats are used in the clam trade during the "off season."

NEW JERSEY AND SOUTHWARD.—Scallops are taken to a very small extent at different points on the coast of New Jersey and southward, but nowhere enter into trade, so far as I can learn, except at Morehead City, N. C., there being a large bed of them in Bogue Sound, just opposite that town. Fishermen there have long taken them for local use and have shipped a few to the nearer northern markets from time to time. In the winter of 1876–'77 the business reached its height and several thousand gallons were sent north, a few going as far as Philadelphia and New York. Since this date few have been shipped and the supply is consumed locally.

The height of the season is from December to February 15, though they are abundant during the entire year. In winter fifteen or twenty men and boys often engage in this fishery, while five or six continue the business during the summer months. An average catch is from 4 to 6 bushels at a tide, the fishermen wading for them on the grassy shoals, that are nearly dry at low water. Ten thousand bushels would probably be a high estimate of the total yearly crop, opening, say, 7,500 gallons. Formerly 60 cents a gallon was the price, but in 1880 they brought only 40 cents. The supply is regulated wholly by the demand, and if a market could be found for them at good prices a considerable quantity could be obtained.

SCALLOPS IN CALIFORNIA.—The scallop occurs on the southern coast of California, in a species resembling *Pecten irradians*. Prof. D. S. Jordan writes me that it is very abundant about Wilmington in the lagoons, where it is caught by any one inclined to go for it, and sells in Wilmington at 25 to 50 cents a bucket. It is liked by the people, but there is no regular market or trade. It is now several years since Dr. R. E. C. Stearns expressed his surprise that the San Diego scallop had not been introduced into the San Francisco markets, and prophesied that it soon would be.

STATISTICS OF SCALLOP FISHERIES OF THE ATLANTIC STATES.

Statistics furnished from New York and Brooklyn give an idea of the consumption, and are repeated below. It is said that in the New York markets Rhode Island scallops bring better prices than Long Island ones. "New York dealers tell me," says Mather, "that the former are larger, and that it is the custom of the Long Island men to wash their scallops too much in fresh water, which causes them to swell and look good and to measure more, but that they shrink up small when cooked. Three gallons of open scallops placed in fresh water overnight will swell to 4 gallons by morning. Salt water does not swell them."

Mr. Lamphier reports that in 1880 there were used in Fulton market alone 29,499 gallons, and in Brooklyn and other suburbs 25,501 gallons more, making 55,000 gallons in all.

This shows that New York City absorbs four-fifths of all the scallops caught on our coast, which, so far as this investigation goes, aggregate as follows:

	Gallons of meats.
Buzzard's Bay	6,400
Cole's River	6,000
Rhode Island	20,000
Long Island	32,163
New Jersey and southward	7,500
Total	72,063

Value, at 40 cents per gallon, $28,825.20.

3. THE CLAM FISHERIES.

1. THE PRINCIPAL SPECIES OF AMERICAN CLAMS USED FOR FOOD.

The "clams" of commerce in the United States are of various species, differing widely in all features except the single quality of being edible bivalves. This permits the including of nearly all the double-shelled mollusks. The list, enumerating those most commonly used, is as follows:

ATLANTIC COAST.

Mya arenaria. Soft clam.
Venus mercenaria. Quahaug or hard clam.
Mactra solidissima. Surf or sea clam.
Cyprina islandica. False quahaug.
Callista gigantea. Painted clam.
Gnathodon cuneatus. Cuneata clam.

PACIFIC COAST.

Pachyderma crassatelloides. Hen clam.
Saxidomus aratus. Round clam.
Chione succincta. Little neck clam.
Mactra falcata. Western surf clam.
Schizothærus nuttalli. Gapers.
Macoma nasuta. Tellens.
Semele decisa. Flat clam.

It is my purpose to treat of these separately, since the circumstances of their distribution, gathering, and sale favor it, and I will begin with that most important, probably, to the Atlantic coast, the clam, *par excellence.*

(*a*) FISHERY FOR SOFT CLAMS.

2. NATURAL HISTORY OF MYA ARENARIA.

The common names of *Mya arenaria* are numerous. North of Cape Cod it is simply the "clam," distinguished, if at all, by the name "soft clam." In Long Island Sound and at New York it is most spoken of as the "long clam" and "squirt clam." English books and people call it the "sand-gaper," the "old maid," &c.

A moist and muddy clam is not altogether an attractive object. Yet there is much about it

that is interesting. Take up one of those *Mya* clams, for instance, and look at it. The two oblong, slight, bluish-white shells hold within an unintelligible yellowish mass, while projecting from one end is a blackish, wrinkled lump that, upon being irritated, quickly withdraws, throwing out at the same time a stream of water, while the shells shut tightly together. But put this forbidding looking creature in a shallow pan of fresh sea-water 12 or 15 inches in length. Although this, its natural element, is no doubt instantly grateful to it, the animal must be left quietly for a few hours before it recovers confidence. Then the blackened tube—of which a glimpse was afforded before—gradually protrudes from between the margins of the two halves or valves of the shell, and slowly extends itself until a length of several inches is displayed. Now it is easy to see that this organ has two openings at the end, beautifully fringed with appendages like little feelers, and mottled with the richest brown. It really, then, consists of two tubes, one on top of the other, leading to the body of the clam, and if you observe the openings closely, you will see a current of water flowing into one of them, and another current pouring as steadily out of the other. These currents are produced by the tremulous motion of innumerable minute hairs (*cilia*) that line the interior of the animal. The extensile and contractile double tube is termed the "siphon," and the currents "siphonal currents."

The anatomy of the clam, like that of nearly all bivalved mollusks, is very simple. Forcing them open, we find that the two halves of the shell are held together by a pair of strong muscles, but if the animal would keep his doors quite closed he must exert a continued effort, since immediately beneath the hinge, occupying a little cup-shaped projection like a bracket, is an elastic substance which acts to throw the valves a little apart when the muscles are relaxed, just as a piece of india-rubber squeezed into the hinge of a door would tend to open it as soon as the pressure was removed. Having taken off one valve, we find lining it—and the other as well—a thin membrane, called the mantle. The scalloped border which follows the edges of the shells is thickened and united, except a small slit through which the "foot" projects at the end opposite the siphon. The foot is a tough and muscular organ serving as an excavator. Within the mantle are the curtain-like gills, between which lie the muscles that operate the foot and siphon, the abdomen and the viscera, which form the principal edible parts. The mouth is just under the forward transverse muscle, and opens almost directly into the stomach. The intestine, after several turns, goes back directly through the heart to its orifice near the mouth. The ordinary length of the shell is about 3 inches, but it is not uncommon to find it much larger, while the siphon may be projected fully a foot.

In this country the *Mya* clams are found from South Carolina to the Arctic Ocean, where the seals, walrus, polar bear, and Arctic fox feed upon them whenever they have a chance. They are scarce south of Cape Hatteras, and most abundant on the New England coast. They occur on the northern coasts of Europe as far south as England and France, on the northeastern coast of Asia, in Japan, and in Alaska. It is therefore essentially a northern species, and had the same general distribution as far back as the pliocene and miocene ages of geology.

Soft clams are everywhere denizens of the beach between tide-marks. The soil that suits them best is sand, with a large admixture of gravel or mud, but all sorts of places are occupied where the water is sufficiently brackish and where it is possible for them to burrow. The specimens that live on the outer sandy beaches have a much whiter, thinner, and more regular shell than those found in estuaries; they are often really delicate in texture, and covered, even when full grown, with a thin, yellowish epidermis, making a striking difference between them and the homely, rough, mud-colored specimens usually seen in the markets. Now, as in 1616, when Capt. John Smith wrote "You shal scarce find any Baye, Shallow Shore or Cove of sand, wyere

you may not take many Clampes," these mollusks are very numerous. More than a hundred, of different sizes, are said to be sometimes dug from a single square foot of ground in Boston Harbor.

On such beaches as I have mentioned, the young clam, as soon as old enough, turns his head down, and pushing out his foot, which he can fold into various shapes, "now a dibble or spade, a trepan or pointed graving tool, a hook, a sharp wedge," he digs his way straight down, 6 or 8 inches into the sand, leaving stretched behind him his siphonal tubes, to keep up his communication with the surface. When the water over him is deep, the siphons are thrust well out; when shallow, as in some tide pool, only the fringe of short tentacles is visible above the closely impacted mud, and when, as happens most of the time, in the case of those clams whose home is near high-tide mark, there is no water over him at all, his tubes are withdrawn wholly into the sand.

Confined in his burrow deep in the earth, the clam cannot roam in search of food. It is, therefore, to bring sustenance to it that the tubes are pushed up into the sea and the cilia set in motion. A current of water is sucked in, bearing microscopic particles, as aliment for the stomach, and bringing oxygen to revivify the blood brought into contact with it in the gills. Its burden unloaded, the available residue of the water flows out through the discharging siphon, carrying with it all excrementitious matter, and a continuous current is thus kept up. It is never "long between drinks" with this bivalve, which may, perhaps, account for the origin of the adage "happy as a clam."

The spawning season, according to the fishermen, occurs in June and July. The eggs, issuing from the ovaries of the female, find their way into the cavities of the outer gills, where they are fructified. There they develop until the eggs are furnished with triangular, vellum-like shells just large enough to be seen, which are discharged by thousands into the water and left to take care of themselves. How long it is before they reach a sufficient size to settle down in life and construct a burrow for themselves is unknown—probably not a great while. It is doubtful indeed whether one in a hundred ever fulfills that domestic ambition before being swallowed by some one of the numberless aquatic birds, fishes, and crabs, that are on the lookout for just such tidbits. Nevertheless the little clams do their "level best," anchoring themselves by a slender thread to the bottom, and holding on against the currents with all their might.

Beds of soft clams are sometimes of vast extent, and are usually found in sheltered parts of the coast, where the action of the waves is not sufficiently strong seriously to disturb the beach. The inside of the long sandy neck connecting Nahant with Lynn, for example, is filled with them, while on the outside, where the surf pounds, not one is to be found. They are sought at low tide, betraying their hiding places by squirting water up when the sand is shaken or pressed. That is the spot to drive in your spade. Since the days of the Mayflower, hogs have had sagacity enough to discover the situation of the buried bivalves at low water, and to root them out and devour them, for no less than 250 years ago old Thomas Morton recorded that this diet "makes the swine prove exceedingly," and Wood, in his "New England Prospect" (1634), remarks:

"These fishes be in great plenty in most parts of the country, which is a great commodity for the feeding of swine both in winter and summer, for, being once used to those places, they will repair to them as duly every ebb as if they were driven to them by keepers."

Long Island farmers and their swine are of the same opinion and practice still.

Such clams as have been unlucky enough to be washed out and cast high up by some rude breaker, and yet escape the pigs, are quickly seized upon by gulls, cormorants, crows, and other large birds that frequent the shore. During the winter months when ice is often piled high upon the northern beaches, the clams bury themselves more deeply than ordinary, and get along

as well as they can. They seem able to endure great cold without harm. Professor Agassiz found within their shells icicles, which did not incommode them in the least.

The utilization of the soft clam as human food and as bait forms an important element of the marine wealth and industries of the United States, and has been carefully kept in view during the progress of the present investigations.

3. SOFT-CLAM FISHERY OF MAINE.

Though occurring in the Gulf of Saint Lawrence, clams are little eaten there. In the Bay of Fundy, however, they are constantly dug in sufficient quantity for household use, and the shell-heaps left by the Indians consist almost wholly of these shells. The absence of extensive mud flats bordering the sea along this precipitous and rock-bound coast, however, makes it unsuitable for the growth of clams to any great extent until the bay at Jonesport, Me., is reached, where between that town and Rogue Island are very important diggings. From there all along the shore to West Goldsborough these mollusks are got in variable quantities. At West Gouldsborough, however, they exist in great abundance. The next important point is Mount Desert, or rather Bartlett's Island, close by, which yields more than Mount Desert; beyond which few are found as far as Eggemoggin Reach, where between Deer Island and the mainland enormous quantities of clams are got for local consumption and for sale. Northward of this point, Isleborough, in the mouth of the the Penobscot River, is a very productive ground, but between the Penobscot and Casco Bay there are only small diggings, nor any deserving special mention between Portland and Portsmouth.

The point of special interest on this coast, as a clam locality, is Deer Island, not only because of its extreme productiveness, but also because it is the only place in the United States where women make a practice of digging clams.

For statistics of the coast of Maine I am indebted to Mr. R. E. Earll, of the U. S. Fish Commission, who furnishes them as follows:

Locality, 1879.	Product.	Value.
	Bushels.	
Eastport custom-house district	1,500	$525
Machias custom-house district	20,100	6,916
Frenchman's Bay custom-house district	15,153	5,144
Castine custom-house district	58,520	15,142
Belfast custom-house district	7,265	1,980
Waldoborough custom-house district	14,798	3,756
Bath and Wiscasset	16,628	4,851
Portland	62,352	15,618
South of Portland	122,067	36,124
Coast of Maine	318,383	90,056

As I have intimated, the greater part, perhaps nine-tenths, of these clams are prepared for bait, an account of which is deferred until a later paragraph. Those used as food are eaten at home by the persons catching, who are the farmers and villagers living near the shore, or who come down, picnic fashion, from the interior, as did the Indians of yore, to enjoy a feast of clams and sea-side recreation, or they are disposed of in the markets of the coast towns. I think few are sent to Boston from farther away than Scarborough, in Maine. According to the History of Searborough, by the way, "It was not until within a few years [previous to 1852] that any of our citizens made it a part of their yearly business to procure clam-bait for the fishermen on the Banks. The clam-flats have now become a source of considerable profit to many of the townsmen. During the winter and spring of the present year (1852) they have procured nearly 2,000 barrels of this bait."

It follows, from the nature of the case, that along this northern coast, where foreigners are few, and nearly everybody, however estimable or well to do, works with his hands and is largely concerned in fishing and other marine industries, those who "go clamming" suffer no less of social respect on account of their humble employment, nor do they deserve to by reason of any more "shiftless" and loose behavior than characterizes the majority of their fellow citizens. I point this out here, because as I advance down the coast into different conditions of society the reader will find a great change in the *morale* of the clam-digging fraternity.

4. SOFT-CLAM FISHERY OF MASSACHUSETTS.

General Review.—Leaving Maine, all the coast of Massachusetts Bay is found to be a highly productive region for soft clams, and an immense trade is supported, centering in Boston.

The abundance of clams was a matter of great solace and profit to the Puritan colonists, as quaintly expressed chronicles bear witness. For example, it is recorded in the early annals of Plymouth that a good man, in a time of scarcity of food, asked his pastor to dine on clams, and returned thanks that they were permitted "to suck of the treasure hid in the mud." That was surely being jolly under creditable circumstances. In his "New England Canaan," 1632, Thomas Morton mentions among the riches of the New World certain fishes and mollusks, among which our *Mya* is prominent.*

The digging of clams is the winter occupation, whenever weather will permit, of all the people who live along the shore and get their living from the sea wherever suitable flats are accessible, and the business is quite as high in repute and remunerative as the fishing. It has changed but little in its general features since described in "Peter Gott, the Cape Ann fisherman," as practiced twenty-five years ago on the Ipswich Banks:

"When the tide is out, on pleasant winter days, one will often see gangs of ten, twenty, or fifty men and boys busily employed in turning up the mud on the flats, and picking up the clams into buckets. The implement which they use is a stout fork, with three flat prongs, each about an inch wide and 10 or 12 inches long. The men go out on the flats in wherries, when the tide is retiring, and push an oar into the mud and make fast the boat to it, and as soon as the water has left the boat commence operations. When a bucket is filled it is emptied into the boat. They continue their work until the tide comes in again sufficiently to float the boat, when they pull to the wharf.

"On many places on the shores of these flats there are groups of small huts, 10 or 12 feet square, with stone chimneys running up on the outside, furnished within with a small stove and two or three stools for seats. The clams are deposited in these huts, and in those parts of the day when the tide is in, so that the men cannot work out on the flats, and in stormy weather they are employed in shocking them, as it is called, that is, in opening the shell and taking out the clam, which is done with a small, stout knife. As the clams are taken from the shell they are dropped into a bucket; when the bucket is filled they are emptied into a barrel. Around these huts it is not uncommon to see heaps of clam shells larger than the huts themselves, the accumulations of a winter's labor. The clam diggers sell the produce of their labor to traders, who send their

*Morton says: Mustles there are infinite store. I have often gon to Wassaguscus, where were excellent Mustles to eate (for variety) the fish is so fat and large.

Clames is a shell-fish, which I have seene sold in Westminster for 12 pe. the skore. These our swine feede upon; and of them there is no want, every shore is full, it makes the swine proove exceedingly, they will not faile at low water to be with them. The Salvages are much taken with the delight of this fishe; and are not cloyed (notwithstanding the plenty) for our swine we finde it a good commodity.

Raser fishes there are.

Freeles there are, Cockles and Scallopes and divers other sorts of Shell-fishe, very good foode.

teams around to the huts weekly or daily, according to the weather, and carry them to their storehouses, and repack and salt them and head them up in barrels, when they are ready for the market."

The price paid in Massachusetts is considerably higher than the average price in Maine, because of the nearness to a good market, and may be placed at 39 cents.

The great majority of the clams dug here, as northward, are made into bait, rather than sent to market. There are a few boats, of small size (dories chiefly), which regularly come to Boston during the colder half of the year with from forty to two hundred baskets of clams, which they offer for sale at retail down on the wharves, lounging against the railing and smoking or whittling, with a sample-basket at their feet, while waiting for a customer. Three or four oyster firms there also deal in clams and other shell-fish. Estimating the combined sales of these merchants, afloat and ashore, I conclude that the whole consumption of Boston and its shipping custom amounts to about 60,000 bushels yearly, worth to the wholesaler about $50,000. Exports of clams to the amount of $11,846 were made in 1879.

NEWBURYPORT TO GLOUCESTER.—Beginning at Newburyport, Mass., the following statistics of supply and incidents of the local fishery are available, for much of which I owe thanks to Mr. W. A. Wilcox, United States Fish Commission, of Gloucester. At Newburyport clam digging is followed when little else can be done by those who follow fishing. At these seasons of scarcity the banks at the mouth of the Merrimac are resorted to by nearly four hundred men (half as many can sometimes be seen at once), who dig up good wages, the amount dependent only upon their industry, for the supply seems inexhaustible, and increasing rather than diminishing. In 1860 the crop was valued at from $10,000 to $15,000 annually. In 1880 Mr. Wilcox reports thirty boats, worth $750, and sixty men constantly and professionally engaged in clamming. Their product was 28,800 bushels, worth $11,520.

The next center of clam digging is at Ipswich, where long ago its importance was recognized by the settlers, and was legislated upon in a precautionary way.

In 1763 the Ipswich authorities forbade the digging of more clams than were needed for the use of the people of the town and for fishing vessels, allowing one barrel for each of a crew to the banks and in proportion for boats in the bay. In 1771 it was enacted that "owners of vessels are to pay 6*d.* a barrel. The poor may dig and sell clams out of town for 2*s.* a barrel." In 1789 the town voted to let the clam-flats and sand-banks at the rate of 1*s.* a barrel for clams. At that time 1,000 barrels of clams were annually dug and sold in Boston and elsewhere for bait, counting five hundred to six hundred a barrel of shelled clams.

"At present," says Mr. Wilcox, "the clam digging or flats extend from Rowley southward 10 miles, to Essex, with a width of half a mile. At Essex and elsewhere the clam beds have been plowed, but the experiment was found unprofitable. The State law permits any fisherman to dig 2 bushels for bait. The town law places the clam-flats in the hands of the selectmen, who give a license to work on them only to citizens. All others working there are liable to arrest, a fine of $1 a bushel for all clams dug, and confiscation of all tools. This law is strictly enforced. For the last ten years no close season has been observed, and during this time the clams have steadily decreased in abundance. To arrest this decadence a close season was proclaimed in 1880, no clams being dug from May 15 to October 15 of each year, except for fishing-bait, as before mentioned. Attempts at cultivation have failed hitherto.

"During 1879, from March to June, seventy-five men were engaged in the business, and fifty men from November until March. During 1879, 500 barrels were put up as bait, a very small amount compared with the thousands of barrels recorded a few years ago. On the other hand, a

large demand has recently sprung up from Boston and other towns for clams as food. From June to September of 1880, 40 barrels a week were shipped in shell from Ipswich to Salem, and between December and March 60 barrels a week to Boston and elsewhere. From December 1 to April 1 280 gallons a week were shipped open to be eaten, chiefly to Boston."

The present prices realized by the diggers are as follows, for various uses:

To be eaten:	
For clams in shell, per barrel	$1 00
For clams shelled, per gallon	25
As bait:	
Sshelled, fresh, per barrel	4 00
Shelled, salted, per barrel	3 00
Shelled, per water-bucket	50

Mr. Wilcox estimates the clam outfit of the locality to be worth $1,650, comprised in thirty-five dories, fifteen small boats, and sundry implements. The product of the digging in 1880 he gives as follows:

750 barrels shelled	$3,000
480 barrels in shell	480
4,480 gallons	1,120
Total	4,600

This, he says, equals 11,500 bushels, which would give an average price per bushel of 40 cents, and average annual receipts for each of the one hundred and twenty-five diggers of about $37.

From the clam flats in Essex and Annisquam Rivers about 20,000 to 25,000 bushels are annually gathered. Some of these are salted for bait in the fisheries from Gloucester, but the greater part is shipped to Boston either in the shell or "shucked."

BOSTON AND VICINITY.—In Boston Harbor clams are much depleted, owing to the fact that they are remorselessly dug the year through, chiefly by a class of ignorant foreigners who go down the harbor for the purpose. July and August are the most productive months, there being a large demand for the "clam-bakes," which picnic parties from the cities indulge in on the various beaches. All the clams got in Boston Harbor are very small because they are allowed little chance to grow; in March and April they are hardly worth eating. It is difficult to judge of the amount caught in Boston Harbor annually, but I think 40,000 bushels is not far out of the way.

South of Boston, Plymouth and Duxbury beaches form the first important stations. The whole shore there, a citizen of Plymouth said to me, was "saturated" with them. The young clams would sometimes whiten a flat "as though it had snowed." He had known them gathered by simply digging a regular trench and picking up the mollusks thrown out. The digging is mainly done in the winter, when a large class of men are employed every day. They sell them, opened, at 10 cents a "bucket" or pailful for small ones. Large ones are now scarce, not being given time to grow, and are kept in the shell for the Plymouth and Boston markets. But great quantities of clams not bigger than a dollar are hawked through the interior by peddlers.

At the time of my visit they were very scarce, and the tide allowed digging only very early in the morning or late at night; and the total catch of 1880, according to Mr. Wilcox, was only 5,000 bushels at Plymouth and 5,000 at Duxbury, worth about 50 cents per bushel, or $5,000.

CLAM FISHERIES AT CAPE COD.—At Harwich, says Mr. F. W. True, there are fifteen men who rake in winter at Pleasant Bay. They average 75 bushels each, or 1,125 bushels in all, worth nearly $400.

This brings us to Chatham, one of the most important places on the coast for soft clams. My statistics concerning it are based on the reports gathered by Mr. True.

The clam fishery at Chatham as a business dates back about fifteen years. It began in small proportions and has grown rapidly, especially since the decline of the fishing business in general. Many men do not now realize enough from their summer fishing to support their families upon during the winter; they must dig clams or starve. There are also many old men whose time of offshore fishing has gone by, and who must content themselves with inshore fishing in summer and clam raking in winter. From these two classes the force of clam fishermen in most part comes. With them, however, are many youths who still live under the paternal roof, but whose fathers are unable to support them. Altogether about one hundred and fifty men dig for clams every winter in Chatham Harbor, beginning in November and raking every fair day until April. The tools used are short-handled, three-pronged iron rakes. The law of the State applying to these flats is as follows:

"No fisherman or any other person shall take from the towns of Chatham and Nantucket any shell-fish, for bait or other use, except clams and a shell-fish commonly known by the name of horse-feet; and no quantity exceeding seven bushels of clams, including the shells, or one hundred of said horse-feet shall be taken in one week for each vessel or craft, nor in any case without a permit being first obtained from the selectmen of the town."*

Following is Mr. F. W. True's report, made in 1880, on the present condition of the fishery:

"About five years ago Mr. Taylor's father took about 150 barrels to Provincetown, where they were looked upon with favor. Since that time and until last year the business rapidly increased. The clams are sold by the fishermen to three or four firms in the grocery business in Chatham, who advance them credit, hold the clams over until spring, and then sell them at good prices. This is to the advantage of the fishermen, and makes a little trade for the shops. Usually about 700 barrels of salt clams are sold each year at $4 per barrel. This is equal to about 4,800 bushels. Each man would get about 5 barrels as an average, but some who are very persistent and successful take 25 barrels. In the winter of 1877–'78 the sea-clam fishery at Dennis Port was a partial failure, and in that year 1,000 barrels of Chathams were sold. Last winter (1878–'79) clams were scarce at Chatham and not much over 400 barrels were taken. These were all salted and sold for bait at much higher rates than previously. It happened last year that cod were very abundant in Provincetown Harbor, and as a consequence bait was in demand. Chatham is but a short distance from Provincetown by rail. As fresh bait is always preferred to salt bait, a large amount of clams were sent from Chatham out of the shell but not salted. Probably about 300 barrels were shipped for immediate use.

"In addition to this catch by citizens, for the past three years a Boston dealer has sent down a team to cart clams from Chatham to the depot at Harwich, and hired men at 25 cents per bushel to dig them. It is supposed that he took in the neighborhood of 2,000 barrels of clams in the shell each year.

"The citizens of Chatham feel very much offended at having their fisheries disturbed by an outsider and appealed to the General Court for protection."

Examination of this report seems to disclose that one hundred and fifty men sell 8,400 bushels for themselves and about 24,000 bushels for the Boston firm, whose intruding enterprise and competition naturally disgust them. This makes 32,400 bushels. Supposing they eat at home 2,600 bushels, an estimate of the total yield at that locality per year would be 35,000 bushels. They are worth not more than 35 cents a bushel, however, which would make the cash value of the crop $12,250.

Beyond this point anything on the bay side of Cape Cod in the way of soft clams is of small

* Rev. Stat., c. 55, § 16; Stat. 1850, c. 6, § 2.

importance, except at Orleans, where some few men who have been in mackerel vessels in summer stay at home and dig clams in Town Cove, getting perhaps 250 bushels, all of which are salted and sold at Provincetown at $4 a barrel.

SOUTH OF CAPE COD.—When Cape Cod is passed the digging of soft clams, in Massachusetts, is unimportant, as they are more scarce than in Massachusetts Bay, and have a rival in the quahang. Clamming is carried on in Buzzard's Bay, but not to a much greater extent than supplies the home demand. This coast, and that of the islands off it, are too rocky to make good clamming ground in many places. The shipments by rail to Boston—whither nearly all go—amount to only about 100 barrels a year, and I suppose 10,000 bushels, worth $5,000, would adequately represent the whole catch for both bait and food.

STATISTICS FOR MASSACHUSETTS.—The total yield of soft clams in Massachusetts, in 1880, was as follows:

Customs district.	Bushels.	Value.
Newburyport	39,126	$17,848
Gloucester	26,359	11,994
Boston	34,940	17,470
Plymouth	10,000	5,000
Barnstable	32,773	15,420
Nantucket	2,253	872
Edgartown	4,000	1,570
New Bedford	5,800	2,900
Fall River	3,375	3,121
Total	158,626	76,195

Of the above quantity, 31,832 bushels, worth $12,305, were used as bait in the fisheries.

5. SOFT-CLAM FISHERY OF NARRAGANSETT BAY AND CONNECTICUT.

In Narragansett Bay the gathering of soft clams becomes the business of a great many poor men and boys in winter, who search for them along a stretch of about 18 miles, from Sabine's Point to Cold River, on the eastern side, and from Field's Point to Greenwich Bay, on the western. Clam grounds are found at Wickford, R. I., also, and altogether it is calculated that about 35,000 bushels are dug. These go chiefly to New York, and are worth from 75 cents to $1 per bushel, so that the total value of the crop is about $30,000.

Roger Williams's "Key" (p. 224) makes mention of this mollusk under the name "sickishuog,"* a Narragansett word. The paragraph is as follows:

"*Sickishuog.*—This is a sweet kind of shell-fish, which all Indians generally, over the country, winter and summer, delight in; and at low water the women dig for them. This fish, and the natural liquor of it, they boil, and it makes their broth and their nassaump (which is a kind of thickened broth) and their bread seasonable and savory instead of salt."

Proceeding westward to the Connecticut coast, the soft or "long" clams are found more scattered, and used mainly in winter, when the quahaug is out of season. I find noted a product at Clinton, Conn., of 4,500 bushels; at Fair Haven, 2,500 bushels, and at Norwalk, Conn., 7,000 bushels. Those taken at Guilford are of very excellent quality and became famous formerly on account of their size. A dozen years ago, according to Verrill, the Guilford clams were assorted into regular sizes, and bought from the fishermen on the spot by the hundred. "Those of large size bring about $3 per hundred; these are retailed in the market at New Haven for 60 cents per

* William Wood, in his "New England's Prospect" (1634) says the Massachusetts coast tribes spelled the word "suckis suacke."

dozen. Smaller sizes bring 48 cents and 36 cents per dozen. During unusually low tides in winter clams of extraordinary size are obtained at Guilford, below the zone ordinarily uncovered by the tide; these often weigh a pound or more, and sell for about $1.25 per dozen; occasionally the weight is as much as a pound and a half, and the shells become 6 or 8 inches in length." In 1880 I visited Guilford, but heard that no clams were now dug there of large size, and that all were sold by the bushel at a price not greater than elsewhere. Verrill gives the prices of clams in Connecticut, about 1870, as follows: "The ordinary long clams of small and moderate sizes bring 95 cents, $1.25, and $2 per bushel at wholesale; these retail in our markets at 50 cents to 75 cents per peck, the smallest sizes being cheapest, while the reverse is the case with the round clams." The total product of Connecticut, home-consumption and export, will no doubt amount to 75,000 bushels (and probably much more) every year.

At Bridgeport, of late, serious attempts at clam-planting have been made by Hawley, Lewis, and other oyster growers, in spite of immense opposition from the shore people of the suburbs, who, as usual, bitterly and blindly opposed any cultivation of marine products. Privilege to ground was first secured under the general State law, and afterwards, in one case at least, bought outright in order to leave no doubt as to right. This beginning required a long time, during which, as one man expressed it to me, he "fit the subject from Tophet to wayback!"

At first small clams, which were bought at 50 cents a bushel for the purpose, were regularly planted in the sand between tide-lines by punching a hole and pushing the young mollusk down into it. This was found too slow and laborious work, however, and the method of plowing the seed in was undertaken. After many trials of all sorts of plows and cultivators, surface and subsoil, and proving them unadapted to the turning of the dense, wet, heavy mixture of sand and mud, Mr. Wheeler Hawley succeeded in inventing a light plow, having a thin, narrow, steel mold-board, which did the work satisfactorily. It was three years after the first considerable planting of seed when I was there, and the whole beach, for half an acre in extent, was as full of the holes indicating clam-burrows as a vast colander. When you dug down you found the mollusks shoulder to shoulder and piled on top of one another. This was manifestly too many, yet they seemed to be doing well, except that the growth was slow. The owner was engaged in thinning them out, and increasing the area of his ground by transplanting. This gentleman says that the clam in Long Island Sound spawns in June, grows only a little during the winter months, and increases in size so slowly that the planter must wait four or five years for his first crop. This attained, however, he will find his whole space "saturated" with young clams derived from his transplanted stock, and can draw almost endlessly upon his "bank" as each selling season comes round. I know no branch of mollusk culture likely to prove more remunerative than this so long as it is not overdone.

6. SOFT-CLAM FISHERY OF LONG ISLAND.

Crossing to Long Island, the careful inquiries of Mr. Fred. Mather provide full data to show the product of the southern shore of Long Island Sound. Mr. Mather reports the yield of 1880 to be as follows:

Locality.	Bushels.	Value, at 50 cents.
Whitestone	100	$50
Little Neck	200	100
Port Washington	400	200
Glen Cove	600	300
Oyster Bay	50,000	25,000
Cold Spring Harbor	18,000	9,000
Bayville	75,000	37,500
Huntington	35,000	17,500
Centreport	75,000	37,500
Saint James	900	450
Stony Brook	30,000	15,000
Setauket	5,000	2,500
Port Jefferson	3,400	1,700
Total	293,600	146,850

The great irregularity observable between localities in close proximity is perhaps not wholly explainable. You will hear that in this place or that (as, for example, Cow Bay) they were abundant formerly, but have now died out, while elsewhere (as at Riverhead) they are reported reappearing. The conditions of the bottom are to be considered, of course; the number of enemies present, and, lastly, the amount of searching which is made for them. At Port Washington, for instance, more soft clams might perhaps be found if the people were not too busy with oysters and quahaugs to look for them. All of those sold from this northern coast go to New York, and chiefly by boat, in the spring and autumn. There is also a considerable trade in carting into the interior of the island and to Brooklyn by peddlers.

In Gardiner's and Peconic Bays, at the eastern end of Long Island, clamming is not much of a pursuit. They believe at Greenport that the soft clams are not good until snow comes and its melting fattens them. Napeague beach is a favorite clamming ground, and another is on Shelter Island. Many are dug as bait for summer fishing and pleasure parties. The rest are cooked at home for cool-weather chowders. Mr. Mather reports from 50 to 500 bushels from each shore village around the bay, except Three Mile Harbor, which digs 8,000 bushels, and Sag Harbor 3,000. The total product is given at 13,575 bushels, worth about $7,000. On the south side no clams or quahaugs of consequence are found except near the western end of Great South Bay, and thence to Coney Island, but they are reported to be gradually moving eastward. Formerly the flats opposite Babylon were good clamming ground, but the closing of Oak Island inlet, about thirty years ago, so excluded the salt water as to ruin the supply. In South Oyster Bay a product of about 2,000 bushels annually is realized, while Hempstead and Rockaway Bays and westward are credited by Mr. Fred. Mather with 75,000 bushels. Many years ago this was also an important business around Rockaway, and a large number of poor families were and are supported wholly out of it. As you drive along the shore road through this region you constantly come upon miserable roadside shanties, houses of the clammers, and in front will be some old boxes and barrels, with great dirty heaps of shells. Perhaps the father and big boys of the family will have just returned from digging, and the whole family, rough and mud-covered men, worn-out and bedraggled mother, slatternly girls, and besmeared youngsters, will be clustered about the booty, opening them and dropping dirt and clams together into the old pails and buckets out of which they are to

be sent to market. I do not know, and it is hardly worth while to inquire, how many souls manage to exist in this way, except to show that in providing so easy and ignoble employment laziness is encouraged and a large class of citizens enabled to live in shiftless penury, which can only breed idleness and crime in the neighborhood. It is doubtful, therefore, whether the plenitude of soft clams in this region is not more of a curse than a blessing to Long Island.

7. SOFT-CLAM FISHERIES OF NEW JERSEY AND SOUTHWARD.

In New York Harbor clams used to be gathered in great abundance along the Communipaw Flats and at the mouth of Newark Bay, but that ground is now unproductive, having been exhausted or ruined by various causes incident to its proximity to the metropolis. Along the northern line of the New Jersey shore, however, from Raritan River to Sandy Hook, the soft clams are still dug, during all the cooler months of the year. The westerly winds of winter sometimes produce extra low tides, and less accessible and richer spaces of bottom are exposed than the ordinary ebb discloses. At these times it is an interesting sight to witness the wide-reaching mud flats, abandoned for a little while by the sea, speckled with hundreds of men and boys, wading and stooping and digging for dear life; not exactly "making hay while the sun shines," but "clamming while the tide's out." But the class who are thus seen making a spasmodic effort at work are socially very inferior and incorrigibly lazy. Of course there are exceptions, but that, unfortunately, is their general character. "What a life of toil and drudgery this is," exclaims Professor Lockwood, who knew it well at Keyport, and gave me many memoranda. "What a low status in the social scale it enforces, and low, few, and primitive are the daily wants it supplies. I could point out cases in which this sort of living has gone down from father to son, as a sort of fated pariah inheritance. An old fellow named Bailey used to bring a basket of long clams on his back, without stopping, 4 miles. Opened they made 18 quarts, which he would sell at 12½ cents a quart, or $2.25. Now his son, almost a hump-back, brings soft clams regularly in winter to Keyport from Port Monmouth, 5 miles distant, 'toting' a bushel on his bent back without once resting. Old Bailey, or any of his fraternity, would work in the morning until he had dug perhaps three-quarters of a bushel, opening perhaps 7 quarts if he should take them to the town, for which he might receive 25 cents per quart. Often he would be aided in this digging by his two boys. On arriving at home the wife and all her children would open the clams, after which the husband would peddle them until he had sold enough to buy the loaf of bread and other simple material for the family's evening meal. It was living literally from hand to mouth; literally sufficient for the day was its morning toil and its evening recompense. No animal could possibly live more strictly in its own feral way than does such a family of clammers. Their only luxuries are vile tobacco and vilest whisky; the only variation in their degrading work, the peddling of oysters picked from the refuse heaps of the planters."

From Sandy Hook southward to Barnegat Inlet, Mr. R. E. Earll reports 20,489,000 soft clams taken annually, at the present time. This is equal to about 70,000 bushels. As the value is given at $29,500, the average price becomes a trifle over 40 cents per bushel. In fact, however, they are chiefly sold by count.

Below Barnegat this sort of mollusk grows scarce, and only about 2,000 bushels are reported for all the rest of the State. Probably an estimate of 100,000 bushels would cover New Jersey and southward.

In a New York newspaper of thirty years ago I find a short description of "shucking" as

practiced on the New Jersey coast at that time, when more of these clams seem to have been furnished there than nowadays:

"The clams are thoroughly washed before they are given over to the knives of the 'shellers,' or 'openers,' as they are sometimes called. As many as two dozen shellers are at work at one time, among whom are children, old persons, and, in fact, all who can handle a knife. These are seated round a large tub into which the unshelled clams are thrown promiscuously, while the shells are deposited in a heap by themselves. The rapidity with which they are opened would astonish a stranger to the business. They are not opened with the point of the knife, nor is the front of the shell broken as is the case with oysters; but the clam itself is adjusted to the edge of the knife and forced open by striking it upon the edge of the tub, or some other hard substance. Before they are taken to market large quantities of them are attached to strings and sold in this way off carts."

In Maryland and Virginia the soft clam, though abundant enough on suitable shores, is eaten by the negroes almost alone and does not enter into trade at all. It is called "butterfish" and "mannoze" or "nanninose," the last being corruptions of an Indian word.

8. THE SOFT CLAM ON THE PACIFIC COAST.

This mollusk has been transplanted to Californian waters during the past few years; by accident apparently, being taken with the oyster seed which is annually sent in large quantities from the Eastern States. It appears to have thriven very well, and to have multiplied so as to stock San Francisco Bay with a good supply, succeeding in this respect where the oysters fail. I do not possess accurate information on this matter, however, and would not speak positively.

9. THE USES OF SOFT CLAMS.

The ordinary method of cooking clams is by making them into a soup, or by the mixture of various other ingredients forming a thick sort of broth known as chowder, which is a favorite dish in the more northern States. Frying clams is also practiced in various ways, and Mr. Carley and other dealers in New York and Boston pickle them to a considerable extent. These pickles are used principally by ships, but in 1854 a large supply was sent to California. They are also salted like mackerel, but to a small extent. They are to be bought in the markets raw all the year round; and in New York they are always sold in "strings" of a dozen connected by a cotton cord. In the spring, particularly, the region about Fulton market is crowded with clam vendors, chiefly from Long Island and Staten Island, who come in wagons and retail their clams, both in shell and by the string, with much chaffering and clamor. Both these and the quahaugs are also sold from baskets, wheelbarrows, and crazy wagons, by the peripatetic vendors, whose prolonged howl—"Cla-a-a-ams! fresh cla-a a-ms!!"—is so well known in the suburban parts of the city. In Newark I used to hear a song drawled out by these street merchants of mollusks which would do well as the opening measures of a dirge. The larger part of those taken each year, however, are used as bait, and something remains to be said in regard to the preparation of this. Our fishermen very long ago learned that most carnivorous fishes, and those of the cod family in particular, have a special fondness for the various species of *Mya*, the codfish of Newfoundland Banks relying very largely for nourishment upon a species allied to our edible *Mya arenaria*. The soft clam came at once into approved use, therefore, in shore fishing of almost all varieties, and with other bait-mollusks, was carried farther and farther to sea as the fishing voyages lengthened. The clams used inshore then, as now, were fresh; and when, following their retreating prey, the

fishermen went far to sea after cod and mackerel, the smacks south of Cape Cod enveloped live clams in netting bags, and kept them in the wells with which many of the vessels are provided. If the voyage is to be a short one, clams may also be preserved alive for a considerable period by being put in a cool place, and stores of ice are now taken on some vessels from New York for this purpose.

The vessels of Cape Cod, Gloucester, and Maine, which form the largest part of the fleet on the Banks of Newfoundland in the cod and mackerel fisheries, have no wells, and therefore are obliged to carry their bait removed from the shell, salted and packed in barrels. With the edible *Mya arenaria* are often mixed in the bait-barrel an inferior species, the "sea-clam" or "skimmer" and also the quahaug, both of which are to be considered hereafter. The principal depots for the digging, manufacture, or sale of bait to the "bankers" have been already mentioned, but every town on the New England coast north of Cape Cod, where clams occur at all, is a point of bait supply. The salting is of two kinds, "full salting" and "slack salting" or "corning." In the former, 1 bushel of salt is placed in each barrel of opened clams; in the latter case, from half a peck to half a bushel of salt is allowed to every barrel. It is reckoned that 12 bushels of clams in the shell make a barrel of salt bait, the present price of which is about $4.

In the old style of mackerel fishing, however, clams were chopped up (often with a mixture of menhaden) and sprinkled overboard as "toll-bait" to attract the mackerel to the surface. A vessel going to the Gulf of Saint Lawrence on a mackerel voyage of three months, in the old days, would carry from 5 to 10 barrels of salted clams, besides 30 to 35 barrels of menhaden; but it was generally thought that the clams were much better than the menhaden. Now mackerel are caught in seines, and there is now little use for toll-bait.

In the cod-fishery trawls are not baited with clams, and their use is therefore restricted to the hand-line or dory-fishing. In this fishery about one hundred vessels go every year on trips of from three to four months' duration to the Grand and Western Banks. The crews of these vessels will average twelve men, each one of whom will, as a rule, use 2 barrels of salted clams before the end of the season. This makes an average of 24 barrels for one hundred vessels, or an annual consumption, north of Cape Cod, of 2,400 barrels, representing 28,800 bushels (in the shell), annually consumed as salt bait on the Banks of Newfoundland alone.

10. STATISTICAL RECAPITULATION OF FISHERY FOR SOFT CLAMS.

A summary of the statistics of the foregoing pages produces the following table:

Statistics of production of Mya arenaria in 1880.

District.	Number of bushels.	Value.
Maine	318,383	$90,056
New Hampshire*	17,960	8,980
Massachusetts	158,626	76,195
Rhode Island	53,960	48,564
Connecticut	75,000	38,000
New York	340,775	255,581
New Jersey and southward	100,000	45,000
Total†	1,064,704	562,376

* The clam fisheries of this State have not been noted on the preceding pages. The information gathered by the census agents give the statistics as herein.—A. H. CLARK.

† Number of clams by count, at two hundred per bushel, 212,940,800.

(*b*)—FISHERY FOR QUAHAUGS.

11. NATURAL HISTORY OF VENUS MERCENARIA.

Next to the *Mya arenaria* in commercial importance stands the quahaug.

Its scientific name is *Venus mercenaria*, derived from the use of its shell as material for coining their money by many Indian coast-tribes, and its Indian names have been preserved and studied with care by Mr. J. H. Trumbull, of Hartford, Conn., who kindly writes to me as follows concerning them:

"For the spelling and derivation of the common name, quahaug, in the last edition of Webster, I am, I believe, responsible. The pronunciation there given is that of Eastern Connecticut and Rhode Island—kwaw'hŏg. I have occasionally heard the name reduced to a monosyllable—quaw'g; and, farther east, it is often made pooquaw.*

"In a note to my edition of Roger Williams's Indian Key (Narragansett Club Publication, Vol. I, p. 140) I gave two or three other dialectic forms of the Indian name. As you may not have the volume within reach, I copy the note: 'Pequot, *p'quaughhaug*. Pres. Stiles, MS.—Abanaki, *pekwe*, pl. *pekwahak*, 'huitres' Râle. The signification appears to be either 'thick shell' or 'tightly closed shell.' The Delaware equivalent is—as Zeisberger wrote it—*pooque-u*, a mussel. I have now no doubt that the second meaning given above, 'tightly closed,' is the true one, distinguishing the *V. mercenaria* from the more common *Mya*, or gaping clam. Strachey's Virginia Vocabulary (about 1612) gives *cawaih* for 'oysters,' which is, I have no doubt, another form of the same name, *p'cawaih*.' The vocabularies mentioned are the only ones I now remember in which the name is found."

The shape of the quahaug is well defined in the accompanying figure (see plate), and is familiar to all eastern people. Like all of the genus *Venus*, the shells are chalky, roundish, somewhat globose, ornamented with concentric ribs, the "heel" or beaks pointing far forward, with a deeply-curved indentation in front, which the fishermen on the south shore of Long Island call "the point of a clam." The color varies from brownish-white to smoke-tint, sometimes painted with waving lines and zigzags of red and brown, there being so much difference between varieties from different localities and depths that many have been described as distinct species. The posterior end of the shell (*i. e.*, farthest from the beaks) terminates in a blunt point. The surface is covered with concentric grooves and ridges, the ridges being crowded and rising into thin sharp plates most conspicuous at the ends; the central portion is nearly smooth. There are also minute lines radiating from the beaks to the margin, where they form a lattice-work with the concentric lines; this is an important character helping to distinguish this shell from the *Cyprina islandica* and other allied species. Within, the color of the shells is white, with sometimes a dirty yellow tinge in aged specimens. The impressions marking the attachments of the large adductor muscles, and usually called the "eyes" by the clam-diggers, are deep and united by a well-marked line defining the edge of the mantle. These impressions and the interior margin are a beautiful dark violet color. The general length and breadth are about 3 by 2½ inches.

The quahang is very abundant along the coast from Cape Cod to Florida; north of Cape Cod it is comparatively rare and local. It does not occur on the coast of Maine or in the Bay of Fundy, except in a few special localities, in small, sheltered bays, where the water is shallow and warm, as at Quahog Bay, near Portland; but in the southern parts of the Gulf of Saint Lawrence, as about Prince Edward's Island and the opposite coast of Nova Scotia, where the water is shallow

* The writer of an account of Martha's Vineyard, about 1807, makes the common name *poquau*.—E. I.

and much warmer than on the coast of Maine, this species again occurs in some abundance, associated with the oyster and many other southern species that are also absent from the northern coasts of New England, and constitute here a genuine southern colony, surrounded on all sides, both north and south, by the boreal fauna.

Concerning the curious instance of a colony isolated in Casco Bay, Maine, Prof. A. E. Verrill draws some quotable inferences in a late Report of the U. S. Fish Commission. From a critical examination of this and similar colonies, Prof. A. E. Verrill concludes:

"First, that in the Post-pliocene and Champlain periods the coast was at a lower level, and the marine climate of Casco Bay colder than at present, probably that of the present Newfoundland or Labrador coast. Second, that at a subsequent period, when the coast had attained nearly or quite its present level, the marine temperature was considerably higher than at present. Third, that the temperature of these waters has gradually declined, but was still somewhat higher at the period when the Indian shell heaps were formed than at present."

A like conclusion is reached by the examination of a somewhat similar colony on the Saint Lawrence. Professor Verrill ascribes the survival of these earliest colonies to the fact that, in the increasing coldness of the water, the peculiar isolation and other favorable conditions of their position protected them against the general fate of their neighbors.

This clam is thus assigned to a very ancient race.

The home of the quahaug everywhere is on sandy and muddy flats, just beyond low-water mark. It also inhabits the estuaries, where it most abounds, especially in shallow but pretty salt water. It is also found on oyster beds, when these do not take the form of rocky reefs, and in this capacity often helps the unconscientious to defy the laws, by alleging, whenever they are caught tonging or raking on forbidden ground, that they are only getting clams and would be glad of all the assistance the discoverer might give in culling out oysters accidentally caught. On these bottoms of sand and mud the clam spends most of its time in crawling about with the shell upright and partly exposed. It can travel pretty fast, and leaves behind it a well plowed furrow. Sometimes it is left bare by low spring tides when making these excursions. In such cases, if it wishes, or at any other time, it can easily and quickly burrow beneath the sand by means of its thin-edged but broad and muscular foot. The lobes of the mantle are separate all around the front and ventral rim of the shell, and their edges are thin, white, and folded into delicate frills. Owing to this broad opening in the mantle, the foot can be protruded from any part of the ventral side, and has an extensive sweep, forward and backward. The foot and mantle edges are white; but the two short siphon-tubes—for, not burrowing far down like the soft clam, it has no need of the long distensible feeding apparatus of that and the razor-fish—are united from their base to near the ends, and are yellowish or brownish orange toward the end, more or less mottled and streaked with dark brown, and sometimes with opaque white. When very aged, so as to deserve the New Jersey term "bull-nose," the whole flesh loses its white color and becomes a dirty, forbidding yellow-brown.

The generation of the quahaug is after the general plan of *Lamellibranchiate* mollusks, but I am not aware that any naturalist has made its embryology a special study. The eggs are probably fertilized within the body, and sustained in the folds of the mantle and gills until they have attained rudimentary shells, when they are sent out and lie upon the bottom to become the food of crabs, ground-feeding fishes and various other enemies to their welfare. This happens early in summer, and the young are sometimes observable in enormous numbers. In the summer of 1879 the shallow sand-beach opposite Babylon, Long Island, for 10 miles in length was crowded with young quahaugs from the size of a pin-head to that of a silver 3-cent piece. The succeeding

winter being very mild these all lived through it, which they probably would not have done had the frosts been very severe, for the water was only 2 to 4 feet deep. There were none in the deeper water off shore. The same season a similarly innumerable generation of young quahaugs was deposited at East Point, in Raritan Bay, New Jersey, where they were so thick that you could not pick up a handful of sand which did not contain a hundred or so.

Opinions along shore vary as to their rate of growth. Some men would tell me they increased in size very rapidly, others would say slowly. The situation undoubtedly makes considerable difference, but it is probable that the middling sized quahaugs sent to market are at least five years old, and that they attain great age if undisturbed. The rapidity of its growth has an effect, it is said, on the shape and appearance of the shells. Those that grow fast are wedge-shaped with only a slight convexity, while one that grows slowly becomes more globose or gibbous. The shells of these will be found much heavier and thicker than the others, and their flesh (in old age at least) shows a turbid, orange-brown, nasty tint, and is very tough, in high contrast to the creamy whiteness and tenderness of younger and more thrifty specimens. These heavy and almost worthless old fellows are called "bull-noses." Sometimes they exceed a pound, avoirdupois, in weight.

At the approach of cold weather in September the quahaugs begin to "settle" or sink down from their position on the surface of the bottom to another about 2 inches below. Here they remain until the approach of spring.

12. APPARATUS AND METHODS OF GATHERING QUAHAUGS.

The procuring, consumption, and sale of quahaugs is a constant and persistent industry along the whole extent of our coast south of Cape Cod, wherever the conditions are suitable or people live near the beach; yet, from the nature of their home, and the fact that they must be taken with the help of heavy instruments, it employs a less number of hands, no doubt, than does the annual search for the soft clam. Although there are many oystermen who never seek for quahangs, and a numerous body of the clamming fraternity who are not interested in oyster-culture, yet it is largely true that the same men are to be found in the ranks of both industries at different seasons of the year. Upon the whole I should regard the army of men who gather the hard clams as a superior class to those who dig the soft clams. This is owing, as I have already said, to the greater difficulties in the way in the present case. Women and children cannot do much at it because of lack of strength; lazy, useless men will not attempt it because it involves too much exertion and steady diligence. Yet I was told that in the Great South Bay of Long Island the clammers were of a very low grade of morality, as a rule, being mostly foreigners who had failed at everything else, and who in this hand-to-mouth employment proved themselves far from valuable citizens. But I think this is an exceptional instance, and I believe that in the great majority of cases the men who gather hard clams are the stout-armed native oystermen and farmers who live adjacent to the water and make this a regular summer occupation. In a letter to me during the year 1875, my kind and venerable friend, Prof. Samuel W. Lockwood, of Freehold, N. J., gives me a picture of this as familiar to him then at Keyport.

"They go after hard-shelled clams from Keyport in squatty, one-sailed vessels, called "cats," dragging clam-rakes, which are thrown out and drawn in by the wind. The ground extends in Raritan Bay from Sandy Hook to South Amboy. A good day's catch would be from 3 to 3½ barrels of 'count' clams—that is, clams of such size that eight hundred will fill a barrel, and at wholesale worth about $3. All below this size are sold by the bushel, at from 60 cents to $1, depending more on demand than size. These are sometimes so small as to count two thousand to

the barrel; and if about 1¼ inches in diameter go by the name of 'tea-clams.' It must be remembered that thrift and its contrary are as often found among these watermen as in other departments of industry. The man who owns his boat and sells his stock by the ten or twenty thousand at wholesale is a sort of aristocrat compared to those who go down to the shore daily, with a basket, get their somewhat precarious catch, take it home on their backs, open the bivalves, and then peddle the result in a can with a quart measure in the other hand, usually winding up their work by 3 p. m."

The methods and instruments of clam gathering are simple and easily described. The quahaugs, left bare at low tide, may sometimes be taken by hand. The Indians, who had no machinery for aiding them, caught them by wading in and feeling for them with their toes, something the early colonists quickly learned to do. Another way was by diving; this was the work of the squaws and the older children, and was, of course, exceedingly laborious.

The tools at present used are oyster tongs, straight rakes, curved drag-rakes, and dredges.

The oyster tongs are rarely used for this purpose since the quahaugs do not ordinarily lie thickly enough; but many are caught along with oysters.

The rake employed at Wellfleet is described by Mr. True as similar in form to an oyster rake, but made of steel instead of iron. "In former days this instrument was of iron, the tips of the teeth only being of steel. An average rake has seventeen teeth and weighs about 12 pounds. The handle or tail is of wood and is about 23 feet long."

The clam rake in use on the south shore of Long Island is much like a garden rake in shape; but the teeth or tines are from 6 to 12 inches in length, and only an inch or so apart, while the head of the rake is from 2 to 3 feet across.

Another form seen in Long Island Sound, New York Bay, &c., has its tines set very closely together and very much curved inward, so that the operator can alternately push and pull with the rake in his swaying boat, and yet cause it to dig down into the sand underneath the clams On the top of the strong pole-handle, therefore, is a cross-piece to give a firm two-handed hold. The man who uses this rake generally goes alone in his small boat. The drag-rake is an exaggeration of this form, both in the extraordinary curvature of the teeth and in the breadth of the head, which is often 4 feet across. It is generally operated like a dredge, and is rarely used outside of Rhode Island, or even there at present. I fancy it must have been such an instrument as this, which, under the name of "scraper" was in service twenty-five years ago, or more, about New York. I find it described as "furnished with a large number of semi-circular teeth, each of which is as thick as a man's little finger and about 6 inches long. It is thrown over the side of the boat." This account adds, "and when it has sunk into the sand to the required depth, it is drawn along the bottom, and taken up about once every minute, when the clams are extracted from the sand, washed, and thrown into the boat. This is exceedingly laborious work and four or five hours of it in one day is sufficient to use up the stoutest scraper. Tonging clams is even more laborious and straining, but is not so generally pursued." The clam tongs of that day differed from the oyster tongs, we are told, in having a wider head, 3½ feet being the average measurement. Quite opposed to this, we find that the tongs now in use in the Chesapeake Bay differ from oyster tongs chiefly in having a narrower head, which measures only 1 or 1½ feet.

13. IMPORTANCE OF QUAHAUGS FOR FOOD.

The value of the quahaug among the food-mollusks was recognized long before scientific men gave it a Latin name and census-takers studied its commercial relations.

The Indians along our whole sea-coast have always been accustomed to eat some sort or

another of shell-fish. In Alaska it is the mussel; at Puget Sound it is the *Schizothærus*, which they smoke for winter stores; in California, the oyster and other bivalves; in the Gulf of Mexico, the *Gnathodon*, of which the shell-roads around New Orleans and Mobile are made; on the Atlantic shores, the oyster, common and horse mussels, razor-shell, cockle, scallop, and two clams besides the fresh-water unios and anodons. To what an extent these various mollusks furnished sustenance to the wild tribes of the coast and of the Mississippi Valley is shown by the vast banks of east-away shells that remain to mark the points of aboriginal habitation. The Gulf coast and some parts of the interior of Florida are so full of mounds composed of broken shells of nearly every species, large and small, found in the adjacent sea, and of wide fields strewn with unios not only, but also with the smaller gasteropods, *Ampullaria* and *Paludina*, that the fact is commonly known to the people living there; while the savannas of Georgia, the banks of the Mississippi and its tributaries—particularly along the Ohio—of the Susquehanna and Delaware, and even of the Merrimac and Concord Rivers, in Massachusetts, are dotted with heaps of the mussels existing in those rivers, the animals of which have been consumed by the Indians. The same sort of remains are found on the Pacific slope and in South America.

As for shell-heaps upon ocean coasts, they are world-wide in their distribution, and often prominent in appearance. On certain points of the shores of Denmark and Norway there were disclosed, many years ago, banks of marine shells, sometimes 1,000 feet in length, 200 feet in breadth, and 10 feet in depth. At first these were taken for natural deposits, but it was observed that here only adult specimens of the littoral fauna were present, and closer examination revealed calcined shells, circles of blackened stones indicating fire-places, fragments of the bones of edible animals, and remains of rude utensils and implements. Thus it came finally to be proved that they were the kitchen-refuse of ancient mollusk eaters, and were called "kjoekken moeddings." This discovery prompted research, and similar deposits were soon found in various other parts of the world. Our own coast is lined with them, from the piles which grew up around the doorways of fishers on the low Florida shores, until their huts stood on hillocks above the reach of the highest tides, to the layers of oyster shells exposed on the cliffs of Maine, where "mine oyster" is no longer to be found. Most of our refuse heaps are buried under a foot or more of soil, and have long nourished the roots of a (so-called) primeval forest, but there are others which did not cease to be increased until the Indians were driven back from the coast by white settlers. At these places they spent a portion of each year, probably the winter months, when the climate of the shore is warmer than that of the interior, in feasting, while some perhaps lived there permanently, raising in the east-away shells unconscious monuments of their sea-shore life. At such times the two clams, but mainly the quahaug, formed the chief comestible.

How greatly the quahaug was prized by the early New England settlers appears from the many allusions to it in their writings, particularly in those of Roger Williams. Not only the meat, but the shell was utilized by them, in the making of various utensils and implements, such as arrow points, scrapers, paint-holders and spoons.*

It was from the purple "eye" and edge of the quahaug that the Indians fashioned their famous wampum, or dark shell beads with which they ornamented their clothing and furniture, adorned their hair and necks, or made their ceremonial peace and war belts and their insignia of authority. Wampum, combined with the white beads, made chiefly from the central column of the conch or periwinkles (*Busycon* and *Fulgur*), also passed as money among the Indians themselves

* "The dainty Indian maize
Was eat with clamp shells out of wooden trays."

not only, but between them and the whites, and, previous to the eighteenth century, in the ordinary trade of both the English and the Dutch merchants. I have elsewhere given a history of this shell money, which appears in a great diversity of forms on both coasts of the United States and played a very important part in aboriginal economy, and shall not dwell upon the matter here, further than to identify the quahaug with it.

As I have already said, this shell was valuable to the Indians as a food resource, and they taught the whites how to use it. Governor Winthrop called it "a dainty food" and wrote home that "the flesh eats like veal; the English make pyes thereof." An interesting reminiscence in this connection occurs in Baron Kalm's "Travels," 1748, as follows (the Baron is speaking of New York):

"A considerable commerce is carried on in this article, with such Indians as live farther up the country. When these people inhabited the coast they were able to catch their own clams, which at that time made a great part of their food; but at present this is the business of the Dutch and English, who live in Long Island and other maritime provinces. As soon as the shells are caught, the fish is taken out of them, drawn upon a wire, and hung up in the open air, in order to dry by the heat of the sun. When this is done, the flesh is put into the proper vessels, and carried to Albany upon the river Hudson; there the Indians buy them, and reckon them one of their best dishes. Besides the Europeans, many of the native Indians come annually down to the sea-shore, in order to catch clams, proceeding with them afterwards in the manner I have just described."

That this practice was long continued, there is plenty of evidence. Coast tribes conquered by the Six Nations were compelled to pay their tribute, or at least a portion of it, in this commodity, which became a luxury in the interior. Professor Lockwood told me of an old Quaker who lived near Point Pleasant, Ocean County, New Jersey, whose grandfather often saw the Indians there drying clams and oysters by the sun on pieces of bark. The Chinese still do this, but Americans have wholly forgotten the custom, so far as I know, with the disappearance of the Indian. I have heard that some years ago a factory was started in New Jersey to preserve clams and also oysters by a process of drying and granulation. It was asserted that soups and chowder could be made to the best advantage from this desiccated material. The product is said to have proved of good quality; but as it did not find general favor, the business was abandoned.

The chief use of clams in early days was in summer and fall. Then it was that the Indians came to the sea-shore for their greatest festival, that of the green corn. On such an occasion a great assembling of sages and warriors with their families was held at the beach, and clams, succulent ears and seaweed were roasted together in astonishing quantity, amid all the delights of a New England mid-summer by the ocean and every savage amusement. So good a custom merited perpetuation, and has, indeed, survived to the present day in the "clam-bake," that patriarchial institution of New England, where the icy Puritan might permit himself to be won a little from his rigor by the seductive mussel, and the prim maidens enjoyed a moment's timid relax from conscientious austerity in the fun of saying "periwinkle." Nor is the custom yet extinct, although it is no longer possible that the clam-bake should be a season of universal holiday as of yore. But now and then some great occasion in Rhode Island or Connecticut is celebrated much after the traditional fashion, and the wise and renowned joined in the festivity, as in the old days when Diedrich Knickerbocker and his friends sailed over to Communipaw to discuss grave questions of Dutch polity as they smoked their pipes beside the sunlit bay until the quahaugs were toasted

brown, and they could eat them slowly, as befits the viand, and listen to Jacob Steendam as, sonorously, he sang his "Praises of New Netherlands,"—

Eu Kreeft, en Krab, en Mossels: Oesters, dio
Eeu better is als Europa drie
In veelheyt heel on-kenbaar voorhem, wio
't Mocht onderwindon.

Now, the manner of a modern clam-bake is this: A circular hearth is first made in the sand with flat stones, upon which a fire is kept up until they are red hot and the coals fall down into a flat heap. A layer of sea-weed is then placed upon them, and upon the seaweed a layer of clams about 3 inches thick covered by more seaweed; then follows a layer of green corn in the husk, intermixed with potatoes and other vegetables; then a layer of oysters, crabs (in sacks to prevent their escape), and poultry, dressed and seasoned; then more seaweed. This arrangement is continued according to the number of persons to take part in the feast, and when the pile is complete it is covered with canvas overlaid with wet seaweed to prevent the steam from escaping. When after about an hour the whole is cooked each one helps himself without ceremony to morsels from the delicious mass. This joyful marine barbacue has prompted to verse some genial soul whose heart was warmed, and he tells cleverly how others may emulate his epicurean delight and possibly also meet the muse at table. Here is his recipe—I wish I knew his name that I might sound that too:

First catch your clams—along the ebbing edges
Of saline coves you'll find the precious wedges
With backs up, lurking in the sandy bottom;
Pull in your iron rake, and lo! you've got 'em.
Take thirty large ones, put a basin under,
Add water (three quarts) to the native liquor,
Bring to a boil (and, by the way, the quicker
It boils the better, if you do it cutely);
Now add the clams, chopped up and minced minutely,
Allow a longer boil of just three minutes,
And while it bubbles, quickly stir within its
Tumultuous depths, where still the mollusks mutter,
Four tablespoons of flour and four of butter,
A pint of milk, some pepper to your notion;
And clams need salting, although born of ocean.
Remove from fire (if much boiled they will suffer—
You'll find that india-rubber isn't tougher);
After 'tis off add three fresh eggs well beaten,
Stir once more and it's ready to be eaten.
Fruit of the wave! Oh, dainty and delicious!
Food for the gods! Ambrosia for Aspicius!
Worthy to thrill the soul of sea-born Venus
Or titillate the palate of Silenus!

A "clam-bake" expresses the sum of all human happiness to the Rhode Islander, and to gather all his relatives and friends on the sea-shore, bake the roystering clam in dried seaweed, and eat it with other good things, fills his cup of joy. As enthusiasm and emotion always seem odd, and perhaps ludicrous to those who are not under its influence, the New Englanders get much fun poked at them by outsiders. It is related, for example, that a Sunday-school teacher in Rhode Island told the pupils that there were poor children in Illinois who had never experienced the supreme delight of a clam-bake, and the last penny in the juvenile pocket was dropped in the plate in aid of the benighted sufferers.

A better story, however, is the following, which I "sell to you as I bought it," not making myself responsible for the truth of the tale: Prof. Anton Siegafritz was selected a few years ago by the Prussian authorities to examine into the expediency of making plantations of oysters,

like those at Ostend and St. Nazaire. In his preliminary report he advanced the theory that in the case of persons having more bodily than mental exercise, the eating of shell-fish produced emotional insanity. His principal illustration is derived from what he saw in America. With a seriousness that precludes all suspicion of caricature the learned professor says:

"While I was in America I saw the excitements caused by immoderate indulgence in shell-fish violently illustrated. They have there a sort of political assemblage called a clam-bake, where speeches and music and songs are interspersed with profuse feasts upon a species of oyster called the clam. Vast crowds attend these celebrations, and no sooner are they gorged with the insidious comestible, than they become full of excitement and furores; swear themselves away in fealty to the most worthless of demagogues; sing, fight, dance, gouge one another's eyes out and conduct themselves like madmen in a conflagration."

But enough of this joking.

In Northern New Jersey they call small young quahaugs, only an inch or so in breadth, "tea" clams. These are often served at an evening meal, two or three being opened and set in a row on each one's plate with a slice of lemon as an appetizer. One item in trade is pickling, and for this purpose the tender small clams are always reserved. For this sort the dealers generally depend on the mud-catchers, or rakers, who work in shallow water, and often orders are given to Shrewsbury men for this kind. They pass as "Little Necks," however, by the market-men.

14. THE PRINCIPAL MARKETS.

The principal depots for the sale of quahangs are New York and Philadelphia. All the coast towns south of Providence use them, but Boston sells comparatively few. In the scrap-books preserved by Mr. Thomas DeVoe, of New York, I find a long account of the clam-trade of that metropolis in 1855. The wholesale and retail trade at that time was estimated at $600,000, but this included both hard and soft clams; still the vast majority were quahaugs. There were one hundred sail-vessels carrying clams to Oliver street and to Washington market in summer; in winter they brought oysters. To these must be added twenty others supplying North River towns. Besides the large boats, about two hundred small boats, handled by one or two men, were engaged, and the value of all the crafts, big and little, was given at $50,000. The largest vessels were of about 50 tons burden. They were usually owned by two partners, and manned by two men and a boy. The average tonnage was 30, and the average cargo 100,000 clams. Including all from the diggers to the retailers and hawkers, eight thousand persons were supposed to be dependent on this trade centering at New York, during a large portion, at least, of the year. The principal fisheries at that time were in Atlantic County, New Jersey—New Inlet, Absecom, and Egg Harbor being the best; in the Great South Bay and in Cow and Little Neck Bays, Long Island. A few came from the Chesapeake. Then, as now, there were no exclusive clam dealers, but all the oyster merchants sold them. Fulton and Catherine markets were the main depots, and the colored people are noted as particularly fond of them and were large buyers. The business was thus conducted:

"The wholesale dealers enter into a contract to supply their customers with a certain amount at appointed times. The agreement is signed by both parties, each of whom is liable to a forfeiture of $100 in the event of non-fulfillment. The captain owning the boat sails for the fishing-grounds, where he purchases the clams indiscriminately among the small boatmen, and having loaded his vessel within the time prescribed by the contract, returns to the specified place. Here he finds his customer, with his wagons ready to receive his freight and to transfer it to the hands of the retail dealers, who generally purchase by the thousand. When a delay is caused by unavoid-

able circumstances, such as a difficulty in procuring the required supply or unfavorable weather, the penalty is never enforced."

In addition to this, many clams were brought into New York by wagons from Long Island. This is still the case in respect to both hard and soft kinds. A considerable trade was then in existence in clams salted and pickled for the European steamers and the interior. There was also an inland commerce (still continued) in quahaugs, packed in ice or preserved in the manner of oysters, since immigrants have taken to the prairies the taste for the fry, the fritter, and the chowder, perhaps because they find in their salt flavor the best reminder of the early home by the seaside. I have heard an old clam dealer recommend a dozen raw before breakfast as sure cure for obstinate dyspepsia. The sale of clams in Catherine market in 1855 was $20,000, a falling off it was reported, from the previous demand. During that decade the price of hard clams in New York varied from 37½ cents to $1 a hundred for ordinary, according to size, but those from Shrewsbury and Little Neck often brought much higher prices, the greatest quantity coming from New Jersey.

At present the clam business is an appendage or department of the oyster trade, as of yore, and its statistics were found to be inaccessible through these channels. But careful inquiry along the whole Atlantic coast, in which my own labors were most generously and skillfully supplemented by Mr. R. E. Earll, enables me to present a pretty accurate view of the present consumption.

15. THE QUAHAUG CLAMMING-GROUNDS.

Gulf of Saint Lawrence to Buzzard's Bay.—In the Gulf of Saint Lawrence quahaugs occur, but are never eaten, nor are any mollusks other than oysters.

The early productiveness of Cape Cod is shown by the presence of numerous shell-heaps, particularly in Wellfleet and Barnstable Harbors, filled up by the Indians and consisting almost wholly of the shells of this mollusk. Though in greatly depleted numbers, the quahaug still survives along the inside of the cape, and at Wellfleet has been raked from early times by the settlers. Mr. F. W. True contributes some notes on this place, from which I learn that the quahaug fishery as a business there dates from the beginning of the present century. It grew in extent until 1863, and from that time until 1868 the trade was at its height, since when it has diminished year by year, owing to lack of good market rather than failure of the supply. Between 1863 and 1869 the average catch each year was not less than 2,500 bushels. Of this amount a comparatively small part was consumed at Wellfleet, and the rest were shipped to Boston, Provincetown, Salem, Newport, Manchester, and a few other New England ports. From 1870 to 1876 the quantity of quahaugs taken per year decreased from 2,500 bushels to 1,800 bushels; and this latter amount has remained constant to the present year. Of the total catch in 1878 fully one-half, or 900 bushels, was consumed in Wellfleet. The remaining 900 bushels were shipped to Boston and other neighboring towns. For three years beginning with 1876, 75 bushels of quahaugs have been annually shipped to New York City.

Quahaugs are found in all parts of Wellfleet Bay, except in a small spot near the wharves, called the "Deep Hole," and a similar one on the west side of the bay. Both of these places are covered with a thick soft mud. It is not usual, however, to fish in parts of the bay where the average depth at low water exceeds 8 feet. Most of the raking is done on the western side. In ordinary years quahaug raking is begun the last of March, and continues until the first of October. As a general thing no raking is done during the winter months, although in some years a small amount has been done through holes cut in the ice. The fishermen rake about four tides per week, beginning at half-ebb and raking to half-flood. The boats used are either cat-boats

or yawls rigged with two sails. Each boat carries one man. The rake has been described. The baskets in which the quahaugs are collected and measured are of the ordinary manufacture and hold about a bushel each, and the whole outfit of a quahang fisherman does not cost over $150, and the total amount of capital invested in apparatus at the present time in Wellfleet does not exceed $800. This amount is about evenly divided between the five men, none of whom are engaged in this fishery more than a part of their time.

Quahaugs are sent to market always in the shell, and packed in second-hand flour or sugar barrels. The wholesale price of quahaugs for many years averaged 60 cents per bushel, but in 1879 it fell to 55 cents. One dollar and seventy-five cents is the average wholesale price per barrel. Quahangs retail in Wellfleet at 80 cents per bushel. The usual method of transportation is by packet, at a cost of 25 cents per barrel.

The Wellfleet fishermen employ no agent, but receive orders directly from merchants in various places, who know them personally.

At Orleans, some few men who go mackereling in summer stay at home and dig clams in winter, getting perhaps 50 barrels of quahaugs, among others, which are peddled in town. The south side of the cape is hardly more productive commercially, although the mollusks are plenty enough at certain points, as, for instance, at Waquoit; and I fancy that 3,000 barrels, holding, say, 7,500 bushels, and worth $5,000, will cover the whole cash sales of the cape.

Martha's Vineyard used to be bordered by good quahaug ground, but I am not aware that many are caught there now. In an old book I find the following historical allusion to it:

"The poquau (*V. mercenaria*) is found in Old Town Harbor, at Cape Poge, and in Menemsha Pond; great quantities are exported. It is taken up with iron rakes in deep water; and in shallow water it is picked up by the hand. The siki, or common clam, is found on the borders of the lagunes and in several other parts of the island. It attains its full size in two years. Much examination has convinced us that it has not the power of locomotion; but the poquau is able to cover itself with sand, and to move itself forward, though very slowly. Two thousand dollars' worth of clams, at $9 a barrel, have been sold in Edgartown, the present year [*i. e.*, previous to August, 1807]. They also begin to be taken at Menemsha Pond, and we believe in other places, and sold for bait. The razor shell and the musele are scarce."

Narragansett Bay.—In Narragansett Bay, Rhode Island, the yield is large, as might be expected of the traditional home of the "wampampeege." Seventy-five men, it is asserted, take an average of 1½ bushels a day the year round. The ground extends on both sides of Providence River below Field's Point and down to the deep water, perhaps farther. They are also caught at Wickford, to the extent of 1,000 bushels. Adding this to the estimate for Providence River gives over 42,000 bushels as the annual yield, nearly all of which goes to Providence and returns the fishermen about $35,000.

Coast of Connecticut.—I must deplore a lamentable lack of statistics in regard to the coast of Connecticut. At Norwalk three oystermen ship them, together with supplies from Long Island. The quahaugs are caught by seventy-five men, all among the islands in the harbor, and amount to about 7,000 bushels a year, worth $5,000. At Rowayton, close by, twenty-five men take half as many, and a small planting has been begun. I think it would not be much out of the way to say that at least 25,000 bushels were sent to market annually from Connecticut, and another 25,000 bushels eaten at home. The class of men who get them and the soft clams mainly, are a miserable set who help the oystermen in winter and "go clamming" in summer. They are locally known as "proggers." The hard clams are reported on this shore to be found over a wider area than formerly, but in far less quantity.

From City Island, in East River, four boats run twice a week for three or four months. This makes about one hundred and twelve trips, which, with an average cargo of 300 bushels, amounting to 33,600 bushels, having a market value of about $22,000. It is a more solid business here than farther eastward.

NORTH SHORE OF LONG ISLAND.—Crossing over to the Long Island shore, I have Mr. Mather's notes and statistics:

"Flushing Bay" clams are larger than "Little Necks," are solid and fat, and the shells are dark while those of the latter are light, a difference caused by the dark mud of the bay, the "Little Neck's" lying in sand.

At Little Neck a very few soft clams are taken, but the hard clams have a very high reputation, and are in great demand when oysters are out of season. They are most esteemed when about the size of a quarter-dollar, and are usually eaten raw. The bottom of the bay is sandy and the shells light colored.

About thirty men, from Roslyn, occasionally rake for oysters and clams, but do not depend entirely upon it. They only have a skiff and a rake apiece, and not over $75 is invested.

At Glen Cove some clams of both sorts are got along with the oysters.

In Oyster Bay soft clams are more plenty than in the bays west of it, but hard clams are not.

At Port Washington I was told that about five hundred persons regularly raked quahaugs in summer, and the clams were slightly scarcer than formerly. About three hundred of these men rake in or near Cow Bay, while two hundred go down or up the sound for several miles. The catch is from 1 to 3 bushels a day, but an average would be 2 bushels. The season lasts through perhaps one hundred working days. If you say, then, that 400 bushels a day are caught inside Cow Bay and 300 bushels a day outside, with 5,000 bushels caught along with the oysters in winter, you have a total of 75,000 bushels. This, at an average price of 65 cents, would be worth $48,750.

Mr. Fred. Mather's summary for this north shore, in respect to hard clams, is as follows:

Locality.	Bushels.	First value.
Flushing	20,000	$15,000
Whitestone	40,000	30,000
Little Neck	50,000	35,000
Roslyn	10,000	7,500
Glen Cove	2,500	18,000
Oyster Bay	6,000	4,000
Cold Spring	2,000	1,500
Port Washington	75,000	48,750
Bayville	5,000	3,750
Huntington	20,000	15,000
Centreport	25,000	18,000
Saint James	500	400
Stony Brook	20,000	15,000
East Setanket	20,000	15,000
Port Jefferson	5,000	3,500
Mount Sinai	500	300
Total	301,500	230,700

SOUTH SHORE OF LONG ISLAND.—Turning Orient Point and entering the sheltered waters of Gardiner's and Peconic Bays, we find a few quahaugs, reported by Mr. Mather in careful detail as follows:

Locality.	Bushels.	First value.
Riverhead	2,500	$1,500
Jamesport	2,000	1,300
Mattituck	600	400
New Suffolk	10,000	7,500
Southold	400	300
Greenport	1,000	750
East Marion	200	150
Orient	500	350
Three-Mile Harbor	1,000	750
Amagansett	100	75
East Hampton	150	120
Sag Harbor	1,000	750
Bridgehampton	50	35
Water Mill	180	150
Southampton	1,000	750
Total	20,680	14,880

At New Suffolk some of the many scallop boats are used in the off-season in getting hard clams, averaging 4 bushels a day from April to October. They take them early and bed them down for summer.

The south shore of Long Island is also a great source of the supply of clams which go to New York and are used to supply the immense and numerous summer hotels which are open along the whole length of the island during warm weather. It is asserted that in the Great South Bay the clams are gradually moving eastward, the limit of their occupation at present being Ferry's Bed, off Brown's Point. They are taken all the year round, when ice does not prevent, but most actively when oysters are out of season. The oyster boats from 2 to 6 tons in size are used, and five hundred men, with two hundred boys, work more or less at this fishing. A good day's work now is to procure a thousand clams, or about three bushels (for they are of small size), worth about $2. The tongs and rakes are made heavier than those used in oystering, generally having iron heads, and costing $5 or $6.

At Islip a firm of packers puts up these clams for market. The statistics of this firm's business for 1880 are as follows:

Men employed	10
Women employed	12
Boys and girls employed	4
Men catching clams	80
Number of clams used	5,000,000
Number of 2-pound cans "clams"	75,000
Number of 1-pound cans "clams"	40,000
Number of 2-pound cans "clam chowder"	10,000
Number of 1-pound cans "clam chowder"	3,000

At Amityville one man has attempted successfully the cultivation of quahaugs. His method is simply to gather or purchase them when about the size of pennies and spread them upon his oyster beds. He says they grow very fast and return him a good profit.

Statistics of this region are furnished by Mr. Mather's notes as follows:

District.	Bushels.	Value.
Atlanticville	500	$375
South Oyster Bay	7,000	5,250
Hempstead and Rockaway	15,000	11,250
Flatlands, &c	4,500	3,375
Bath, &c	7,000	5,250
Packed	17,000	10,000
Total	51,000	35,500

NEW YORK BAY.—I am at a loss what estimate to make for the yearly catch of quahaugs in New York Bay, including by that term all the water inside of Sandy Hook where these mollusks grow, but I suppose 150,000 bushels, worth about $100,000, would include all taken, except those caught by the considerable number of boats which go from Staten Island and New Jersey towns, Perth Amboy, Keyport, Shrewsbury, &c., down to Sandy Hook. These are included in what follows. My notes give 125,000 bushels to Raritan and Prince's Bays alone. The quahaugs caught otherwise in New York Bay are taken chiefly with the oysters and by the oyster planters, though a large number of people alongshore, of the poorer class, make a summer employment of raking them. This number varies, and is not separate from the population already described and enumerated under the history of the oyster product of this coast. The same may be said of the boats employed. In the winter both men and boats are hired by oystermen, or work their own beds and regard that as their real business. There are few exceptions to this practice here or elsewhere. The clams bring the fishermen about 60 cents a bushel.

NEW JERSEY.—The amount of the quahaug fishery in New Jersey was a subject of careful inquiry when I was along that coast, and was also attended to by Mr. R. E. Earll. His estimate for all the shore from (and including) Sandy Hook to Barnegat light, gives as the yield, in 1880, 18,931,000 by count. This, at 300 to the bushel, would give 63,103 bushels, which is valued by him at $35,625.

From Barnegat Light southward around Cape May to Cohansey Creek makes another district to which he assigns an annual catch of 85,741,000, or about 285,803 bushels, worth, it is stated, $117,667. The northernmost locality of this district is "Clam Bay," which is just inside of Barnegat light-house, and yields 150,000 bushels a year, I was told. Boats come from New York to buy them of the men who rake. Great Bay, at the mouth of Mullica River, is another extensive ground, much resorted to by buyers from Philadelphia as well as New York, and yields 40,000 bushels annually. From Lake's Bay, just in the rear of Atlantic City, the clams are sent chiefly by rail to Philadelphia, about 18,000 bushels going last year. Little Egg Harbor is credited with 25,000, and Seaville, still farther south, with 8,000 bushels in 1880. All these are from my own studies, and the total, 241,000 bushels, agrees pretty closely with Mr. Earll's estimate, which, however, is worthy of higher credence in this case than my own.

CHESAPEAKE REGION.—The Chesapeake region is highly productive, but I must confess to incomplete information in regard to it. The clamming ground extends from New Point, north of Mob Jack Bay, on the western shore, to Old Point, on Hampton Roads, and on the eastern shore from Pokomoke Sound southward. The principal markets are Baltimore, Norfolk, and Yorktown. These clams are got by the oyster tongers, when the summer close-season for the oyster-beds comes on, and the best market prices are received in April and May, because then the whole army have not begun tonging. These clams are sold by the thousand, and the general price ranges from

$1.50 to $2, but $2.25 was paid in 1881. Estimates at hand of the present yield gives to Baltimore (as destination) about 3,500,000 yearly; to Norfolk, 2,000,000 and to other markets (almost wholly Yorktown), 2,000,000. These 7,500,000 quahaugs will measure about 30,000 bushels, and are worth, at $1.75 a thousand, $11,375. I am convinced, however, that these figures are much too small to represent the total year's catch in Chesapeake Bay.

NORTH CAROLINA.—Southward of Norfolk not many quahaugs are obtained at present. Some years ago the Norfolk dealers sent boats down to the sounds of North Carolina, particularly to Okracoke Inlet, to buy clams, but that experiment was found unprofitable, both on account of the length of the voyage, and the fact that no dependence could be placed upon the fishermen getting the clams when they were wanted, notwithstanding the abundance of this mollusk. To the small exportation and the local consumption of the whole coast from Norfolk to Florida at 50,000 bushels a year, three-fourths of which is given to North Carolina, would not be far from the truth in my opinion. This 50,000 bushels will not be worth more than $20,000 however.

16. STATISTICAL RECAPITULATION OF QUAHAUG FISHERY.

Summarizing, we have the total quantity of quahaugs used in the United States annually:

Locality.	Bushels.	By count.	Value.
New England	102,300	30,690,000	$70,000
Long Island*	406,280	121,884,000	303,080
New York Bay	150,000	45,000,000	100,000
New Jersey	348,906	104,671,800	153,292
Chesapeake	30,000	9,000,000	11,375
Southern States	50,000	15,000,000	20,000
Total	1,087,486	326,245,800	657,747

*Including 30,000 bushels from City Island, East River.

(c) FISHERY FOR SEA-CLAMS.

17. DISTRIBUTION, METHODS OF GATHERING, AND USES OF SEA-CLAMS.

In addition to the quahaug and the soft clam, there are several bivalves of minor usefulness as food. Chief of these is the *Mactra solidissima*, which is known under such diverse names as "sea-clam," "surf-clam," "hen-clam," "beach-clam," "dipper," "skimmer," &c. It is distinguished by its great size and smooth surface, some of the shells being more than 6 inches long and 4 or 5 broad; and there is great variation in the form of the shell, some being oval, others more oblong or elliptical, and others nearly triangular; some are very swollen, others quite compressed. Though more active than the quahaug, it frequents much the same localities, being seldom found away from sandy beaches, and there remaining below low-water mark and thence to a depth of 4 or 5 fathoms. Hence it is not so easily obtained as the quahaug. "The siphon-tubes are quite short, and the creature usually does not burrow very deeply, nor does it seem to construct any permanent burrows. But it has a very large muscular compressed foot, with which it can quickly burrow beneath the surface of the sand. Nevertheless large numbers are always thrown on the beaches by violent storms and once there they are very soon devoured by crows, gulls, and other large birds that frequent the shores."

The range of the species includes our whole coast from the Gulf of Mexico to Labrador, but this clam is familiar only to the people of Massachusetts Bay, Cape Cod, the south shore of Long Island, and New Jersey. One of the earliest tracts written upon our natural history, Wood's "New

England Prospect" (1634), says that along Nahant beach the sea, "after storms casts up greate store of great Clammes, which the Indians, taking out of their shels, carry home in baskets;" also of "clammes as big as a halfe-penny loaf, which are greate dainties amongst the natives." It is evident that this is the species referred to. Following their example, the Massachusetts people have always eaten them to some extent, and one Boston merchant told me that a few years ago he was able to sell fifteen barrels a year, but that now there was no call for them. They were worth $3.50 a barrel at the beach and sold for $4 a barrel in Boston. On Cape Cod they are eaten to some extent when washed up on the "backside" of the cape, all of the mollusk being thrown away except the "cheeks;" precisely what this portion represented however, I was unable to learn. This is a traditional custom, as I was assured in conversation with an old Provincetown man: "I hearn old folks say," he explained "yeou mustn't eat none of it, 'cept the cheeks. They pretend to say the rest is poison, or suthin."

I suggested that at Lynn the whole animal was eaten, and said perhaps the people there were tougher. "Well, I dunno," he replied, "most all the folks at Swampscott are Cape Codders." They are occasionally eaten in the lower towns of the cape, too, and on Long Island, where the south shore is frequently strewed with them. Mr. Mather makes a note of this as follows:

"It is very large, and would afford a cheap and wholesome stock for soup, if the American poor did not always want the very best of everything. We know a poor man in Brooklyn who, when out of work, walks down to Coney Island and gets a bag full with which he rides back on the street cars, and, said he, 'I can get clams enough to make good soup for my big family for a week, by taking one day, and 15 cents for car fare.' Here is a text for a political economist. We have often said that there is more good food wasted in the United States than in any other country, but as population increases this will remedy itself. At present our people are too proud to buy anything but the choicest things in market, or even to ride second class; but in a few more generations the fishermen of Long Island Sound won't say with indignation, of a truly fine fish which graces the tables of the best in the land in Europe and some parts of New York, 'No sir; I never was poor enough to eat sturgeon.' We repeat, sea-clams make good soup; we have eaten it and pretend to know the various grades of goodness in salt-water clams and oysters."

They rarely appear in New York markets, and I suppose their general rejection as food is due partly to their inaccessibility, partly to prejudice against them, but chiefly from the fact that they are likely to prove tough, and of a "sweetish" flavor, disliked by many persons in comparison with the abundant oysters, quahaugs, and *Mya* clams.

In New Jersey, they occasionally serve as manure, being now and then thrown up on the outer beaches in vast wind-rows, sometimes 2 or 3 feet deep, and so dense that they may be shoveled up. There are records of many such a visitation, the latest of which, perhaps, was during the winter of 1877–'78, when the farmers along the shore from Atlantic City to Cape May carted away hundreds of wagon-loads of the washed-out flesh of these mollusks and spread it on their fields. They were utilized also as food for hogs and poultry, and as bait. The same was true at Barnegat, and, Mr. Lockwood tells me, has happened frequently near Sandy Hook. This great bivalve is principally serviceable then, as bait, and as such it occupies considerable time and attention everywhere along the coast, briefly and at irregular intervals. On Cape Cod, nevertheless—that great depot for all sorts of marine industries—the fishery for sea-clams takes on a commercial importance. In the course of Mr. True's investigations of the shore-interests of that interesting and amphibious corner of the United States, he learned that at Dennisport, in 1879, there were about two hundred and forty dories procuring sea-clams within a mile and a half of the village, half of which were owned in Dennisport, and the rest in Harwich, Chatham, West

Dennis, South Yarmouth, South Harwich, East Harwich, North Dennis, Brewster, and Nantucket. These dories employed about two hundred and fifty men, half of whom belonged in Dennisport.

The history of this fishery is this: About 1870 Mr. Joshua Pieree discovered the sea-clams in the neighborhood of a wreck, outside the port. That winter Mr. Pieree, accompanied by another man went again to the spot and brought in a large number of the clams. The next year there were eight boats engaged. Thus the business has continued to grow until the winter of 1876–'77, when the zenith seems to have been reached with a product of 3,000 barrels. Since then there has been a decrease, due, it is said (no doubt properly) to overfishing, and not throwing back the very small ones; and no exact report of the present diminished yield is available.

Out of the whole number of men employed, some fifty hire dory and gear, paying an eighth of the amount made. Of the rest, many buy dories and gear, paying a dollar or two on them from week to week until all has been paid. The rakes in use are made of iron, with wooden handles from 20 to 27 feet long; they have seventeen to twenty-five teeth, and cost $5 to $8. Most of the raking is done in water 8 feet deep at ebb tide, but sometimes the men go into very deep water, trying once, and often twice each day. Dealers on shore pay from 25 to 28 cents a bushel for the catch.

The clams are sold almost wholly as bait for the bank fisheries, and therefore must be opened and packed in barrels for shipment to Cape Cod ports, Boston, Swampscott, Rockport, Gloucester, Portsmouth, Newport, New York and New London; for the last two years three-fourths of the whole have been sent to Boston. In 1877–'78, thirty men were employed in opening the clams, but in 1878–'79 only twenty found work, and were paid at the rate of 10 cents a bushel. Barrels are made chiefly by two men, one in Dennisport and the other in West Dennis, and cost from 50 to 75 cents each. In the fall it takes 16 bushels of clams to fill a barrel with "meats," in the spring only about 12 bushels, showing considerable rapidity of growth in the mollusks during the winter. Cartage and transportation add 60 cents, so that in Boston the actual cost of a barrel of sea-clams, calculated as above, will be about $5.75; the price last year was actually $6. The year 1873 saw it at the highest, $9. In addition to this, the shells are sold at 5 cents a wagon-load for road-making.

At West Dennis, also, is a small business employing, according to Mr. True, twenty-five men, and yielding about 400 barrels.

Mr. True estimates the capital invested in this fishery on Cape Cod in the following manner, but apparently refers to the year 1877, in the item "3,000 barrels," since not so many are used now—perhaps not more than 2,000:

240 dories, at $8	$1,920
250 rakes, at $7	1,750
Gear (anchors, &c.), at $3 to a dory	720
34 shanties, at $50	1,700
3,000 barrels, at 60 cents	1,800
Fuel, repairs, &c., at least	110
	$8,000

To the above may be added perhaps $2,000 as representing the capital in use in the "South Village," making $10,000 for the whole.

At this point, for want of a better place, I may insert the following bit of information as to the law of Massachusetts (1867) "concerning clam-bait:"

"CHAP. 347, SEC. 1. When clam-bait is sold by the barrel it shall be construed to mean a fish-barrel of not more than 29 nor less than 28 gallons, and shall contain 26 gallons of clams and not over 3 gallons of pickle. If a disagreement arises between the purchaser and seller respect-

ing its quantity, either party may call on an inspector of fish and have it measured, and if it does not contain the number of gallons of clams aforesaid, the seller shall receive pay for only the number of gallons each barrel contains, and shall pay the expense of measuring and coopering; otherwise the purchaser shall pay the expense."

(*d*) CLAMS OF THE PACIFIC COAST.

18. COMMERCIAL IMPORTANCE OF PACIFIC COAST CLAMS.

The edible mollusks in addition to oysters to be found on the Pacific coast of the United States are many. First in importance among them probably is the *Lutraria maxima*, concerning which a long account is furnished by Mr. J. K. Lord, in his "Naturalist in British Columbia," which I subjoin in full.

"Among the edible shell-fish found on the coast of Vancouver Island and British Columbia, the Great Clam as it is there styled (*Lutraria maxima*), or the otter-shell of conchologists, is by far the most valuable. Clams are one of the staple articles of winter food on which all Indian tribes in a great measure depend who inhabit the northwest coast of America. The clam to the Indians is a sort of molluscous cereal, that they gather and garner during the summer months; and an outline sketch of this giant bivalve's habits and style of living, how captured, and what becomes of it after being made a prisoner, may be interesting; its habits, and the uses to which, if not designed, it is at least appropriated, being generally less known than its minute anatomy. Clams attain an immense size; I have measured shells 8 inches from the hinge to the edge of the valve. We used them as soap-dishes at our headquarters on Vancouver Island.

"The clam has a very wide range, and is thickly distributed along the mainland and Vancouver Island coasts; his favorite haunts are the great sand-banks that run out sometimes over a mile from the shore. The rise and fall of the tide is from 30 to 40 feet, so that at low water immense flats or beaches, consisting of mud and sand, are laid bare.

"There is nothing poetical about the clam, and its habits are anything but clean; groveling in the mud and feeding on the veriest filth it can find appears to constitute the great pleasure of its life; the stomach is a kind of dust-hole, into which anything and everything finds ready admission. Its powers of digestion must be something wonderful; I believe clams could sup on copper tacks, and not suffer from nightmare. Spending the greater part of its time buried about 2 feet deep, the long siphon reaching to the surface discovers its whereabouts, as the ebbing tide leaves the mud, by continually squirting up small jets of water, about 6 or 8 inches high. The sand flats dry, out marches an army of squaws (Indian women), as it is derogatory to the dignity of a man to dig clams. With only a small bit of skin or cedar-mat tied round the waist, the women tramp through the mud, a basket made from cedar root in one hand, and in the other a bent stick about 4 feet long. Thus armed they begin to dig up the mud-homes of the unsuspecting clam; guided by the jets of water, they push down the bent stick, and experience has taught them to make sure of getting it well under the shell; placing a stone behind the stick, against which the squaw fixes her foot firmly, she lifts away; the clam comes from darkness into light ere he knows it, and thence into the Indian's basket. The basket filled, the clam pickers trudge back again to the lodge, and next to open him. He is not a native to be astonished with an oyster-knife; once having shut his mouth, no force saving that of dashing his shell into atoms will induce him to open it. But the wily redskin, if she does not know the old fable of the wind and the sun trying their respective powers on the traveler, at least adopts the same principle on the luckless clam; what knife and lever fail to do, a genial warmth accomplishes. The same plan the sun adopted to make the trav-

eler take off his coat (more persuasive, perhaps, than pleasant) the Indian squaw has recourse to in order to make the clam open his shell.

"Hollowing out a ring in the ground about 8 inches deep, they fill the circle with large pebbles, made red hot in the camp fire near by, and on these heated stones put the bivalve martyr. The heat soon finds its way through the shelly armor, the powerful ropes that hold the doors together slacken, and, as his mansion gradually grows 'too hot to hold him' the door opens a little for a taste of fresh air. Biding her chance, armed with a long, smooth, sharp-pointed stick, sits the squaw—dusky, grim, and dirty—anxiously watching the clam's movements. The stronghold opens, and the clam drinks draught after draught of the cool life-giving air; then down upon him the savage pounces, and astonishes his heated and fevered imagination by thrusting, with all her force, the long sharp stick into the unguarded house: crash it goes through the quivering tissues; his chance is over! Jerking him off the heated stones, pitilessly his house is forced open; ropes, hinges, fastenings crack like packthread, and the mollusk is ruthlessly dragged from his shelly home, naked and lifeless.

"Having got the clam out the next thing is to preserve it for winter. This is effectually accomplished by stringing-up and smoking. A long wooden needle, with an eye at the end, is threaded with a cord made from native hemp, and on this the clams are strung like dried apples, and thoroughly smoked in the interior of the lodge. A more effectual smoking-house could hardly be found; I can imagine nothing in the 'wide, wide world' half as filthy, loathsome, and disgusting as the interior of an Indian house. Every group has some eatable—fish, mollusk, bird, or animal—and what the men and squaws do not consume, is pitched to the dusky little savages, that, naked and dirty, are thick as ants in a hill; from these the residue descends to the dogs, and what they leave some lower form of animal life manages to consume. Nothing eatable that is once brought in is ever by any chance swept or carried out again, and either becomes some other form of life, or, decomposing, assumes its elemental condition.

"An old settler once told me a story, as we were hunting together, and I think I can vouch for the truth of what he related, of having seen a duck trapped by a clam: 'You see, sir, as I was a cruising down the flats about sun-up, the tide jist at the nip, as it is now, I see a whole pile of shoveler ducks snabbling in the mud, and busy as dog-fish in herring-time; so I creeps down, and slap I lets 'em have it: six on 'em turned over, and off went the pack gallows-scared and quacking like mad. Down I runs to pick up the dead uns, when I see an old mallard a playing up all kinds o' antics, jumping, backing, flapping, but fast by the head, as if he had his nose in a steel trap; and when I comes up to him, blest if a large clam hadn't hold of him, hard and fast, by the beak. The old mallard might a'tried his darndest, but may I never bait a martin-trap again if that clam wouldn't a' held him agin any odds 'til the tide run in, and then he'd a' been 'a gone shoveler sure as shooting; so I cracked up the clam with the butt of my old gun, and bagged the mallard."

In addition to this a large number of other edible bivalves exist in the waters of the Pacific, and have added to the food resources of the Indians on that coast, or are yet eaten by white men and Chinese. Some of these are described elsewhere, such as the mollusks and abalone (*Haliotis*), or have been alluded to in the introductory volume, Section I, of this report upon the fisheries. I shall content myself therefore by mentioning that the bay of San Francisco, in particular, and some other portions of the sea-shore of California, are now being peopled with the eastern clams of both species which have been taken thither, mainly or wholly by accident, with eastern transplanted oysters. They thrive in their new quarters, increase and grow rapidly and are figuring largely in local markets. To what extent Prof. Jordan has included native mollusks with these

introduced clams in the following figures I am not informed; but his totals reported from California of edible shell-fish other than oysters, is as follows:

Statistics of clams gathered in California in 1880.

County.	Number.	Value.
San Diego	10,000	$100
Los Angeles	2,500	25
Ventura	500	10
Marin	40,000	400
Total	53,000	535

(*e*) THE RAZOR-FISH.

19. NATURAL HISTORY AND COMMERCIAL IMPORTANCE.

Another bivalved mollusk to be noticed among our edible shell-fish is the razor-clam (*Ensatella americana*), which is a common inhabitant of sand-flats and sand-bars, where the water is pure, generally living near low-water mark or below, but sometimes found considerably above low-water mark. "This curious mollusk," writes Professor A. E. Verrill, in one of the pleasantest of his many pages concerning New England's invertebrates, "constructs a deep, nearly round, somewhat permanent burrow, which descends nearly perpendicularly into the sand to the depth of 2 or 3 feet. These holes can generally be recognized, by their large size and somewhat elliptical form, when the tide is out. Sometimes they are very abundant in certain spots and not found elsewhere in the neighborhood. They sometimes come to the top of the burrow, when left by the tide, and project an inch or two of the end of the shell above the surface of the sand; at such times, if cautiously approached, many can easily be secured by pulling them out with a sudden jerk, but if the sand be jarred the whole colony will usually take the alarm and instantly disappear. When thus warned it is generally useless to attempt to dig them out, for they quickly descend beyond the reach of the spade. They will often hold themselves so firmly in their holes by means of the expanded end of the long muscular foot, that the body may be drawn entirely out of the shell before they will let go. When not visible at the orifice they can often be secured by cutting off their retreat with a sudden oblique thrust of the spade below them. They are obliged to come up to the upper part of the burrow on account of the shortness of their siphons or breathing-tubes, which can be protruded only about an inch in specimens of the ordinary size, and, as they depend upon one of these to bring them both food and oxygen, and on the other (dorsal) one to carry off the waste water and excretions, it is essential for their happiness that the orifices of these tubes should be at or near the opening of the burrow most of the time. In this respect the common 'long clam' (*Mya arenaria*) and many others that have very long and extensile tubes have a great advantage. But the 'razor-shell' makes up for this disadvantage by its much greater activity. Its foot or locomotive organ is long and very muscular, and projects directly forward from the anterior end of the shell; at the end it is obliquely beveled and pointed, and it is capable of being expanded at the end into a large bulb, or even into a broad disk, when it wishes to hold itself firmly and securely in its burrow. In excavating its burrows it contracts the end of the foot to a point and then thrusts it beneath the surface of the sand; then, by forcing water into the terminal portion, it expands it into a swollen, bulbous form, and thus crowds the sand aside and enlarges the burrow; then, by using the bulb as a hold-fast, the shell can be drawn forward by the contraction of the foot; the latter is then contracted into a pointed form and the same operations are repeated. The burrow thus started soon becomes deep enough so that the shell will

maintain an upright position, when the work becomes much easier and the burrow rapidly increases in depth."

A very amusing account of the efforts of a naturalist to procure one of the English species is to be read in Lankester's "Uses of Animals," a part of which I may be permitted to quote:

"After many vain efforts to secure one of these creatures alive, I mentioned my failures to the late Prof. Edward Forbes. 'Oh,' he said, with a waggish smile, 'there is nothing easier. All you have to do is to put a little salt on their holes and they will come out.' I remembered, you know, the story of putting salt on birds' tails, and although I resolved secretly to try my friend's plan, it was so simple, I had not the courage to tell him that I would. I had, however, no sooner got to the sea-side than I quietly stole to the pantry and pocketed some salt, and then went alone at low tide to the sandy shore. As soon as I espied a hole I looked round, for I almost fancied I heard my friend chuckle over my shoulder; however, nobody was there, and down went a pinch of salt over the hole. What I now beheld almost staggered me. Was it the ghost of some razor-fish whose head I had chopped off in digging that now rose before me to arraign me for my malice, or was it a real live razor-fish, that now raised its long shell at least half out of the sand? I grasped it, fully expecting it would vanish, but I found I had won my prize. It was a real, solid, specimen of the species *Solen maximus* that I had in my hand.

"I soon had a number of others which were all carried home in triumph. Of course there were more than were required for science, and at the suggestion of a Scotch friend the animals not wanted were made into soup. When the soup was brought to table, our Scotch friend vowed it particularly fine, and ate a basin with at least twenty razor-fish in it. One tablespoonful satisfied the ladies, whilst myself and an English friend declared—against our consciences I do verily believe—that we had never eaten anything more excellent. I counted the number of the creatures I was able to swallow; it amounted to exactly three. After a tumbler of whisky and water, taken, of course, medicinally, arrangements were made for a dredge in the morning. The Scotchman was up at five, but I and my English friend could not make our appearance. Nightmare and other symptoms of indigestion had fairly upset us and unfitted us for anything so ticklish as a dredging excursion. Now, I do not wish to say anything against razor-fish as an article of diet, but from what I have told you, they would seem to possess an amount of resistance to the ordinary digestive activity of the stomach that would render it highly desirable to insure before taking them such a digestion as a Highlander from his mountain wilds is known to possess.

"Notwithstanding this *dictum*, it is certain that the ancients, who were not backward in discovering what was fit to eat, were fond of *solens*. 'Athæneus directs them to be boiled or fried, or, what is still better, to roast them on live coals till they gape.' The same author * * * quotes a commendation of Sophron, who not only praises them as great delicacies, but says they are particularly *grateful to widows*."

Knowing that a couple of centuries ago they were commonly eaten in Italy, in France, in England, and especially during Lent in Ireland, the early visitors to America observed at once that they occurred here also, adding another to the long list of marine delicacies which the New World boasted. It is evidently the *Solen* (or modern *Ensatella*) that Josselyn means in the following:

"*An achariston for pin and web.*—Sheath-fish, which are there very plentiful; a delicate fish as good a prawn; covered with a thin shell, like the sheath of a knife, and of the color of a mussel. Which shell, calcin'd and pulveriz'd, is excellent to take off a pin and web, or any kind of filme growing over the eye."

But Americans never took kindly to eating the razors, or even putting them into their *materia medica*. Under the name of "long clam," "knife-handle," and "razor clam," they are occasionally

seen in New York market, but have no sale as food. Their taste is sweetish and not approved. The same is true of the Pacific coast, though there they are said to be of "fine flavor." As bait the razors serve a good but limited purpose, particularly on Cape Cod and along the south shore of Long Island, but there is no regular demand for them. In his "Market Assistant" Mr. Thomas DeVoe, records that during a gale in February, 1839, so many clams of all sorts were sent ashore on the beach "that it is supposed it would require all the horses and wagons in the town of Hempstead for months to carry them away." No doubt the Long Islanders availed themselves of this visitation to get much manuring for their sandy farms.

The razor-shell, like all other bivalves, depends upon the minute infusoria and other organic particles, animal and vegetable, brought in by the current of water that supplies the gills with oxygen. It is preyed upon by several fishes that seem to be able to root it out of the sand, or perhaps seize it when at the surface. In this region its principal enemies are the tautog and skates. The latter appear to eat only the "foot," for in their stomachs there are sometimes many specimens of this organ, but no shells or other parts. I was told by a New Jersey bay-man, too, that the conchs (*Fulgur*) would pull the razors out of their burrows and devour them. The long and pretty shells are devoted to a variety of ornamental uses, where they can be kept whole, for they are too thin and brittle to be cut up as are heavier shells.

(*f*) STATISTICAL RECAPITULATION.

20. STATISTICS OF THE CLAM FISHERIES OF THE UNITED STATES.

The total summary of the business in "clams" of various kinds in the United States, detailed statistics of which have been given on previous pages, foots up as follows:

Kind.	Bushels.	Value.
		$
Soft clams	1,064,704	$562,376
Quahaugs	1,087,486	657,747
Sea clams, &c	30,000	7,500
Californian clams	2,120	535
Total	2,184,310	1,228,158

4.—MUSSEL FISHERY.

1. THE SPECIES, GEOGRAPHICAL DISTRIBUTION, AND HABITS OF MUSSELS.*

Of mussels there are four common species on the Atlantic coast of the United States, besides several species on the Pacific coast. These are the following:

Mytilus edulis Linné. Arctic Ocean to Cape Hatteras and San Francisco.

Modiolaria nigra. Northern, in the deep sea.

Modiola modiolus. Arctic Ocean to New Jersey and Southern California.

Modiola plicatula. Maine to Georgia; Gulf of Saint Lawrence.

The internal structure of mussels, their food and manner of life are not greatly different from that of other bivalved mollusks, and need not be described at length here. Both valves of the shell are alike in shape and size. The hinge or lock uniting them is located in the smallest angle of the triangle formed by the shells, and both of the latter end at this point in short conical elevations.

* Further details of the natural history of mussels, as also information about the *Unionidæ*, or fresh water mussels and other mollusks not considered here, will be found in Section I of this report, Natural History of Aquatic Animals.

At the opposite end there is a small opening in the shell corresponding to the anus of the mussel; and in close proximity runs a short fringed tube connecting with the inner organs of respiration. On both sides of the mouth there are long, narrow, folded tentacles. Under and behind the base of the muscles which control the foot, is situated the byssus-spinning gland. From its cavity a groove extends along the lower side of the foot, and ends at its tip in a transverse cavity containing a small plate, perforated by seven small apertures, used for sucking.

Characteristic of the mussels is the strong, triangular "foot," and the "beard" or byssus, a group of silken threads. The foot is the weaver of the mussel's beard, and the manner of secretion of the threads takes place in a fashion quite analogous to that in which the spider makes its thread. From special glands under and behind the foot comes a viscid, semi fluid material, which, run into the groove in the foot, sets therein as a firm thread. This thread is drawn out of the foot by the retraction of that organ, and another thread is rapidly formed, until the beard grows apace, and the mussel has tied itself to something or has tied something to it. This attachment is made early in life to the surface of the rock, log, or other object forming its abode. The second engraving represents the mussel thus attached. In most cases several tie themselves to each other and to a common object, and thus form large clusters. "Thus a very firm and secure anchorage is effected, and they are generally able to ride out the most violent storms, though, by the giving way of the rocks or shells to which they are attached, many are always stranded on the beaches after severe storms. * * * These shells are not destined to remain forever fixed, however, for they not only swim free when first hatched, but even in after life they can, at will, let go their anchor-threads, or 'byssus,' and creep about by means of their slender 'foot,' until they find another anchorage that suits them better, and they can even climb up the perpendicular sides of rocks or piles by means of the threads of the 'byssus,' which they then stretch out and attach, one after another, in the direction they wish to climb, each one being fastened a little higher up than the last. Thus, little by little, the heavy shell is drawn up, much in the manner employed by some spiders when moving or suspending an unusually large victim." Though written by Professor Verrill concerning the edible mussel, the words just quoted will apply substantially to all species.

"The 'beard' of the mussel as a zoological curiosity is interesting enough, no doubt, but that it could by any stretch of the imagination be regarded as subserving an important function in defending man's structures against the ravages of time and tide is altogether an unlikely supposition. Listen, however, to a recital, as quoted by Mr. Gosse in his manual of the 'Mollusca.' 'At the town of Bideford, in Devonshire, there is a long bridge of twenty-four arches across the Torridge River, near its junction with the Taw. At this bridge the tide flows so rapidly that it cannot be kept in repair by mortar. The corporation, therefore, keep boats in employ to bring mussels to it, and the interstices of the bridge are filled by hand with the semussels. It is supported from being driven away by the tide entirely by the strong threads these mussels fix to the stone work; and by an act or grant, it is a crime liable to transportation for any person to remove these mussels, unless in the presence and by the consent of the corporation trustees.' Such a history is both curious and interesting, and in the absence of any contradiction—Mr. Gosse's 'Manual' bears date 1854—the correctness of the narrative may be assumed, if only from an inductive inference concerning the strength of the *byssus* of the mussels on the beach. The story, besides, presents but another, and, perhaps, novel illustration of the old axiom, *L'union fait la force.* Utilitarianism may again claim us when we find that a near neighbor of the mussel—the Mediterranean pinna—manufactures a silky *byssus* in sufficient quantity to enable the Sicilians to

weave it into gloves and stockings. These latter are rather *articles de luxe*, however, than garments of wear, and are costly withal, the latter fact depending on the nature of their origin and the trouble of manufacture. Pope Benedict XV received in 1754 from certain of his subjects a pair of stockings of Pinna's 'beard,' and the event was regarded as testifying to the worth of the present and to the dexterity of the manufacturers—a dexterity which was certainly equaled in respect of its ingenuity by Dame Nature herself in the production of the raw material."*

The American representatives of the European edible mussel are somewhat different in appearance, as may be seen by comparing specimens of the two varieties. Our shell is more thin, pellucid, and beautiful in its colors and radiating ornamentation.

Its home is among the rocks toward low-water mark and in the larger pools, particularly in shallow bays and estuaries, wherever there is an opportunity for anchorage to some firm object, and at the same time more or less mud. It is also frequently found on sandy flats in large patches fastened together by the threads of byssus. Gosse in his "Tenby" (p. 30) speaks of "myriads of mussels" in a cavern pool at Tenby: "These latter form a remarkable feature of the place; they fringe the walls of the cave and the rocks around up to a certain level; they floor the pools; and they cluster around every stone, being packed so densely that it would not be possible to thrust even the blade of a knife between them without violence. Thus they form great patches, or rather tracts, of intense blackness, from the general hue of the mussel-shells, though on a minute examination we can discover many individuals among the sable host which are beautifully tinted with pellucid olive or golden brown and pointed with radiating bands of purple. They adhere with great force to the rock and to each other by means of the silky threads of byssus, which they spin as their mooring cables, and which are capable of resisting a strong pull."

From such sheltered and favorable conditions it ventures out into deeper and rougher life, for Verrill dredged them off Eastport, Me., in 40 or 50 fathoms, where the tide runs with great force, and it has since been dredged in still deeper water in the same region, showing that it can live and prosper equally well under the most diverse conditions. This was not so new information as it seems to be, however, since in the New York Journal of August 4, 1785, a nautical correspondent informs shipmasters "that in latitude 35° 46′ and longitude of Cape Hatteras, there is a large mussel-bank, intermixed with cockles and pebbles, in 50 fathoms of water, and abounding in sundry fish, as sea bass, sea trout, flounders, skates, cusk, and dogfish; also in winter ballahs. All these fish are extraordinarily large and numerous."

To-day the most productive localities for mussels are the swift tideways of the inlets through Fire Island and the other beaches on the southern shore of Long Island, the channels about Sandy Hook, and the inlets of the beaches between Barnegat and Cape May. There are many beds in the lower part of New York Bay, also, particularly north of Point Comfort, near East Point buoy and near the Highlands; also in the East River.

"The specimens from sheltered localities and sandy bottoms are, however, much more delicate in texture and more brilliant in color than those from more exposed situations. Some of the thinner and more delicate specimens, from quiet and pure waters, are translucent and very beautifully colored with brown, olive, green, yellow, and indigo-blue, alternating in radiating bands of different widths; while others are nearly uniform pale yellow or translucent horn color. Those from the exposed shores are generally thicker, opaque, and plain dull brown, or bluish black, and not unfrequently they are very much distorted."†

This species breeds early in the spring. The eggs hatch into little free-swimming microscopic

*Belgravia. †A. E. Verrill.

objects which rapidly develop into something recognizable, and when only about the size of the head of a pin attach themselves in myriads to weeds and other objects, living or dead, near shore. In this condition they furnish food to a large number of rapacious animals, but grow with such celerity that those which survive attain their full size and armor in two seasons, or, under the most favorable auspices, even in one year.

Associated with the *Mytilus edulis*, and of like habits in general, are two other widely diffused species, the big "horse mussel" (*Modiola modiolus*) and the ribbed mussel (*Modiola plicatula*).

The former of these two is Arctic in its range, and rarely seen south of New Jersey on our coast, or Great Britain and France, in Europe. Fond of the deeper water it is to be looked for, according to Verrill, "at extreme low-water mark in the crevices between the rocks, and usually nearly buried in the gravel and firmly anchored in its place. Sometimes it occurs in the larger pools, well down toward low-water mark, * * * and, although it is almost entirely confined to rocky shores and bottoms, it extends to considerable depths, for we dredged it abundantly in the Bay of Fundy, at various depths, down to 70 fathoms." It is larger and heavier than the common mussel, being 6 inches in length sometimes. Generally lacking anything like the pretty radiating lines which adorn the mytilus, this mussel is covered with chestnut-black glossy coat, rudely haired towards the tip. It will easily be distinguished.

Modiola nigra is a rare form occasionally washed up on our northern shores by storms. It lives in the deep sea.

Modiola plicatula, on the other hand, belongs to high-water mark, clinging to rocks exposed more than half the time in many cases by the receding of the tide. It is very abundant in Long Island and New Jersey, along the muddy borders of the marshes and banks and among the roots of grass. In the brackish tide-streams that indent the coast, and in the drains through the salt marshes, these ribbed mussels are found crowded in among the stones, or embedded in the peat-like soil of the banks near high-water mark. "In this position, with the upper posterior portion slightly exposed, they crowd in such numbers as to form a complete stratum from 6 to 12 inches in thickness. A great portion of the time they are, of course, out of water; but they retain enough to serve the demands of their economy during the recess of the tide, and eject it when any disturbance prompts them to close the shell."

A closely allied species, the *Modiola hamatus*, is occasionally met with, especially on oyster beds, adhering to the shells, where it is sometimes very abundant. It has been introduced with the oysters, from the south, where it is common. It somewhat resembles the preceding species, but it is shorter, broader, with strong radiating ribs, many of which are forked. Its color is yellow or yellowish brown, from which fact it gets the popular name of "yellow mussel." It belongs naturally to the Gulf of Mexico and the southern Atlantic coast from Florida to Delaware, but is so thoroughly introduced into New Jersey that, as Professor Lockwood informs me, it grows abundantly through the sedges along the southern coast of that State, and serves as "stools" for the young wild oysters. In New York Bay these shells exist in considerable quantities, but do not multiply, and unless re-enforced by constant accessions from the Chesapeake Bay, brought by the oystermen, would speedily disappear.

The natural service rendered to the world by the race of mussels, so far as we can see, consists in the resistance their well-knitted colonies oppose to the waves and currents, thus preventing largely the wear and tear of certain portions of coast; in the fact that the highly useful oyster often finds a lodgment for his young on their shells when otherwise they would perish; and in the food which they supply to marine animals of various kinds.

Seals, particularly in babyhood or youth, subsist largely upon mollusca, the most accessible

of which, where they live, is probably the large arctic mussel. "The common star-fishes feed largely upon mussels, as well as oysters, and they also have many other enemies among the invertebrates, chiefly the whelk, drill, and other boring or crushing shell-fish. A small parasitic crab, *Pinnotheres maculatus*, lives in their shells, between their gills, in the same manner as the common *Pinnotheres ostreum* lives in the oyster. The principal enemies of mussels, though, are fishes of various sorts. The scup and other kinds devour their young, and the drum, weakfish, tautog, &c., live largely upon the older ones wherever the beds exist." In some regions, New York Bay particularly, it is difficult to prevent clusters of mussels growing among the planted oysters. This is considered very damaging by the planters, not because the mere presence of the mussels is harmful, but because they attract the drums, skates, and other fishes highly destructive to the valuable oysters. At Stump Shoal, Little Egg Harbor, N. J., however, I was assured that the excess of mussels there would crowd out the oysters by their abundance and more rapid growth, so that planting there was impracticable.

2. COMMERCIAL IMPORTANCE OF MUSSELS.

Besides being almost indispensable as bait for certain fish, mussels are extensively used as an article of food. They are largely cultivated in all European waters, in so-called "parks." In the North Sea these consist of large numbers of trees, from which the smaller branches only have been cut, and which are planted in the bottom of the sea at such a distance from the shore that their upper portion is partially laid bare at low water. After four or five years they are raised, stripped, and replaced by others. In the bay of Keil, Germany, alone, about one thousand of these trees are annually planted and about 1,000 tons of mussels are brought on the market. Bad seasons occur, however, both with respect to quality and quantity, owing to various causes. In the Adriatic the mussels are raised on ropes extended between poles rammed into the ground. The ropes are raised and stripped once in eighteen months. The mussel beds of Great Britain and western continental Europe are worth hundreds of thousands of dollars annually. For information in detail in respect to them the reader may consult the lectures by Dr. Philip Carpenter on Mollusca, printed in the Smithsonian Report for 1860, Simmonds's "Commercial Products of the Sea," Phipson's "Utilization of Minute Life," and so forth.

In America no such cultivation has ever existed, or is likely to be adopted for scores of years to come, since our wealth of the preferable oysters and clams is so great; still this mollusk is not altogether neglected on the American bill of fare. But before I proceed further let me say that to the aborigines of this continent the mussel has always been of very great importance as food; and in conversation recently with Mr. H. W. Elliott, who has acquired a wide reputation by his reports upon the fur-seal fisheries and the general natural history of Alaska, I learned many interesting facts bearing on this point.

Mr. Elliott said that the mussel of Alaska, which is the same as the *Mytilus edulis* of Europe and the eastern United States, is found from Saint Lawrence Island, south of Bering Strait, through Bering Sea, along the southern shores of the Aleutian Islands, and in the waters contiguous to the coast all the way to San Francisco. Mr. Elliott is not sure, but he believes it clings to the small islands known as the Diomedes, and is gathered by the Eskimo (in limited quantities) clear around to Point Barrow. It is in great abundance from the head of Cross Sound to the Straits of Fuca, and is especially luxuriant in growth and numbers throughout the whole of the Sitkan Archipelago and in that extensive chain of lesser and greater islands which break the swell of the North Pacific ere it reaches the coast of British Columbia. It is also abundant, but not of so large size, in the whole of Puget Sound and neighborhood.

Of that whole great region it constitutes the molluscan food-supply, since no oysters grow there, and the "clams" (*Cardium*, *Mya*, &c.) are nowhere numerous. Every day the women and children of all the Indians near the coast are out picking mussels from the rocks, and they are eaten the year round. The white inhabitants of that wilderness also consume them, and the Russian name for these mollusks is "black shells" (*chornie rakooshka*).

The Alaskan method of cooking is by boiling. Sometimes a whole bunch weighing 10, 20, or even 40 pounds, is thrown into the pot of boiling water. When the shells gape the water is poured off, and the Indians sitting around the fire gleefully pick out the mollusks with their fingers and transfer them swiftly to their mouths by the same primitive instruments.

Similar feasts take place on Vancouver Island and elsewhere among the more southern tribes, but there they are said generally to practice roasting instead of boiling.

As is shown by tradition and the presence of the shells scattered through the shell-heaps of the Atlantic coast, mussels formed an important article of food to the eastern Indians. Prof. Samuel Lockwood told me he once discovered a place on Mohinksun Creek, near Keyport, N. J., where it was evident that the Indians had lived wholly on *Modiolus modiola*, raising a monument of the fact in a great heap of the refuse shells. There is no doubt that everywhere along the coast they gathered and ate them constantly.

The Indians made use of their shells also. It is well known to all that the vanity of the redman is shocked by the presence of the meagre beard which would, if permitted, grow in a scanty way upon his chin. All Indians pull out these hairs with a diligence which disregards all the pain. The apparatus used by the Delawares to accomplish this, according to Heckewelder, "consisted of a pair of mussel shells, sharpened on a gritty stone, which answered very well, being somewhat like pincers."

In respect to the present demand for these mollusks, I find that it is very small, except in New York City. Almost the only other locality where I found them availed of as food was at Savannah, Ga., where the negroes eat them occasionally, but find them tough and often bitter. They are never seen in the Savannah markets.

In the city of New York, however, they have been constantly used as an article of food for many years. The season for mussels is midsummer, though some have asserted that they are only fit to eat during cold weather. That they do not come to market much in winter, however, is largely due to the fact that then the persons who employ idle time in summer in procuring them are busy.

The mussels sold in New York markets come from the East River, from Sandy Hook, and especially from Rockaway and Canarsie, Long Island. There are some evidently from the north shore of Long Island, also, since Mr. Mather gives me a note that one man at Port Jefferson shipped 300 bushels a day on many days, and in May and June of 1880 averaged 900 bushels a day. He got $1.25 a barrel for them in New York. Mussels are exceedingly plenty there, but the demand is limited.

The men who gather mussels for this market are an inferior part of the population, as a rule since the regular oystermen do not care to take the trouble. The clammers get them to a certain extent. They are detached from the rocky beds, where they lie in masses, by the use of a strong fork.

The mussels are brought to the city every day, and are sold almost entirely at Fulton market, where several wagon loads and several sail-boat loads are disposed of each morning, at from $1 to $1.50 a barrel. A few also are daily received at the Broome street wharves. The amount

coming in varies, but runs from 1,000 to 1,500 bushels daily, so near as I could learn the total season's supply amounting perhaps to 100,000 bushels.

This employs several boats regularly, chiefly, as I have said, those running from Fire Island Inlet and Rockaway. They "float" the mussels—*i. e.*, put them in fresh water and inflate them much as they do oysters—before taking them to market.

Occasionally the mussels are eaten raw, but this is in their poorest shape. Mr. DeVoe, in his Market Assistant, says "they are best boiled and pickled, but, on account of their solid texture, &c., they do not readily digest, and therefore do not agree with many stomachs."

Mr. Elliott remarked to me in the conversation mentioned above, that the Alaskan Indians recognized very well the dangerous intestinal troubles which were likely to follow the eating of *Mytilus*, and escaped them by extracting the byssus whenever it was green; this greenness indicating a poisonous quality due to the convervoid food the mollusk had fed upon. The season of the year, as some have supposed, has nothing to do with these delcterious properties.

The ordinary method of preparation in New York is by pickling. This preparation, which is a troublesome and expensive matter, is done by the oyster-saloon men, who sell them to customers by the quart at 25 cents, or gallon at $1, almost wholly in the city.

Mussels to be pickled are first taken one by one and deprived of their "beard," which is the name given to the byssus, by pulling it out. This is hard work, for the byssus is strongly inserted into the muscular center of the animal. They are next thoroughly washed, and after that boiled for a considerable time. This finished, the animals are removed from the shells, and again thoroughly washed in fresh water. They are then thrown into the pickle, and are soon ready for the table. The pickle is made according to a variety of recipes, each man considering his method the best, the differences depending upon the character and amount of the condiments put in, with the natural "liquor" of the mussel and the vinegar which are the chief ingredients.

From Monterey, Cal., comes word through Prof. D. S. Jordan that 5,000 bushels of mussels are eaten there; this is the only note from the Pacific coast, so far as refers to civilized usage.

A second, but perhaps equally important, utilization of mussels is by making manure out of them. This is extensively done and might be largely increased with undoubted profit. The value of this fertilizer and the State's natural resources in it were long ago recognized by New Jersey. In the geology of Cape May County, published by the State in 1857, occur the following paragraphs on this point: "There are great quantities of mussels in the creeks and thoroughfares of the marshes. They are usually attached to sods and roots in the banks, entirely covering the surface of such objects. They could be very easily and cheaply collected, by detaching them from the sods, by the use of a sharp spade, and by loading them directly into boats. The animal matter and the lime of their thin shells are both valuable for manure, and could be advantageously used.

The value of mussel beds for manure is given in an article from Essex County, Mass., published in the Country Gentleman, vol. 7, p. 155: "Thousands of cords of mussel beds are annually taken from the bed of the streams bordering on the sea, and used on grounds cultivated. I have repeatedly witnessed the value of this fertilizer in the growing of carrots and onions. The very best crops of carrots I saw the last season, more than 34 tons to the acre, had no other fertilizer applied to the land. For the last thirty years I have known it applied to lands on which onions have been grown, with a product varying from 300 to 600 bushels to the acre. It sells, delivered several miles from where it is dug, at $4 or $5 the cord. It is usually gathered in the winter months, taken to the shore in scows or gondolas, and thence to the fields where it is used. Sometimes it is laid in a pile of several cords together, and after it has been exposed to the frosts

of winter distributed from 4 to 8 cords to the acre. At other times it is laid out in heaps of a few bushels only, which remain for a time exposed to the frost."

"Mussels and star-fish (five-fingers)," says a writer in the Agricultural Gazette, "have long been an established manure in the neighborhood of Faversham, Kent. They are procured by dredging. The mussels sell at 16*s.* sterling per wagon, and five-fingers at 21*s.*"

At present in Southern New Jersey mussels are got in great quantities through the summer at the inlets in Little Egg Harbor and south of Beach Haven. The shore farmers gather them for home use, during the slack days of August, and the clammers work at procuring them and bringing them to sell to the farmers at irregular times and places, to as great an extent, no doubt, as on Long Island. The measure is usually a wagon load of 30 bushels, for which $1.25 to $1.50 is charged. No statistics of the amount thus disposed of could be procured. Horseshoe Bay (where Raritan Bay rounds into Sandy Hook) is the favorite scene of mussel gathering in the northern part of the State, but only enough for the fields next to the shore is taken annually.

Along the eastern half of the south shore of Long Island exists a similar industry. They are taken with oyster tongs and rakes in summer, and sold at 3 cents a bushel, 200,000 bushels according to Fred. Mather being turned into manure between Moriches and Babylon in 1880, Elsewhere perhaps 50,000 bushels are so used.

Summarizing all, gives values as follows:

100,000 bushels to New York market, at 20 cents	$20,000
250,000 bushels on Long Island, at 3 cents	7,500
250,000 bushels in New Jersey, at 4 cents	10,000
Total, 600,000	$37,500

5.—THE ABALONE FISHERY.

The family of the abalone-shells, ormer-shells, or sea-ears (*Haliotidæ*) is a large one and has considerable commercial importance in various parts of the world. Though well represented on the eastern (European) shore of the Atlantic, yet there are none on the Atlantic coast of North America, nor anywhere in South America, while they abound along our Pacific from Cape Saint Lucas to Kamtchatka and also in Japan and Australasia.

In California these mollusks are all known as "abalone," which is said to be a corruption of Spanish *aulon* or *aulone*. The Indians, again, who used the shining shells very largely as ornaments and also worked them into coin, called it *uhllo;* the money itself they knew by the same name, and usually handled it in separate pieces, which served as gorgets, girdles and head-dresses when not passing in trade.

The gleaming, nacreous, highly tinted beauty of the sea-ears has proved attractive not to savage eyes alone. In Europe they are extensively employed for inlaying work, in decorating fancy sign-boards, in ornamenting articles in papier-maché, and in making fancy buttons, studs, buckles, &c. They are sometimes called in trade "aurora shells," and one of the seventy or more described species abounds in the Channel Islands under the name of "ormer," "ormier," or "omar,"* where it is cooked for food after being well beaten to reduce its toughness.

* This word is contracted from *oreille-de-mer* of the French. The Portuguese name is *Lapa burra*. The Italian, *Orecchiale*, and the Sicilian, *Patella reale*. Cherbourg fish-woman, according to Jeffreys, call it *si ieu* (six yeux) from an idea that the orifices in the shells are real eyelets or peep-holes. The Eolians gave it the pretty name of Venus's ear. It is the mother-of-pearl or Norman shell of old English writers, the last name perhaps corrupted from the same origin as "ormer." These shells are popularly spoken of as sea-ears, and the scientific name is *Haliotis*, from the Greek *halios*, marine, and *otis*, ear. Ear-shell and abalone are the usual American appellations.

"The people of Guernsey and Jersey" says Simmonds, "ornament their houses with the shells of the ormer, disposing them frequently in *quincunx* order, and placing them so that their bright interior may catch the rays of the sun. Some of the large and splendid intertropical species, which, after removing the outer layer, take a polish almost equaling the natural brilliancy of the interior, might be converted into dishes for holding fruit. If mounted with good taste, their indescribable iridescence and prismatic colors would materially add to the richness of an elegant table."

On the Pacific coast of the United States, especially in Southern California, the gathering of *Haliotis* shells, or abalones, affords employment to a large number of persons, and a considerable commerce has sprung up, which is chiefly in the hands of the Chinese.

That this should be so is very natural. At home the Chinese were, and are yet, accustomed to dry the flesh of their own *Haliotis*. Finding in California the same luxury, they at once began to gather the abalones for the sake of the meat, which they dried and salted and sent home to China at a good profit. After a time white men began to gather up the shells thrown away and work them into polished mantle ornaments and articles of jewelry. Thus apprised of their value, the Chinamen also saved all the shells they got, and soon found this half of the catch brought more money than the flesh. For three or four years past the business in these shells has been very extensive; but fears are felt for its future, since the mollusks are being rapidly exterminated along the whole coast.

The species which enter into this western industry are said to be four:

Haliotis cracherodii.

San Francisco to Lower California.

Haliotis splendens.

San Diego and adjacent islands.

Haliotis corrugata.

Santa Barbara to San Diego and Catalina Island.

Haliotis rufescens.

Mendocino County southerly to Saint Nicholas Island.

The first named of these is the ordinary abalone of commerce; the last is northern and rarely seen, but was the one most employed by the Indians for making *uhllo* money and ornamental disks.

Late information and partial statistics of the abalone fishery are furnished by the investigations of Messrs. David S. Jordan and W. N. Lockington of the Census Office, whose figures are for the year 1879. They inform us that the abalone producing region embraces the coast of California from San Francisco to the southern boundary; also the peninsula of Lower California and the opposite shores of Mexico. Those credited to San Diego County and San Francisco in the appended table are largely derived from Mexican waters. Until lately the Mexican Government paid no attention to the depredations of the abalone fishers on their coasts; but now a consulate has been established at San Diego, and a license duty of $60 a year is placed upon every boat from the United States going in search of these shell-fish in their waters.

In respect to San Diego County it appears that "most of the abalones are collected by Chinamen, who have already stripped the coast as far south as Cerros Island. There are eight companies of them now between there and San Diego; four of these companies belong at San Diego, and combine this labor with 'red-fishing.' During the first week of January, 1880, alone, their sales amounted to 10 tons of shells, worth (then) $450, besides the meat they saved, which is worth 5 cents a pound in San Diego City."

In Los Angeles County the white men control two-thirds of the trade, deriving their stock mainly from Santa Catalina, San Clemente, and adjacent islands.

Ventura ships very little, and what comes from her coast is mainly in Santa Barbara boats.

In Santa Barbara County, however, more is done, a schooner called the Surprise being constantly employed in taking Chinese colonies to the various islands, and receiving the shells to pay for the transportation, while the Chinamen retain the flesh for their own profit. Various Californians also work at it irregularly, and there are a few Chinese permanently located along the coast near Point Concepcion and Point Arguello.

The entire sea-front of San Luis Obispo County is bordered by detached rocks, and is therefore very favorable to the growth of Haliotides. San Simeon, Cayucos, and Port Harford are the principal points of shipment, and thence the abalone fishermen, principally Chinese, send their catch to market.

Monterey County contributes a small quota, and there is also a colony of Chinese on Santa Cruz, and another on Santa Rosa Island collecting abalones; but the exact account of what they do was not ascertained; their probable product is included in the following estimate table under the head of San Francisco:

Summary table of the abalone fishery in 1879.

County.	Meats.		Shells.		Total value.
	Pounds.	Value.	Pounds.	Value.	
San Diego	280, 000	$14, 000	1, 400, 000	$30, 000+	$44, 000+
Los Angeles	160, 000	8, 000	800, 000	18, 000+	26, 000+
Ventura	20, 000	1, 000	100, 000	2, 500	3, 500
Santa Barbara	100, 000	5, 000	500, 000	12, 500	17, 500
San Luis Obispo	15, 600	780	23, 500	575	1, 355
Monterey.....	12, 000	600	60, 000	1, 500	2, 100
San Francisco*	190, 000	9, 500	950, 000	23, 750	33, 250
Total.....	777, 600	38, 880	3, 833, 500	88, 825+	127, 705+

* Those credited to San Francisco are taken in the neighborhood and the off-shore islands, by Chinese.

Concerning the habits of the Haliotides little need be said. They dwell upon weed-grown rocks not far from the low-water line and feed upon the sea vegetables. Their foot is "very large, rounded at the ends and fringed with thread like tentaenlæ, which, when the animal is protruded from the shell below the surface of the water, are gently swayed with a somewhat vibratory motion." They move very little and with great slowness. The broad muscular foot is adapted less to locomotion than for adhesion, and so strong is the force with which they cling to the rock, withdrawing their protracted lobes and squatting flat down at the least disturbance, that it often is exceedingly difficult to detach them, even with the aid of the trowel or spade to slip under them which is usually carried by the fishermen. Another method is to pour over them a small quantity of warm water, and then give them a sharp push with the foot sideways.

There is a grisly story of a poor Chinamen, who discovered a large abalone left bare by the tide and partly exposing his mantle-lobes. The man had no spade with him, but attempted to tear the mollusk up with his fingers. No sooner did the abalone feel his touch, however, than it shut down, pinching the Chinaman's fingers between its shell and the rock so tightly that he could not pull them away before the tide, rising with cruel speed, had drowned him in this creature's clutch. Whether or not this be an "ower true tale," it illustrates the strength with which the mol-

lusk holds to its site—a power of anchorage necessary when storms beat upon its native rocks with almost resistless force.

The tenacity of life of this mollusk seems equal to its hold upon the rocks. Dr. R. E. C. Stearns, of San Francisco, writes that he has frequently removed the animal from the shell by means of a sharp knife and thrown it into the water, when "it would at once descend and place itself in its normal position upon a rock, to which it would adhere with apparently as much tenacity as before it was deprived of its shelly covering."

The meat of abalone has long formed an article of food in various parts of the world—Senegal, the South Sea Islands, Malaya, China, Japan, and our Pacific coast. It is said to be "exceedingly nutritious, but indigestible." In San Francisco it is rarely eaten except by Chinamen, who are the only ones who gather it. A simple process of salting and drying is all that is necessary for its preservation, after which the larger portion of every season's crop is exported to China. In order to get a ton of meat about 6 tons of living animals must be gathered, but how many individuals this represents cannot be stated. After being cured abalone meat is worth about 5 cents a pound or $100 a ton in San Francisco; and the value of the crop in 1879 was nearly $10,000. The number of men employed is unknown, but amounts to some hundreds. The coast is so stripped of haliotis now, that the Chinamen are compelled to resort to unfrequented islands, transportation to which is afforded them by American capitalists, who take their pay in shells, while the Chinese retain the meats.

The trade in abalone shells, indeed, is of twice as much importance, financially speaking, as that of meats, since it amounts to nearly $90,000 annually. Some Americans also are engaged in this business, and the finishing-off of the shells for market is wholly in their hands.

The shell of haliotis is one of the most brilliantly beautiful in its interior of any known. The lustrous, iridescent curves of the nacre delight every eye, and is due to a peculiar cellular structure of the laminæ which make up the shell. In aged specimens the part to which the muscle is attached is raised above the level of the rest of the interior and presents a roughened or carved surface of irregular shape, often fancifully imitative of some other object. The writer has seen one which thus contained a singularly correct profile of Napoleon I.

Outside the shells are usually rough and unattractive, but support a small forest of minute vegetable and animal forms very interesting to a naturalist. A curious case is mentioned by Dr. Stearns where a haliotis had been attacked by another mollusk, a boring bivalve, known as *Navea*, which had cut its way through the shell. Advised of this enemy, the haliotis had defended itself by adding coating upon coating of nacre, as a bulwark between him and his foe, until, as the *Navea* progressed, a large knob was built in the interior of the abalone's shell.

The shells are usually sent to San Francisco from the lower counties of the State in the rough. In addition to the regular trade, the captains of coasters often make a special trip, or pick up return cargoes, and speculators venture with a single cargo or two now and then. This is the sort of supply which is credited to San Francisco in the above table, in addition to the regular trade owned there.

The price paid for them by the merchants varies greatly, running from $40 up to $90 a ton; an average price last year would be $50 or $60. From San Francisco they are shipped to China, Europe, and the Eastern States. In China they are broken up and used for inlaying in connection with the lacquer-work for which the Chinese are famous. The mosaics of Europe are often adorned in the same way, various arts are served by their glittering fragments, and in Guernsey their scintillating surfaces, dangling from strings on the top of poles, become effective in frightening birds from the grain-fields. Many of the shells sent to Europe are polished with the help of acids

and reshipped to the United States, where they are valued as mantle ornaments, toilet-soap basins card-cases, and receptacles for flowers. The same work is done to some extent in San Francisco. Mr. Lockington reports that many are there manufactured into combs of various descriptions, particularly ladies high hair-combs of great elegance and costliness, for which there is a large demand.

At San Diego, according to Prof. Jordan's notes, one gentleman sold about $1,500 worth of polished shells during 1879, at from 25 cents to $5 each according to size and beauty. Most of these were sent to the East by mail in "nests" of four to six, at $2 to $5 per nest. Many are also sold to tourists. In polishing, the young of *Haliotis splendens* are treated with diluted hydrochloric acid. Other species and the adult of *splendens* are ground down on stones by hand, until the rough exterior is removed and the lustrous under-layers are revealed. Steam grinding wears them away too fast and holes result, unless the operator is very careful. After grinding, the shells are varnished.

Some persons suppose that the four, six, or eight round holes which are seen along the ridge at one side of the abalone shell are designed by the man who polished it. But this is a mistake. Through those holes, when the animal sits close down upon the rock, he derives the pure water necessary for his breathing. From them also protrude little horns or feelers, by which he is warned of the approach of any danger.

To the Indians of California the haliotis was very valuable. They wore it as an ornament about their necks and in their hair. The tribes of the interior were so attracted by its glitter that they were willing to pay a large price in barter to possess it. A horse was not an infrequent price for a fine shell. The coast tribes also made from them beads and coin of different values and shapes. These were all made from the red-backed abalone, *Haliotis rufescens*. Mr. Stephen Powers, describing this shell money, says:

"The uhllo pieces are of a uniform size on the same string; they do not mix them. The dollar pieces are generally about one and a fourth inches long and an inch wide, the smaller about as long, but narrower. A couple of fragments I picked up in an old Indian camp are worth 25 cents each. The Indians are very ingenious and economical in working up the aulones. Wherever there is a broad flat space they take out a dollar piece; where the curve is sharp, a smaller one. They especially value the outer edge of the whorl or lip, where the color is brilliant, and these they are obliged to cut in 25-cent pieces. You will see that the uhllo is cut into pieces of different sizes, and even pieces of the same size vary in value according to their brilliancy. * * * All the money that I have seen was strung on grocery twine, but they often use sinews of various kinds, also the outer bark of a weed called milkweed about here.

"The uhllo necklace has three or four strings of very small glass beads above the shells, forming a band about one-quarter of an inch wide, which encircle the neck."

PART XXI.

THE CRAB, LOBSTER, CRAYFISH, ROCK LOBSTER, SHRIMP, AND PRAWN FISHERIES.

By RICHARD RATHBUN.

1.—THE CRAB FISHERIES.

a.—Atlantic and Gulf Coast.

Common edible crab, or blue crab.

1. Natural history and uses of the blue crab.
2. Methods of fishing and transporting.
3. Extent and character of the fishery.
4. Coast review of the crab fishery.
5. Crab canning.
6. Statistical recapitulation of blue crab fishery.

The minor crab fisheries.

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c.—Statistical Recapitulation.

6. Statistics of the shrimp and prawn fisheries of the United States.

PART XXI.

THE CRAB, LOBSTER, CRAYFISH, ROCK LOBSTER, SHRIMP, AND PRAWN FISHERIES.

By RICHARD RATHBUN.

1.—THE CRAB FISHERIES.

(a.)—FISHERIES OF THE ATLANTIC AND GULF COASTS.

COMMON EDIBLE CRAB, OR BLUE CRAB.

1. NATURAL HISTORY AND USES OF THE BLUE CRAB.

The common edible crab, or blue crab (*Callinectes hastatus*, Ordway), occurs in greater or less abundance along the entire eastern and southern coasts of the United States, from Massachusetts Bay to Mexico, and gives rise to an industry which, among crustaceans, is second only to that of the lobster. It is used both as food and bait, and also to some extent as a fertilizer.

From a part of this region three additional species of the same genus, regarded by some authorities, however, merely as varieties of this species, have been recorded. They are: *Callinectes ornatus*, ranging southward from Charleston Harbor, South Carolina, and *Callinectes larvatus* and *tumidus*, occurring in Southern Florida and the West Indies. These several species, including the blue crab, resemble one another so closely that they would probably not be distinguished apart by the fishermen, and it is not unlikely that one or more of the additional forms may contribute toward the market supplies in some places. Of their relative abundance, however, we know nothing positively, but among large numbers of specimens sent from the Southern markets we have failed to recognize any form but the genuine blue crab. From New Orleans, La., we have received two species of crabs belonging to other genera, which are sold in the markets but to what extent we are not informed. One of these is the lady crab (*Platyonichus ocellatus*) also occurring on the Atlantic coast, but neither of these species is enumerated separately in the returns of the crab fisheries of Louisiana.

The stone crab (*Menippe mercenarius*) fishery of the Southern States constitutes, however, a totally distinct and well-defined industry, and the same can be said with regard to the rock crab (*Cancer irroratus*) and the Jonah crab (*Cancer borealis*) of the New England coast, so far as they are fished for.

NAME.—*Callinectes hastatus* has received a long list of vernacular names, many of which are quite local in their application. Those most in use are as follows: "Edible crab," "common crab," and "blue crab," toward the north; "sea crab" and "channel crab" along the middle and southern Atlantic coast, and "gulf crab" in the Gulf of Mexico. The more local names are

"green crab" (New Bedford), a term which properly belongs to a smaller species, not regarded as edible on our coast; "paddler" (Vineyard Sound, Narragansett Bay, and Long Island Sound); "blue claw"; "bay crab" and "river crab" (New Jersey); and "lake crab" (Gulf of Mexico). The terms "soft crab" and "hard crab," although having reference to different conditions of the same species, are frequently used as common names to designate the edible crab.

It may be well in this connection to describe the names applied by crab catchers to the different conditions of the crab during the period of shedding its old and growing its new shell, as they will be used on the following pages without further explanation. The hard-shell crab, or "hard crab," as it is commonly called, when about ready to shed its shell, but before the shell has actually broken, is termed a "comer." During the various stages of shedding, from the time of the breaking of the old shell to the soft shell state, it is called a "buster," "peeler," or "shedder." As soon as the crab has freed itself from its old covering it is a "soft crab," but a slight hardening makes it a "paper shell," and a greater hardening, as long as the shell remains flexible enough to bend without breaking, entitles it to the name of "buckler." The buckler, however, soon becomes a hard crab. It is probable that the female crabs moult soon after spawning, for after the eggs have hatched, the egg coverings still remain attached to the swimmerets and can only be gotten rid of by the operation of shedding.

SIZE.—The average size of the blue crabs sent to market ranges from 4 to 6 inches in width across the carapax; extreme dimensions are 7 to 10 inches.

DISTRIBUTION, SEASON, ABUNDANCE.—The winter habits of the blue crab have never been carefully studied. Cold weather drives the crabs away from the shores and into somewhat deeper water, where they are supposed to pass the winter without much activity, or even partly buried in the soft muddy or sandy bottoms. During the warmer months of the year they keep close to the shores, and enter the shallow water areas in immense numbers, affording an excellent opportunity for their capture.

As would naturally be expected, the crabbing season, or, more explicitly, the season in which crabs may be taken in shallow water, varies in duration on different parts of the coast, according to the climatic conditions. At the North the season is considerably shorter than at the South, and during mild winters crabs can be taken close to the shore, on the coasts of the southernmost States, during nearly every month of the year. On the coasts of Southern New England and Long Island, the season extends from about May to October or November. On the New Jersey coast, the season opens somewhat earlier and lasts until cold weather begins. At the mouth of Chesapeake Bay, and from there to Georgia, it extends from March to November, but the best months are said to be generally those from May to September. In Western Florida the usual season is from March to December, and in the Gulf of Mexico it is about the same; but, as mentioned above, warm winters in this region keep the crabs in nearly the same localities which they inhabit during the summer. Crabs are not always taken for food and shipment at the South throughout the season of their abundance near shore. Warm weather interferes with the industry, and in such cases most of the fishing is done in the spring and fall. Soft crabs are only obtainable during the warmer months of the year.

During the period designated as the crabbing season, crabs are to be found near shore in all localities favorable to them within the limits of their distribution. They inhabit principally muddy and sandy bottoms, entering the bays, sounds, inlets, rivers, creeks, and all other indentations of the coast, as well as living upon the outer shores and sand-bars. Brackish water appears to be as favorable to their existence as salt, and they often ascend the rivers to where the water is absolutely fresh. It is probable that even during the summer they may occur in moderate

depths of water farther from the shore, but in such localities they would not be generally noticed when they could be obtained nearer land. According to correspondents, they are obtained for food and bait in the summer months in all depths from high-water mark to 3 or 4 fathoms, but mostly where they can be reached with a hand net. As above stated, cold weather drives the crabs away from the shore and causes them to seek depths which are not subject to sudden changes of temperature. Nearly all observers agree in stating that during the winter months they remain quiet and more or less concealed in the bottom mud or sand. At this season they are often taken by means of tongs and spears, but being then obtained with so much difficulty, the winter crab fishing has never assumed any considerable proportions. In some localities it appears that the crabs do not entirely leave the very shallow water in the fall, but a few bed near the shore, where the conditions are favorable, and these crabs are said to suffer greatly in times of extreme cold. A very severe winter kills many of them, and after heavy winter storms many dead ones may often be found thrown upon the beaches by the waves. After an unusually cold winter, crabs are less abundant than after a mild one. Little can be said regarding the depths frequented by crabs in the winter season. They are taken for food in depths of 3 to 4 fathoms, but probably live also in much deeper water. A correspondent at Hampton, Va., states that the winter crabs are less savory than those procured in the summer, their flesh being rather soft and watery.

According to the statements of many persons along the entire coast from Cape Cod to Mexico, edible crabs are as abundant now as they have been at any previous time. Despite the immense quantities taken and sold or destroyed, there has been no apparent diminution in their numbers. They vary in abundance from year to year, being especially scarce after severe winters; but if they are less abundant one year, they are just as likely to be more abundant the next. Still it would not be wise to countenance an indiscriminate fishing, for there is no reason why the crab fisheries, like many others, might not be overdone. We are informed that on one section of the New Jersey coast, where a law exists to protect crabs during the winter, they have apparently increased in abundance since the law has been enforced.

HARD AND SOFT CRABS.—Both hard and soft shell crabs are used as food and bait, but for both of these purposes the soft-shelled individuals, called simply "soft crabs," are greatly preferred in nearly all localities. While shedding, however, and as long as they remain soft, the crabs generally seek shelter and protection in secluded places or by partly burying themselves out of harm's way. It is also certain that soft crabs are much less abundant than hard ones at any time, as the shedding period is of several months' duration, and it is probable that but a comparatively small proportion shed at exactly the same time. Soft crabs are, therefore, much more difficult to obtain than hard ones, and being in greater demand, bring much higher prices; in many places they are regarded as great luxuries. Soft crabs have this advantage, that there is little waste in preparing them for the table; but with hard crabs, on the contrary, the external coating or shell is thick and hard and constitutes a large proportion of both the body and the claws. At the South, however, it is considered that the soft crab is fit only for frying, while hard crabs may be prepared in a multitude of ways. Only hard crabs are used at the canneries. The quantity of hard crabs consumed upon our coast probably far exceeds that of soft crabs, but the aggregate value of the latter appears to be much greater.

CRABS AS BAIT.—Crabs form an excellent bait for many kinds of fish taken with the hook and line, and are very extensively used for that purpose throughout their entire range from Cape Cod to Texas. About New Bedford they are especially recommended for tautog, and during some seasons nearly all the catch of crabs, amounting at times to many thousands in number a week,

is employed in the tautog fishery. They are, however, also used for other species of fish in the same region.

On the coasts of Long Island and New Jersey they appear to be as favorably regarded as at New Bedford for many kinds of salt-water fish, and are much more extensively employed. The species of fish for which they are said to answer on the New Jersey coast is a very long one, and includes nearly all the species taken there for food with hook and line. North of the mouth of Chesapeake Bay, in Virginia, the principal kinds of marine invertebrate animals used as bait are as follows, in the order of preference: Soft crabs, which are considered to be by far the best, hard crabs, clams and mussels, the latter being but rarely employed. About Norfolk, prawns form the best bait for rockfish, but next in preference for the same species of fish comes the soft crab. Both soft and hard crabs are also classed among the principal baits of this region for nearly all the species of edible marine fish.

Southward from here, along the remainder of the Atlantic coast, extends the great shrimp and prawn region, and wherever shrimp and prawns occur and can be conveniently obtained they form the favorite baits for nearly all kinds of hook and line fishing. In their absence crabs must often be resorted to, and they are used to a very large extent.

On the Gulf coast of the States crabs are also used as bait for all the species of fish for which shrimp will answer. Soft crabs and very small hard crabs are preferred.

2. METHODS OF FISHING AND TRANSPORTATION.

METHODS OF FISHING.—The most common and effective appliance in use for crab catching is the simple scoop-net or dip-net, consisting of a rather shallow net, of moderately coarse mesh, fastened to a ring or hoop, which is attached to a handle of suitable length, dependent upon the manner in which the net is to be used. This scoop-net, generally called "crab net," is employed alone for catching crabs in very shallow water, but in deeper water, where the net cannot be conveniently used on the bottom, or where the crabs cannot be seen from the surface, it is customary to bring in the aid of auxiliaries, in the shape of baited lines. These lines may be used singly, several being easily managed by a single person, or be arranged after the fashion of cod trawl-lines or trot-lines. They are intended merely to entice the crabs to the surface of the water, within reach of the scoop-net, and are seldom furnished with hooks. On the coast of Georgia they sometimes employ the so-called hoop-net, which is simply a piece of twine netting tied to a barrel hoop. It is weighted in the center, and, after being baited with a piece of meat, is lowered to the bottom in shallow water where the crabs are known to occur. This appliance is similar in construction and mode of use to the hoop-net pots formerly employed in the lobster fishery of New England. Seines are also used in crabbing, and in favorable localities are very effective. Oyster or clam tongs and eel-spears are about the only additional implements used in the crab fishery. They are, however, seldom employed, excepting in winter, after the crabs have retreated to deep water and have embedded themselves in the mud, and but little is done with them at any time.

Incidentally crabs are taken in lobster-pots, gill-nets, and fish-seines, and on fish hooks and eel-spears, when they are usually regarded as a great annoyance and seldom retained as food. They are especially troublesome to the seiners on some portions of the Southern coast, as they become entangled in the nets and greatly interfere with operations. Thousands are often captured in the seines, and when they cannot be sold are thrown upon the shore or used for fertilizing purposes.

Nearly all the soft crabs obtained are caught by means of the scoop-net or hands alone, as crabs will not take the bait while in the soft state, and are seldom captured in the seines. Baited

lines for enticing hard crabs within reach of the scoop-net are in common use, wherever crab fishing is pursued as an industry, from New York to Galveston, Tex. As stated above, the usual form of line employed is constructed after the pattern of the trot-line used in ordinary fishing, but without hooks; in the crab fishery it bears the same name. The crabber's trot-line consists of a main line from 250 to 1,200 feet long, with smaller lateral lines, 18 inches or more in length, arranged at regular intervals of about 18 inches to 2 feet. At Hampton, Va., one-half-inch manilla rope is used for the main line. The bait, usually consisting of beef, tripe, raw meat, or fish, is simply tied to the lateral lines.

There are several ways of setting the trot-lines, each of which is managed by one or two persons. In some places, as at Hampton, Va., each end of the trot-line is furnished with an anchor and buoy, and one man tends each line in a small skiff, about 16 feet long by 3 feet wide. Arriving at the fishing-ground, he drops one end of the trot-line overboard, with its anchor and buoy, and rows off, paying out the entire length of the line, until the other end is reached with its anchor and buoy, which are likewise thrown over. The line is then constantly examined, the man in his skiff passing continuously backwards and forwards, drawing himself along by means of the main line, after the manner of under-running cod trawl-lines. The crabs as they are drawn to the surface of the water, clinging to the bait, are removed by means of a scoop-net and thrown into the boat. Another method of setting the lines is to tie the ends to poles, which are thrust down into the bottom, so as to allow the lateral lines to rest upon the sand or mud. On the Louisiana and Texas coasts, the trot-lines are used from the beaches, each being tended by two persons. The main line, which usually measures about 1,200 feet long, is stretched along the beach at the water's edge and the lateral lines are thrown outwards as far as they will reach. The lateral lines are then hauled in in quick succession, the men passing continuously backwards and forwards and securing the unsuspecting victims in their scoop-nets, as they are cautiously drawn upon the beach.

Crab cars or pens.—In localities where large quantities of crabs are taken for shipment to market, in the soft-shell state, it is generally customary to make arrangements by which the hard crabs nearly ready to shed, called "comers," can be kept in confinement until they have cast their hard covering. This practice is extensively resorted to on the northern coast of New Jersey by the use of floating cars or pens, made of laths or thin boards, each fisherman possessing several of them. They are usually from 4 to 8 feet square and about 1 foot deep, with a partition through the center and a cover. When the crabber arrives with his catch, he places the "comers" in one compartment and the "busters" in the other. The cars, which are kept moored in some sheltered cove a short distance from the shore, are examined two or three times a day, and the soft crabs as they appear are taken out and packed for shipment. Soft crabs left for any length of time with the hard crabs are liable to be injured by the latter, and in warm weather the new skin or shell is said to harden rapidly.

Methods of shipping.—Crabs are shipped to market in various ways, but generally alive. Soft crabs are usually packed in boxes, with moist seaweed or salt grass, each one being carefully placed at a certain angle, with the front edge of the body up, so as to prevent, as far as possible, the escape of the moisture from the gills. They are also packed snugly together to prevent lateral movement, the quantity stowed in each box ranging all the way from four to fifty dozens. During warm weather ice is sometimes used in the packing. The shipping-boxes for soft crabs on the Northern New Jersey coast are about 3 feet long by 2 feet wide and 3 inches deep. They are constructed of pine boards or laths, and have a capacity of from four to six dozens each. A thin layer of grass or seaweed is first placed in the bottom of the box, then the crabs in the

manner above described, and finally another layer or covering of the same grass or seaweed. In this condition they will remain alive for several days, except in very warm weather. Hard crabs are generally sent in barrels. Baskets are also employed for transporting crabs in some localities, especially at New Orleans, and on other parts of the Gulf coast. On the Southern coast crabs are sometimes boiled before shipping.

3. EXTENT AND CHARACTER OF THE FISHERY.

The crab industry of the Atlantic and Gulf coasts is very extensive, and gives employment to many persons. It had, however, never been carefully studied previous to the investigations for the census of 1880, and being carried on mostly in a small way by fishermen scattered irregularly along the coast, it has been impossible in the short time at our disposal to bring together anything like a complete account of its extent and value.

The crab fishery, like most other fisheries, is not kept up continuously throughout the year, and the people engaged in it during the summer generally have other occupations in the winter. A large share of the crab catchers are women and children, especially at the South, where many of the colored people, living upon the sea-coast, devote a portion of their time to hunting out the soft crabs and selling them in the nearest towns. At numerous places, however, a regular crab fishery is carried on throughout the entire season for the purpose of supplying the larger markets, like New York, Charleston, Savannah, and New Orleans, or the crab canneries, as at Hampton, Va. The number of crabs used as bait is very great and their value considerable.

Southern New England cannot be said to have any regular crab fishery. About New Bedford many crabs are taken for bait and for eating, and at other places smaller quantities are captured and made use of; but very few persons, if any, devote their entire attention to this industry, even for a short period. Most of the blue crabs eaten in the interior New England towns and in Boston, come from farther south, through the New York markets. New Bedford makes some shipments to Providence and New York. Both the north and south shores of Long Island furnish many crabs, the bulk of those not used at home going to New York and Brooklyn. New Jersey is the center of the soft crab industry, and many more soft crabs are taken there for home consumption and shipment than in any other State in the Union. The fishery is principally confined to the section of coast between Sandy Hook and Barnegat Inlet, and a large share of the crabs sold in New York come from this region.

The lower part of Chesapeake Bay, bordering on the States of Virginia and Maryland, is said to be the center of distribution, as regards abundance, of the edible crab; but the fishery in this region, outside of the canneries, is not as important in money value as that of New Jersey, mainly perhaps for the reason that the larger markets are more distant, and soft crabs not so easily obtained. The large crab canneries are all located here. In North Carolina the crab fishery is mainly confined to the neighborhood of Wilmington, and in South Carolina to the neighborhood of Charleston, at both of which places a large business is carried on. Savannah is the center of the Georgia crab industry, which is very extensive. Florida appears to be but little interested in crab fishing, although crabs are abundant on both the eastern and western coasts. Mobile, Ala., receives large quantities of crabs from the neighboring coast for its own use, but ships only a few. The crab fishery is extensively pursued on the coasts of both Louisiana and Texas to supply the markets of New Orleans, Galveston, and interior towns.

In the Northern cities and towns crabs are regularly sold in the markets along with fish, but at the South (from North Carolina southward), they are generally hawked through the streets by negroes.

Three large canneries, two located at Hampton, Va., and one at Oxford, Md., are engaged in packing crabs in hermetically sealed cans during the crabbing season. This industry is of recent origin, but has already assumed considerable proportions. It is described further on.

4. COAST REVIEW OF THE BLUE CRAB FISHERY.

NEW ENGLAND.—The blue crab is not known from north of Massachusetts Bay, where it is of rare occurrence, but it ranges along the entire southern coast of New England from Cape Cod to New York. At no place upon this section of coast, however, is crab-catching carried on as a regular business, mainly for the reason that this species of crab is less abundant here than to the south of New York, where it is more easily and cheaply obtained. Blue crabs are common in Buzzard's Bay, especially in the vicinity of New Bedford, and enter the mouths of the rivers during the summer in large numbers. Acushnet River, near New Bedford, is described as a great abiding place for crabs in the summer season, and as affording good facilities for their capture. In the spring the average weekly catch is stated to be about four hundred crabs, but in the fall the number taken is sometimes as great as forty thousand per week. Some of these crabs are used as food, being retained in New Bedford or sent to Providence or New York, but by far the greater portion are employed as bait for tautog. Among the other species of fish for which this crab is utilized as bait in this vicinity are the striped bass, rock bass, cod, squeteague, and blackfish. When shipped away, they are packed in boxes with seaweeds, ice being added in warm weather.

In Vineyard Sound blue crabs are less abundant, and are only taken occasionally by persons desiring them for their own use. The Newport markets are partly supplied with blue crabs from Narragansett Bay, where they are said to be more abundant and more easily taken than the Jonah crab (*Cancer borealis*), which also occurs there, and is the only other species of crab used in Newport. Soft blue crabs are also sent to Newport from New York.

All of the other larger towns and cities on the Southern New England coast (Stonington, New London, New Haven, &c.,) make use of greater or less quantities of crabs caught in their immediate vicinity, but these places probably receive most of their supplies from New York. At the smaller towns and villages crabs are probably also collected at times, when desired for home consumption, but nowhere in this region can crab-catching be regarded as an established industry, nor is it possible to give an estimate of the number of crabs annually taken and disposed of. The season extends from April to November, but varies according to the conditions of temperature, some years being more favorable than others. The fishing is carried on mostly by means of dip-nets or scoop-nets, the crabs being sometimes enticed to the surface of the water by the use of baited lines. Incidentally crabs are obtained, often in great abundance, in lobster-pots, fish-seines, and other nets. In the winter they are occasionally speared by eel fishermen, who find them buried in the muddy bottoms.

NEW YORK.—Blue crabs are abundant at many places on the muddy and smooth sandy shores of Long Island, and are taken in considerable quantities for home consumption and for shipment to New York. Small scoop-nets, rakes, and trot-lines are used for their capture. The practice of confining hard crabs, nearly ready to shed, in floating cars until they become soft shell, is pursued in some localities. Soft crabs sell at from 35 cents to $1.50 per dozen, according to their abundance. Hard crabs bring from 75 cents to $1.50 a hundred. The principal markets for the Long Island crab fisheries are New York City and Brooklyn. Shipments are generally made by rail. Hard crabs are shipped to New York from Long Island during the entire year, but soft crabs are first sent to that market about July 15, the shipments continuing until about October.

According to Mr. Fred. Mather, most of the hard crabs sent to market from Long Island come

from Moriches Bay, on the south side. They are taken by means of trot-lines, with the snoods 2 or 3 feet apart. These are baited with meat, eels, or other kinds of fish, and the line is under-run by a man in a small boat, the crabs being taken up in a scoop-net. Shipments are made to New York in second hand cement barrels, obtained from the East River Bridge Company, at a cost of 10 cents each. The Long Island Railroad transports the empty barrels free of charge for the sake of the freight when full. The principal other places on Long Island where Mr. Mather found the crab fishery carried on, though to a less extent, both for home consumption and shipment, were: Canarsie, Flatlands, Sheepshead Bay, Gravesend Bay, Bay Shore, Cold Springs, Oyster Bay, and Centreport, Huntington Bay.

The product of this fishery for New York State, including Long Island, to which the industry is mainly confined, amounted in 1880 to 1,624,583 pounds, valued at $69,234. The crabs were mostly taken and sold in the hard-shell state.

NEW YORK CITY MARKETS.—The blue crab is about the only species of crab that is sold in the New York markets. Hard crabs are received in greater or less quantities during every month of the year, but most abundantly during the winter. Soft crabs first begin to arrive about May 1, from the coast of Virginia; about the 1st of June, from the mouth of Chesapeake Bay; about June 15, from the New Jersey coast, and about July 15, from the coast of Long Island. The greatest consumption of soft crabs is from July 1 to September 1, when the daily sales sometimes reach 2,000 dozens. This amount may, however, be considered as the maximum.

Mr. Eugene G. Blackford, of New York City, furnishes the following estimate of the average sales of soft crabs in Fulton market, by months, for each summer during the past two or three years:

	Dozens.
May	2,600
June	9,000
July	22,500
August	22,500
September	1,500
Total	58,100

The prices of these crabs vary with their abundance and the time of year, from 50 cents to $2 per dozen. Sometimes, but rarely, the price falls as low as 25 cents per dozen. One dollar a dozen is regarded by Mr. Blackford as a fair average price for the entire season, making the total value of the sales for one season about $58,000.

The quantity of hard crabs sold annually in Fulton market averages about 750,000 by count, the average price being about 1½ cents each, and the total yearly valuation, $11,250. They come mostly from the south side of Long Island. About one-fourth of the crabs sold in New York are shipped to other places, but the above estimates do not cover the entire amount marketed in that city, according to the returns from other States.

NEW JERSEY.—The edible crab is abundant along the entire New Jersey coast, coming out of its winter haunts in the early spring and thronging the shoal waters during the summer. Its summer habitats are the bays and sounds, the mouths of creeks and rivers, and even the salt flats and shoals, where the tides ebb and flow, in depths of a few inches to 10 feet and more. Many are often left exposed at low water, and some ascend the streams to where the water is decidedly brackish or even nearly fresh. In the winter they generally go into deeper water, and bed in the mud, but sometimes they remain concealed in the shallow water near shore.

The shedding season is said to begin the latter part of May and to continue until October. During this period a great number of men and boys and even women engage in crabbing, pressing into their service all the old boats and scows available. On the Northern New Jersey coast,

from Sandy Hook to Barnegat Inlet, the crab fishery is of great importance, but farther south it is as yet of very little account.

Between the two places above mentioned this industry is perhaps more extensive than in any similar district of the entire coast, giving employment, as it does, to over five hundred men and boys during at least four months of the year. As a rule, only soft crabs, or those about to shed, are taken for food, but there is also a certain trade in hard crabs, which are used for fish bait as well as food. The soft crabs bring from four to eight times as much as the hard ones, the price depending upon their abundance.

Notwithstanding the immense quantities of crabs annually taken on this coast, there appears to have been no decrease in their numbers, and they continue as plentiful now as they have been in former years. This may be accounted for by the fact that the female crabs have spawned before shedding, or at least do not carry spawn on the outside of the body during the shedding season, and hence but few crabs with matured spawn are taken and destroyed. Crabs vary in abundance, however, from year to year, being more plentiful some years than others, and a very cold winter is said to kill large numbers, and make them less abundant the following spring. One correspondent informs us that they are most abundant on the shore at times of full and new moon, but this may be due to the fact that at such times the tides ebb lower and leave a greater breadth of shore exposed. The enactment of a law in some places to protect the crabs in winter has had the desired effect of increasing their abundance in the following spring and summer.

Crabs can be taken throughout the year, but the regular season, when they are most easily obtained and the only season when the soft crabs are found, is from April or May to November. The best months are said to be June, July, August, and September. After October or November they must generally be sought for in from 6 to 20 feet of water, with long-handled tongs, which are sometimes employed, but the winter fishery is of slight importance. Crabs do not, however, always go into deep water in the winter, for they sometimes bed in the shallow channels and inlets, and in such locations the winter mortality is great if the weather becomes unusually severe.

The common method of capturing crabs in the summer is with a crab or scoop net, having the ring or hoop about 1 foot in diameter and the handle from 7 to 8 feet long. In water too deep for the use of the scoop net alone, lines baited with raw meat or fish are employed to entice the hard crabs to the surface. Small hauling seines are also sometimes used. For the winter fishery long-handled tongs or rakes are brought into play. In those sections where the crab fishery amounts to a regular industry, not only are the soft crabs secured, but also the "comers" and "busters," which are kept in cars until they shed.

As stated above, the crab fishery of New Jersey is mostly confined to the section of coast between Sandy Hook and Barnegat Inlet, and, in fact, as a regular industry, it is mainly limited to a few localities, such as Shark, Squan, and the North and South Shrewsbury Rivers. But considerable quantities of crabs are also taken along the entire northern coast, and smaller amounts toward the south. The greater part of the entire catch during the summer is sent away. A certain quantity is used by the inhabitants of the coast, and a large number are sold to summer hotels, boarding-houses, and restaurants in the crabbing region. At Atlantic City, where the number of summer visitors is very great, the demand for crabs equals the entire supply caught in the neighborhood. At the same place crabbing is pursued as a pastime by the summer visitors and some twenty to thirty men and boys are engaged in assisting these amateur crabbing parties. Fifty to one hundred persons may be seen at times on pleasant days occupied in this way, and this fishery is now considered by many as better sport than that with hook and line. A winter fishery was attempted along the Southern New Jersey coast several years ago, but it did

not prove successful. The fishermen visited the bedding places of the crabs and took them from the mud by means of oyster and clam tongs.

It is estimated that about three-fourths of the crabs sent away from the Northern New Jersey coast (Sandy Hook to Barnegat Inlet) go to New York City and other northern markets; about one-sixth to Philadelphia, and the remainder to interior cities and towns of New Jersey. The New York markets are first supplied from New Jersey about the middle of June, after which time until late in the fall, shipments are being constantly made. Hard crabs are sent in barrels packed in seaweed. Soft crabs are packed more carefully with seaweed or salt grass in boxes or crates, being stowed closely together to prevent injury. Shipments are made by rail, steamers, and sailing vessels.

Crabs serve as bait for nearly all kinds of salt-water fish taken with hook and line. Hard crabs only are used. They are most extensively employed for blackfish or sea bass, and to a lesser extent for many other species.

The following notes on the crab fisheries of Northern New Jersey, furnished by Mr. Charles Doughty, of Fairhaven, are so complete in themselves, that we copy them *verbatim:*

"The fishing season begins about the middle of May, and lasts until the latter part of September. During this period the men and boys in the vicinity of the river mouths and shallow bays provide themselves with long-handled dip-nets and small boats. Each boat is manned by only a single person, who stands in the bow and poles it with the handle of his net slowly along the shore in search of crabs. The depth of water usually resorted to varies from a few inches to 5 or 6 feet. The experienced fisherman can tell whether the crabs he meets with are suited to his purpose or not by their color. A soft-shell crab is much brighter than a hard shell, and those nearly ready to shed have the claws more highly colored, some parts being of a reddish and others of a bluish tint. When he is in doubt as to the condition of a crab which he supposes is about to shed, he breaks off a point of shell or a joint of one of the smaller legs, and if a new shell is forming underneath, the crab is reserved, otherwise it is thrown back into the water. It is considered that about half an hour is required for casting the shell, after the crab is ready to shed, and the crab increases about one-third in size at each molting. The new shell begins to harden in about six hours after shedding, and is supposed to become fully hardened in about thirty-six hours. No hardening appears to take place out of water. After the fishing is over, the crabbers return to the shore where their cars are moored. These are usually 4 to 8 feet long, and about 1 foot deep, with a cover, and are divided in the middle by a partition. They are made of laths or thin boards, and are moored in some sheltered cove a short distance from the shore. The crabs are separated into two lots, the "busters" and soft crabs going into one compartment, and the "comers" into the other. The cars are examined two or three times a day, and the soft crabs taken out and packed for shipment. The boxes used are about 3 feet long by 2 feet broad and 3 inches deep, and hold from 4 to 6 dozens each; they are made of thin pine or laths. A layer of grass or seaweed is first arranged in the bottom of the box, and the crabs are then packed in closely, being placed at such an angle that the moisture will not run from the gills. They are finally covered with seaweed, and in this condition will last several days."

From another source we obtain the following account of certain crab-pens, differing from the above, situated at the mouth of the South Shrewsbury River. We do not know to what extent such inclosures are used, but at the place visited by our informant there were four wooden pens located near the bank, and also several cars floating close by. The pens had a capacity of 4,000 crabs each, and were devoted to the four conditions of the crab known to the fishermen, one being for hard crabs, another for "comers," the third for "busters," and the fourth for soft

crabs. These pens were visited several times a day. While being prepared for and awaiting shipment, the soft crabs are sometimes kept in large refrigerators.

Crab fishing has been pursued on the Northern New Jersey coast for many years, and as long ago as 1855 formed an extensive industry. At that time it was customary to tow a small car behind the boat for holding the crabs just ready to shed, many of which would molt before the shore was reached. About twenty years ago the present form of shedding cars was introduced, and since then it has been almost universally adopted by the fishermen. Previous to its introduction, however, pens were made along the shore, in which the shedder crabs were kept until they had become "soft shell." These pens consisted merely of small sections of the shore line fenced off in such a way as to prevent the escape of the crabs, and they reached a short distance into the water.

During the season of 1880, five hundred and fifteen men and boys were engaged in the crab fisheries of the New Jersey coast between Sandy Hook and Barnegat Inlet. The total catch of soft crabs for that region the same year amounted to 285,825 dozens, valued at $128,612. A fair average daily catch per man is sixty soft crabs, but as many as one hundred and twenty are sometimes taken; some of the best crabbers will make a thousand dollars in a single season, while others make less than a hundred. The average stock is about $250 per man, which would equal a catch of 550 dozens, netting 45 cents a dozen. About 50,000 dozen hard crabs were used in this region as bait during 1880, their value being reckoned at about $6,250. These were partly caught by the fishermen themselves during their leisure hours, and were partly supplied by children who received about 12 cents a dozen for them. It is impossible to make an accurate estimate of the number of hard crabs used as food. The total number of soft crabs consumed along the entire New Jersey coast and shipped from there during 1880 is estimated at 302,075 dozens. For the same region and time, the estimated number of hard crabs used as bait was 59,500 dozens. The total catch of crabs for the New Jersey coast in 1880, therefore, amounted to at least 361,575 dozens, valued at $142,292.

DELAWARE.*—The crab fisheries of Delaware are of considerable importance, especially in Indian River and Bay, and a large part of the male population, as well as a few colored women, are engaged in it to a greater or less extent during the shedding season of the crabs. This fishery is said to have been started at Indian River, in 1873, by two men who came from Long Branch, N. J., for the purpose of catching and shipping crabs to market. Since then, however, the fishery has been wholly carried on by residents of the vicinity.

Crabs are very plentiful along many portions of the Delaware Bay shore. Mr. D. R. Tomlinson, of Dover, states that soft crabs abound on the beaches in the vicinity of Kit's Hammock from the 1st of June to September, and hard crabs from May to November. According to Mr. Van Burkalow, of Magnolia, both hard and soft crabs may be taken in abundance on the bay shore, but as a rule only enough are caught to supply the local inhabitants. He estimates that about 1,000 bushels are secured, during the summer, between Little Creek and Jones's Creek. During a period of very cold weather, in February, 1880, says Mr. A. Hill, of Milford, and immediately after a gale, an enormous quantity of crabs was driven ashore on the west side of Delaware Bay, so many in fact that in some places they lay in windrows on the beaches. One man shipped several barrels of these crabs to Philadelphia, but they did not pay the cost of shipping. But few soft crabs are taken at Lewes, although at least twenty-five thousand hard crabs are caught and disposed of annually in that locality. In the towns of Roxanna and Williamsville, and elsewhere along the extreme southern coast of Delaware, no regular crab fishery exists. The most important crab fisheries of Delaware are those of Indian River.

* The account of the crab fisheries of Delaware has been furnished by Capt. J. W. Collins, of the U. S. Fish Commission.

The crab catchers of the vicinity of Dover are, as a rule, professional fishermen, who, during the summer, after the close of the trout season, gather large quantities of crabs and carry them to Dover, where they hawk them through the streets, together with fish of several species which they may have caught at the same time. Between Dover and Lewes, crab fishing does not appear to be regularly carried on. The residents of the towns in this section who desire crabs for their own use, can readily obtain them almost any time by simply dipping them up from the outer edge of the beaches. At Lewes, however, the crab fishery is combined with that for other species, and most of the men engaged in it may be regarded as professional fishermen. South of Cape Henlopen, in the towns bordering on Rehoboth Bay and Indian River, a large proportion of those employed in crabbing are boys, and colored women also take a slight part in the fishery. The fishermen, whether young or old, are, as a rule, also farmers. Mr. Harmond, of Millsborough, states that he has in his employ during the fishing season, from May 1 to September, twelve men, all of whom, with one exception, are farmers.

Most of the boats employed in the crab fisheries of Indian River are patterned somewhat after the sharpie, being flat-bottomed, sharp-bowed, and wide-sterned; they are constructed of pine boards in the simplest manner possible, and at very slight expense, their average value, as stated by the fishermen, being from two to three dollars each. About two hundred and fifty of these boats are in use in the crab fisheries of Indian River and Bay. In addition to these skiffs especially designed for crabbing, the boats used in the other fisheries are also employed to a large extent for the same purpose.

The principal appliance for catching crabs is a small scoop-net of the ordinary pattern, having a bow from 12 to 15 inches in diameter, with a shallow net-bag, attached to a pole from 10 to 12 feet long.

On the south side of Indian River, many of the crab catchers have small live-cars, which they drag after them as they wade along in search of crabs. The latter, as they are taken, are transferred to the cars, in order that they may be kept alive until the time of shipment arrives. When larger boats than the skiffs above described are used, the cars are towed astern of them or alongside.

At Lewes, crabs are frequently taken incidentally in the gill-nets and haul-seines of the fishermen, who do not regard them as of much value. In regions where the fishery is regularly carried on, however, the fisherman, as a rule, stands in the bow or stern of his skiff, shoving it along with the handle of his dip-net, at the same time watching closely for "shadows" on the bottom. The depth of water visited rarely exceeds 3 or 4 feet, and is sometimes shallower. When a crab is sighted, it is quickly picked up in the dip-net and thrown into the midship section or well of the skiff. When the water is warm, the crabbers often wade along, towing their skiffs after them. On the south side of Indian River, many of the boys and others use the crab-cars above described instead of boats.

According to Mr. Isaac Harmond, the crab fishery continues active for about three months, or from the 1st of May to the 1st of August. During this period, however, the men fish very irregularly, some going out only four or five times in a season, while others go much more frequently. They are said to average, as a whole, about one-fourth of their time crabbing during the season of three months. The crabs are caught mainly about the full and change of the moon, being most abundant for three or four days at each of these periods.

Nearly all the crabs caught north of Cape Henlopen are retailed by the fishermen in the towns and rural districts of that section. At Dover the catch is mostly sold in the town, the soft crabs bringing 18 cents a dozen, and the hard crabs 80 cents a hundred. At Lewes the few soft crabs

taken are eaten by the fishermen. Large numbers of hard crabs, however, obtained in the vicinity are hawked through the village streets by the fishermen, who receive for them about 10 cents a dozen.

A comparatively small quantity of soft crabs is taken at Rehoboth by the fishermen of Lewes, who dispose of them at the latter place. Lewes also receives a few soft crabs from Angola.

Farther south, in the towns situated on Indian River, the crab fishery assumes greater importance. At Millsborough a few of the wealthy farmers and fishermen own each a number of crab-skiffs and dip-nets, which are supplied to the men and boys whenever they desire to go crabbing, with the agreement that they shall sell their catch to the owner of the outfit at a fixed price, which is usually 12 cents a dozen. The local dealer receives the crabs, packs them in boxes holding 10 or 20 pounds each, and ships them to New York and Philadelphia. About seven-eighths of the shipments go to New York and one-eighth to Philadelphia, as shown by the books of the railroad agent at Millsborough. From the same source we learn that the season of 1880 began May 4, when 1 box of crabs was shipped, and ended September 23, when 15 boxes (the catch of several days) were sent to New York. The largest number of boxes shipped from Millsborough in one day was 108 on May 20, and the largest number for a given period was from May 18 to 28, during which time the average daily shipment was 85⅓ boxes.

The following tables give the monthly shipments of crabs from Millsborough and Dagsborough:

MILLSBOROUGH.

May	1,340 boxes, averaging 20 pounds each.
June	1,077 boxes, averaging 20 pounds each.
July	703 boxes, averaging 20 pounds each.
August	286 boxes, averaging 20 pounds each.
September	55 boxes, averaging 20 pounds each.

Total, 3,461 boxes, equaling 69,220 pounds, or about 138,440 crabs by count.

DAGSBOROUGH.

May	1,253 boxes, averaging 10 pounds each.
June	1,044 boxes, averaging 10 pounds each.
July	720 boxes, averaging 10 pounds each.
August	257 boxes, averaging 10 pounds each.
September	122 boxes, averaging 10 pounds each.

Total, 3,396 boxes, equaling 33,960 pounds, or about 67,920 crabs by count.

A large quantity of soft crabs is eaten by the inhabitants along Indian River, and some are sold to the summer visitors at Rehoboth Beach. Opinions differ in regard to the percentage of crabs shipped from this section, but judging from the best information obtainable, it is, perhaps, safe to estimate that from three-fourths to seven-eighths of the catch is sent to New York and Philadelphia, while the remainder is disposed of locally.

At Indian River the average daily catch per man is said to be about three dozen crabs, and the average season's catch about two thousand crabs, worth to the fishermen about 1 cent each. The prices received by the fishermen at Dover for soft crabs is 18 cents a dozen, and for hard crabs 80 cents a hundred; at Lewes the soft crabs bring 25 cents a dozen, and the hard crabs 10 cents a dozen.

VIRGINIA AND MARYLAND.—Blue crabs are very abundant on the coasts of Maryland and Virginia, and in Chesapeake Bay, where they are captured in large quantities to supply neighboring and northern markets and the canneries at Hampton, Va., and Oxford, Md. During the summer these crabs occur in all favorable shallow water localities, and are especially abundant in different depths of water in Hampton Roads. In the winter they lie buried in the bottom, though not

necessarily at great depths, as they are often taken by means of oyster tongs; but during this season their flesh is generally regarded as soft and watery. The crab season extends more or less continuously from March to November, beginning earlier at some places than at others. Soft crabs are generally preferred for ordinary use; they are regarded as the greater delicacy, and the demand for them greatly exceeding the supply, they sell at a much higher price than the hard crabs, but only the latter kind is used at the canneries.

The fishery is carried on by means of trot-lines and crab-nets, but the crabs are also taken incidentally in fish seines, sometimes in immense numbers, to the great annoyance of the fishermen, and in oyster tongs. The latter appliance is regularly used in the winter months by a few crabbers in Lynnhaven Bay and other brackish waters. The trot-lines employed on the Virginia coast are from 600 to 700 feet long, with the lateral lines 18 inches to 2 feet long and 18 inches apart. In Hampton Roads the crabbers who fish for the canneries use trot-lines, of which the main line consists of 600 feet of one-half inch manilla rope, the lateral lines being of much smaller size, 2 feet long and placed at intervals of 18 inches. Beef tripe is used as bait. The ends of the lines are furnished with anchors and buoys, and each one is attended by a single man in a small skiff. About seventy-five men with these trot-lines and boats are in the employ of the Hampton canneries. In hot weather the lines must be overhauled daily to replace the missing baits, but in cold weather two baitings a week are sufficient. Large boats are sent out to collect the crabs from the fishermen and carry them to the canneries several times a day. In other localities sting-ray flaps are sometimes used as bait.

Fishing is carried on for the canneries every week-day during the season, in depths of 6 to 14 feet of water, in the immediate vicinity of Hampton. The average daily catch per man is from sixty to seventy-five dozen, but catches of two hundred and fifty dozen, equal to 10 barrels in bulk, have been recorded for the same length of time. The mild winter of 1879–'80 caused the crabs to be more abundant in the following spring, but during cold winters many die and are cast upon the beaches by the waves. In 1880 the first spawners were seen by the first of March, but they do not usually appear until April. The height of the spawning season is from May to August, although many spawners are seen as late as November.

Although the larger part of the crabs caught on the Virginia coast, or, more strictly speaking, at the mouth of Chesapeake Bay, are for the use of the Hampton canneries, a great many are also used fresh along the shores where they are taken, and considerable quantities are sent to the northern markets and to the interior towns of Virginia. Boats come into Hampton Roads and the surrounding region from Baltimore to catch and buy crabs for the markets of that city, and other regular shipments are made to the same place. From the first of May to the middle of June, New York receives nearly all of her supplies of soft crabs from the Virginia coast and Chesapeake Bay, but after the middle of June or the first of July the weather becomes too warm to ship them without great loss. Outside of the canneries, therefore, the principal crab industry of the Virginia coast is of only about three months' duration, from March or April to July. The canning business, however, continues until November. Soft crabs are packed for shipment in boxes with seaweeds, but hard crabs are sent in barrels. Crisfield, Md., on the Chesapeake, does a very large trade in crabs, which are shipped to Philadelphia and Baltimore. About one hundred and fifty men are engaged in this industry in the neighborhood of that place during the crabbing season.

Blue crabs are extensively used as bait for nearly all kinds of fish at the mouth of Chesapeake Bay and on the outer coast of Virginia. Soft crabs are preferred, but hard crabs are used when the former are not obtainable.

North Carolina.—Blue crabs are very abundant on this coast, where they often receive the

name of channel crabs, but they are not much in demand as food. In the summer they inhabit the sounds and inlets as well as the outer shores, and in the winter bed in the bottom of the channels and also in deep water. The season lasts from May until November, during which time the crabs may be captured in large numbers with little trouble.

About Beaufort and Morehead City, the fishermen take them in immense numbers in their drag-nets while fishing for sea-trout, mullet, and other fish, and consider them a great annoyance, as it is difficult to remove them from the nets. They kill nearly all that are captured in this way by a blow from a stick carried along for the purpose, and then throw them away, or use them as a manure. A few are kept for food, but none are sold, beyond an occasional barrel-full, mostly soft-shelled, which are sent to some of the larger inland towns. A few soft crabs are also sent to northern markets, but most of the crabs sold in this vicinity are gathered by negro children, who take them on the ebb tide in the little pools of water left on the shore. The price is from 15 to 20 cents per dozen. The fishery for this crab promises to become of great importance when a ready market for the catch has been established. Great inducements are held out by this region for the establishment of crab canneries, similar to those of Hampton, Va. The trot-line employed on the Virginia coast has not yet been introduced here. The total quantity of crabs used in this vicinity (Beaufort and Morehead City), or sent from there in 1875, was about 2,500 dozen, valued at 15 cents a dozen, or $375 for the entire catch.

A small quantity of crabs is secured about Wilmington for use in that city and for shipment to interior towns of North Carolina and South Carolina. They are sent either alive in baskets or after being boiled in brine.

But few men on this coast engage regularly in crab catching, and most of the crabs sold are taken by the fishermen or by colored children. Shrimps and prawns constitute the favorite baits for hook and line fishing on the North Carolina coast, but in their absence crabs are substituted in part. They are said to answer for nearly all species of fish.

South Carolina.—The sea-crabs, as the *Callinectes* are called on this coast, are found in abundance during the warmer part of the year, in the harbors, in the shallow waters at the mouths of creeks and rivers, and on the salt marshes, where many individuals are sometimes left exposed at low tide. They might generally be taken during nearly every month of the year, but are secured for market principally in the spring and early summer. Soft crabs are found on the sandy and muddy flats at low tide.

Crab fishing as an industry is carried on only in the vicinity of Charleston, where the fishery usually begins about the last of February and continues until the middle of May. After open winters, however, it often commences several weeks earlier. The crabs are usually taken by means of trot-lines, 75 to 100 yards long, baited generally with beef entrails at intervals of 18 inches to 2 feet. Scoop-nets are used in connection with the trot-lines, and crabs are also taken incidentally in fish seines. During the first few weeks of the season the number secured is comparatively small, 150 to 200 being a fair day's catch for a boat containing two men. Later in the season they become more abundant, the average daily catch per boat of two men reaching 400 to 600. The best fishing-grounds for hard crabs are about the rocky bottoms of the outer harbor, in the vicinity of Forts Sumter and Pinckney, though the crabs are also fairly abundant nearly everywhere along the shore. About eight boats, with ten men and six boys, are engaged in crabbing during the season. The first part of the season the fishermen sell their catch of hard crabs at $1 a hundred from the boat, but later the price falls to 60 cents a hundred. The retail price is 25 cents per dozen. The trade is largely controlled by colored people, who buy the crabs directly from the fishermen, and after boiling them and scraping the spawn from the females, place them on

trays and vend them through the streets of Charleston. Up to a recent date soft crabs were thrown away as worthless, but they are now better appreciated, although they are not yet as favorably regarded as they are farther north.

Mr. R. E. Earll states that about two-thirds of the catch during his visit to Charleston in March, 1880, were females, with large bunches of eggs attached. These eggs were still quite immature, indicating that they would not probably hatch before April or May. Hundreds of thousands of eggs were destroyed with every dozen crabs brought to market.

The crabs caught about Charleston are mostly sold in that city, but some are also sent to interior cities, the principal inland markets being Columbia, S. C., and Augusta and Atlanta, Ga. For shipment to these places they are packed in boxes and small barrels. The demand for crabs on this coast is not equal to the supply, and there are at present no inducements to increase the fishery. The quantity and value of crabs disposed of for food on the South Carolina coast during 1880 is estimated as follows: Hard crabs, 9,000; soft crabs, 1,500; value, $775.

The sea-crab is used as bait for the drumfish (*Pogonias chromis*) and for all other species of fish for which shrimps are employed, when the latter are not obtainable.

GEORGIA.—The sea-crab is very abundant on the Georgia coast, where it enters the river mouths during the summer. The season extends from March to November. The fishing appliances consist of scoop-nets, hooks and lines, and baited hoop-nets. The latter is a twine net, fastened to a barrel hoop, with a weight in the center, and to the upper side of which is tied a piece of bait, generally consisting of fresh beef. This net is lowered to the bottom, and the crab, attracted by the bait, crawls on it and is quickly hauled to the surface. Fish lines with hooks are also commonly used, and a man in a boat or on a wharf can handle several of them. While the soft-shell crabs are generally preferred for food, the hard crabs are much more extensively used on account of their greater abundance. In some localities, however, hard crabs are given the preference.

Georgia is too far distant from New York City to compete with the more northern States in sending crabs to that market, and most of the catch is consumed in the former State and in Alabama. Large quantities are used along the coast and in Savannah, and thousands are sent to the inland towns. They are packed in ice for shipment to some extent. As a bait this crab is used for the drumfish, bass, and other species.

The business of catching and selling crabs gives employment to several hundred men. Crabbing is also indulged in as a pastime by summer visitors on the sea-shore. The yearly catch is stated to be very large. In Savannah crabs are mostly hawked through the streets by negroes.

EASTERN FLORIDA.—Blue crabs abound upon the Atlantic coast of Florida from Georgia to the Keys. In the summer they are found in the shallow waters near shore and in the bays, rivers, and creeks. In the winter they mainly retire to deeper water, where they are sometimes captured in the early spring. During mild winters, however, they remain in nearly the same places which they frequent in the summer. The crab season is mainly from March to December. Although very large quantities of crabs can be easily procured, they have as yet given rise to no regular industry, and are merely taken for home consumption in the towns along the coast. A few dozen, however, are occasionally sent away on special orders. These are boiled in brine and then packed in crates or boxes. Soft crabs are rare and are regarded as a luxury; the hard crabs are therefore almost the only ones used for food. They are captured by means of scoop-nets, hoop-nets, and trot-lines. The blue crabs are sometimes used as bait for the drumfish, bass, and other species of fish.

THE GULF COAST.—The blue crab is very common along the entire Gulf coast, being much more abundant than the stone crab (*Menippe mercenarius*). In the summer these crabs are found

in the bays and estuaries, and often in fresh-water rivers and lakes having direct communication with salt water. At the approach of cold weather they retire into deeper water and remain more or less dormant until the first warm days or settled mild weather of the spring. Their first move in the spring (about April) is to the grass-covered shoals, where they are said to feed largely upon the spawn of fishes occurring there. All through the summer and until about November, they inhabit the shallow waters near the shore, acting as scavengers upon decomposed fish and other animal matter, and also devouring large quantities of small fish and fish spawn. At high tide they approach nearer the shore than at low tide, the young being the most venturesome, and spending the period of high tide at the very water's edge, hiding under patches of sea-weed, behind and under logs and roots of trees and in the sand. They swim easily and rapidly at the surface at times, and are very swift in their movements on the bottom. While shedding they remain hidden in the sand or mud of the bottom or among sea-weeds.

As they are so commonly distributed and so abundant, nearly every one living upon the shore can obtain whatever supplies he wants for the mere trouble of capturing them, and they are therefore considered as having no commercial value outside of the larger cities. In fact, there is no regularly established trade in crabs upon the Gulf coast, excepting in connection with New Orleans and Galveston. The former city receives its supplies mainly from the marshes and lakes of the Louisiana coast. Crabs are, however, used as food along the entire Gulf coast, and, to a considerable extent, in the larger towns and villages. Those living directly upon the shore supply their own wants, but the larger places are supplied by boys and negroes, who catch the crabs and peddle them through the streets. The business is an irregular one, and no account of the sales is kept.

Soft crabs bring a much higher price than the hard crabs, and are preferred when they can be obtained; but they are rarely taken in any quantity, and the sales are mostly of hard crabs. According to a New Orleans correspondent, most of the soft crabs sent to that city come from the coast lakes of Louisiana.

The crab season extends more or less continuously throughout the year, unless the winter be a very severe one; but soft crabs are obtainable only from March until October. In the early spring, before they come into shoal water, they are caught by being trolled from the deeper water, by a bait of meat tied to the end of a long string. Each fisherman handles several of these strings. Later in the season they are readily dipped out with a scoop-net from along the shore. Large numbers are also taken in fish seines, but they are then regarded as an annoyance and seldom retained as food. The crab fishery to supply the New Orleans markets is carried on along the shores of the outer islands and in the marshes and lakes of the Louisiana coast. The crabs are picked up in the hands or by scoop-nets from the outer edge of the beaches and from among the marsh grass. Another method of capture is with trot-lines, the main line being stretched along the beach at the water's edge, and the lateral lines thrown outward as far as they will reach. One of these lines occupies the attention of two men.

About Pensacola, according to Mr. Silas Stearns, "the catching of crabs is classed among the sports. On warm summer evenings parties often set out for secluded portions of the bay shore, where they pursue the crabs with torches and jigs or dip-nets, until tired. A hot midnight supper, made up largely of the fish and crabs taken, terminates the fun."

Hard crabs are sent to the New Orleans market alive in baskets containing about 5 dozens each. They are sold to the marketmen at 50 cents a basket. Soft crabs bring from 10 to 15 cents each. No ice is used in the packing.

Many crabs are taken about Galveston, Tex., for use in that city, and some are sent to the interior towns of Texas and adjoining States. It is predicted that in the course of a few years an

extensive business in shipping crabs from the Gulf coast to interior towns of the Southern States will be built up, and the abundance of material for such a trade appears to favor success.

On the Louisiana coast about one hundred men are regularly engaged in taking hard crabs, and about as many more for soft crabs in their season. The average weekly catch of soft crabs is about 300 dozens, and of hard crabs about 250 baskets. More could be taken if there was a demand for them. At Galveston about twelve men are engaged regularly in crabbing, and others occasionally.

Crabs as well as shrimps are extensively used as bait on the Gulf coast, and are said to answer for nearly all kinds of hook and line fishing. Soft crabs and young hard crabs are preferred. Among the species of fish for which they are employed are the redfish and sea trout.

5. CRAB CANNING.

Canneries at Hampton, Va.—The crab industry of Hampton, Va., is of considerable importance, and consists mainly in the canning of hard crabs (*Callinectes hastatus*) caught in the vicinity. Two establishments there are now engaged in this enterprise—McMenamin & Co., located on Hampton Creek, and T. T. Bryce, located on the Normal School grounds.

Origin of the canning industry.—The canning of hard crabs originated in this vicinity with Mr. James McMenamin a year or two prior to 1878. Aware of the financial success attained by the lobster canneries of New England, he conceived the idea of utilizing the crabs living in such immense numbers in the shallow waters about Norfolk, Va., where he was then located, and which he was convinced could be prepared at much less cost than the lobsters. A correspondence with lobster canners at the North as to their methods of preparation having proved unsatisfactory, Mr. McMenamin began a series of experiments which lasted some time and resulted in his beginning actual operations March 10, 1878. In the fall of that year a few of his goods were placed on the market. Hampton, Va., offering superior advantages to Norfolk, Mr. McMenamin removed to the former place in April, 1879, and began work on a larger scale. Crabs were found to be more abundant and were more easily obtained about Hampton, and meeting with a ready sale, Mr. McMenamin has been induced to increase his works still further during 1880.

Season.—The crab season begins in the vicinity of Hampton about the 1st of April, and continues through May. In June and July so large a quantity of the crabs are found with spawn, in which condition they are not considered fit for canning, that but little is done in this line during those months. The work begins again, however, in August, and is continued through September and October, closing about the 1st of November.

Method of canning.—When the large boats which go out to collect the crabs from the fishermen arrive at the canneries, the dead crabs and spawners are rejected. The remainder are loaded into cars of open slat-work, which are rolled on a tram-way to a wooden steamer, capable of holding about two hundred and fifty dozens, in which they are placed. About 60 pounds of steam is then turned on, and the crabs are allowed to cook sufficiently and until they become red. After the cooking the car is rolled out from the steamer, and the contents shoveled into baskets for the "strippers," who remove the outer shells, viscera, and small claws. The crabs are then thoroughly washed and passed to the "pickers," who consist entirely of women and children. The tables at which they work are circular in shape, with a round central opening large enough to pass the refuse from the crabs as it is thrown away. The table is otherwise divided into eight equal compartments by partitions radiating from the central hole to the circumference. Each of the pickers stands in front of a compartment of a table, there being, therefore, eight to each table. They work rapidly, and the meats of the bodies, as they are removed, are more or less divided up and placed in a pan. The claws are crushed with the handle of the knife employed in the work, and the meats

taken from them. The price paid for this work ranges from 2 to 3 cents per pound for the meats, which are weighed in pound lots, an examination being made to see that no shells remain among them. For each lot weighed the picker receives a ticket or due-bill, redeemable on the following Saturday night. The best pickers usually prepare about 25 pounds of meats a day, but the average quantity is only about 16 pounds each. The refuse or hard parts left after removing the meats are thrown through the opening in the center of the table into a sheet-iron barrel, which, as often as it is filled, is dumped into a scow to be carried off and sold as a fertilizer to farmers in the vicinity. The shells, as the upper part of the carapax is generally called, and which were first removed by the strippers, are cleaned and sold for making deviled crabs.

The meats go from the weighers to the fillers, who put them into cans of two sizes, 1 pound and 2 pounds, a fraction more being added to allow for waste. The quantity of meat in a 1-pound can is said to be equal to thirty-eight crabs. They then pass to the sealer and finally to the bath, after which they are vented, resealed, bathed again, and labeled.

In order that the crabs may keep well in the cans, it is necessary that they be properly cooked, and considerable skill is required to accomplish this in all cases. A great deal of trouble has been experienced, in this particular, especially with regard to canned lobsters, and large quantities of goods have occasionally spoiled in the cans without any apparent reason. It has generally been traced, however, to insufficient or imperfect cooking, and success seems to depend entirely on doing this one thing well. The method pursued at Hampton has been described to us as follows: As above stated, the crabs are first thoroughly steamed as they are brought in alive, and experience alone can dictate the length of time this process should continue. The first bathing of the cans after they are sealed, continues for about half an hour, the cans remaining in boiling water for that length of time. The cans are vented after this bathing, and at once resealed, and then bathed for a second time for perhaps two hours, more or less. The process may be shortened, however, by the use of a chemical bath, consisting merely of a strong solution of chloride of calcium in water, in the proportion of about 100 pounds of the salt to a barrel of water.

Shipping.—For shipment two dozen cans are packed in a case, and the cases (of 2-pound cans) are sold to jobbers at the rate of $2.80 per dozen. A case of shells goes with each case of cans, eight shells being allowed to a can. The trade is largely in the South and West, but considerable quantities are also exported to European and other foreign countries, and an attempt is being made to build up a large export trade. The packing house of T. T. Bryce also cans oysters and vegetables in their season.

Cannery at Oxford, Md.—A crab cannery has been recently established at Oxford, Md., where about one hundred and seventy men are employed. The number of crabs used daily is said to be from twelve thousand to fifteen thousand, but we have been unable to obtain a detailed account of the industry.

Statistics of the two crab-canning establishments at Hampton, Va., for 1879.

Amount of capital invested in buildings, equipment, &c.	$5,000
Number of crabs used during the year	6,000,000
Value of the crabs at fishermen's prices	$10,000
Number of cans produced, at the rate of 2 pounds to the can	84,000
Gross receipts from sales	$16,800
Enhancement in value of crabs during canning	$6,800
Number of hands employed, of which the greater number are women	226
Wages earned by the men, per month	$18 to $50
Wages earned by the women,* per month	$7 to $8
Prices paid for crabs, per dozen	1c. to 3c.
Prices paid pickers per pound of meat	2c. to 3c.

* Very skillful workwomen as pickers sometimes make from $3 to $3.50 per week.

6. STATISTICAL RECAPITULATION OF THE BLUE-CRAB FISHERY IN 1880.

The quantity and value of blue crabs (Callinectes hastatus) taken and sold on the Atlantic and Gulf Coasts of the United States during 1880.

State.	Quantity.	Value (at the fishermen's prices).
	Pounds.	
New York	1,624,583	$69,234
New Jersey	1,470,300	162,612
Delaware	125,680	2,413
Virginia	2,139,200	32,088
Maryland	1,666,667	46,850
North Carolina	11,200	450
South Carolina	42,000	750
Georgia	7,200	125
Louisiana	288,000	7,200
Texas	36,000	900
Total	7,410,830	322,622
Enhancement in value of crabs, in canning, in the State of Virginia		6,800
Total value of the crabs as they enter into consumption		329,422

THE MINOR CRAB FISHERIES.

7. THE FIDDLER CRAB, OYSTER CRAB, STONE CRAB, AND OTHER MINOR SPECIES.

THE FIDDLER CRABS.—The three species of fiddler crabs (*Gelasimus pugnax*, *G. pugilator*, and *G. minax*), which occur abundantly along the eastern and southern coasts of the United States, from southern New England to Mexico, preferring salt and brackish-water marshes, muddy and sandy flats, and sheltered beaches, are occasionally used as bait, and are also, in a few localities, regarded as edible. On the southern New England coast, they are esteemed as bait for the tautog and other species of fish, and in the vicinity of Charleston, S. C., for the sheepshead. They are rarely eaten, but are said to be sometimes used in making soups. One species, which lives in the Lower Mississippi River, is stated to have occasioned some damage to the levees, into which it constructs its burrows, along with a species of crayfish.

THE OYSTER CRAB.—The little oyster crab (*Pinnotheres ostreum*, Say), so familiar to all consumers of fresh oysters, is, notwithstanding its small size, of some economic importance. It occurs more or less abundantly in nearly all supplies of oysters, and is generally eaten along with the bivalve, with which it is associated as a messmate. In the canneries and restaurants, where large numbers of oysters are constantly being opened, the crabs are frequently saved apart and either sold fresh or pickled for the trade. The pickling of these crabs, in some localities, as in Fulton market, New York, assumes the character of a regular business, and they are put up in glass jars like pickled oysters. Prepared in this manner, they are often offered for sale in the larger cities, and especially in New York. The difficulty of collecting together so many small creatures renders their cost somewhat high.

The oyster crab has long been famous as a tempting morsel, and its original describer, Say, remarks concerning it, as long ago as 1817, that, "where the fresh oyster is opened in considerable numbers, the crabs are often collected and served apart for the palate of the luxurious." It is the female alone that is eaten, the male never living, so far as is known, within the oyster shells, but occurring occasionally as a free-swimmer at the surface of the sea. The male also has a thicker shell than the female, and would not, therefore, be regarded as equally palatable.

A closely related species, called the mussel crab (*Pinnotheres maculatus*), lives as a messmate

within the shells of the edible mussel (*Mytilus edulis*) and the smooth scallop (*Pecten tenuicostatus*), and were either of those mollusks extensively used as food with us, as the former is in Europe, the little crab would probably be classed as edible. It is frequently very abundant. When dredging off the mouth of Narragansett Bay, Rhode Island, in 1880, the Fish Commission steamer discovered numerous beds of the smooth scallop, from a bushel of which fully half a pint of crabs was obtained. The same crab was also found abundantly, in 1881 and 1882, in the mussels which form extensive beds on some of the muddy bottoms of Vineyard Sound, Massachusetts.

A third species of *Pinnotheres* occurs on the Pacific coast of the United States, in the shells of the California mussel (*Mytilus californianus*) and of another large mollusk (*Pachydesma*), and is said to be eaten.

THE ROCK CRAB.—Both the rock crab (*Cancer irroratus*, Say) and the Jonah crab (*Cancer borealis*, Stimp.) are very abundant on the New England coast, the former being widely distributed and the latter somewhat local in its occurrence. They are both considered very good eating, but are not much appreciated by the inhabitants of the coast along which they live, and are not, therefore, commonly sought for as articles of food. One reason why they are not more extensively used is probably the fact that their distribution is co-extensive with that of the lobster, which is everywhere much more highly esteemed. The rock crab, the more abundant of the two species, also seldom averages large in size. Neither of the species is marketed in the soft shell condition, and soft-shell crabs of the genus *Cancer* are seldom found upon the shores. The vicinity of Point Shirley, on the north side of the entrance to Boston Harbor, is the only locality where either of these species is regularly fished for. The species found there is the rock crab, and the entire catch is sent to the Boston markets. At numerous other places along the New England coast, the rock and Jonah crabs are taken occasionally in small quantities for home consumption and for use as bait. We have heard of their being used as food at Newburyport, Gloucester, New Bedford, Newport, and Stonington. At all of these places, excepting Newport, *Cancer irroratus* is probably the only species obtained in sufficient quantities. At Newport, however, *Cancer borealis* may be seen in the markets, though never abundantly, during the summer months. In that city it is said to be preferred by many to the blue crab, though both species are eaten. The trade is small and mainly limited to supplying the summer visitors. These crabs are quite common in and about Narragansett Bay, and are sometimes caught at low-water mark, but more often in slight depths of water near shore, in lobster pots and nets.

As cold weather sets in, both species of *Cancer* retire to deeper water, and are more difficult to obtain. The only appliances of capture used regularly in the crab fishery of New England are scoop-nets and the old style of baited hoop-nets. Incidentally crabs are taken in seines and lobster pots and on trawl lines set for fish. The rock crab and possibly also the Jonah crab are employed as bait for the cod, tautog, bass, and other species of fish.

The rock crab (*Cancer irroratus*) is the only species of crab brought direct to the Boston market. Only about four thousand by count are sold annually in Boston, all, or nearly all, of these passing through the hands of two or three dealers in Quincy market. They are brought almost solely from Point Shirley, and sell in the market at the rate of $2.50 per one hundred. The yearly sales, therefore, amount to only about $100.

Most of the blue crabs sold in Boston pass through the New York markets. From 3,000 to 5,000 dozens are handled every year.

The sales of rock and Jonah crabs on the New England coast in 1880 did not apparently exceed a total of $200.

THE MUD CRABS.—Four species of mud crabs, of which the largest is the *Panopeus Herbstii*,

Edwards, occur upon our eastern coast, inhabiting muddy bottoms principally, and seeking shelter under stones or among algæ, and also occurring upon oyster beds. They are occasionally used as bait, though only to a limited extent.

THE STONE CRAB.—The stone crab (*Menippe mercenarius*, Gibbes) ranges from North Carolina to Texas, or, at least, throughout that section of coast the name "stone crab" is applied by the inhabitants to one or more species of crabs, but whether in all cases to the same species or not, can only be determined by a more thorough examination than has yet been made. On the southern Atlantic coast, however, there appears to be no doubt that the stone crab is everywhere the *Menippe mercenarius*. It is a much stouter form than the *Callinectes*, or blue crab, and of a more solid build, with the outer covering or shell much thicker and harder. The body is also very much smaller in proportion to the size of the claws, which are greatly developed. The average adult individuals, in the vicinity of Charleston, S. C., measure about 4½ inches across the carapax, 3 inches in length, and 1½ to 2 inches in thickness. The claws, when folded against the front of the body, measure 7 inches from elbow to elbow.

The stone crab of the Atlantic coast lives in holes in the mud, along the borders of creeks and estuaries, and in the crevices between fragments of any solid materials that may occur near their haunts, such as ballast thrown overboard from vessels, rocks in place, and the stone-work of breakwaters. It is not nearly as abundant as the blue crab, but by many is preferred as food to the latter species. The large claws furnish most of the edible meat which they contain, and which is said to be more lobster-like in texture and flavor than is the case with *Callinectes*. The stone crabs are forcibly pulled from their holes, which are generally just large enough for them to enter with their claws folded. The crabber inserts an arm into the hole, which sometimes reaches down nearly 2 feet, and seizing the occupant by the elbow of the nearest claw draws him out as quickly as possible, and then drops him before he has time to use his free claw. Once out of his hole he is readily secured with the hands. These crabs usually offer stout resistance to being dragged from their abodes, by firmly pressing their powerful claws against the sides. If the mud in which they live be soft, a large quantity is pulled out with them, but if, on the contrary, it is so compact and hard as to withstand the pressure brought to bear upon it in the struggle, the crab must be taken out piecemeal.

Stone crabs are seldom if ever found in the soft-shell condition, and the market supplies therefore consist entirely of the hard crabs. Being less abundant than the blue-crabs and much more difficult to capture, they are far less commonly seen in the markets, and also bring a higher price. They are but rarely sent away from the sea-coast. The season corresponds more or less with that of the blue crab, but they are supposed to occur in about the same situations throughout the entire year. They are too valuable for food to be used for bait.

At Beaufort and Morehead City, N. C., where stone crabs are moderately abundant, they are sought for at intervals during the summer by five or six men. The catch for the season of 1879 was about three hundred dozens, which sold at the rate of 25 cents a dozen, amounting in all to $75. About one-half of this amount was shipped to New Berne, Raleigh, and Goldsborough, the remainder having been used locally. A correspondent at Morehead City states that the average weight of the stone crab in that vicinity is about 10 ounces, although they attain a weight of 15 to 16 ounces at times. They live the entire year in holes on the grassy shoals, where the water is from 6 inches to 2 feet deep at low tide. They are taken at all seasons, excepting in cold weather, as the crabbers must wade for them.

At Charleston, S. C., a great many stone crabs are brought to market, but no one engages regularly in their capture.

On the Georgia coast the stone crab is said to attain an average weight of about 1 pound; but specimens are occasionally found weighing as much as a pound and a half. They live in communities in all depths down to 6 fathoms, on hard bottoms, consisting mainly of mud and shells. They seldom wander a great distance away from their holes. The usual method of capture is the same as that above described, but they are also sometimes dug out of their holes, or caught incidentally on hooks set for the drumfish.

About Fernandina, Fla., the stone crab is found upon oyster beds and among rocks.

The stone crab is said to range along the entire Gulf coast, but to be most abundant on the western and southern coasts of Florida. It lives in the cavities of rocks and in deep holes dug in the sand. The inhabitants of the Florida coast, where it occurs, commonly look to it for a considerable share of their food, and esteem it very highly. It is captured in the same way as upon the Atlantic coast. To the westward of Florida it is much less abundant, averages smaller in size, and is seldom taken for food.

THE GREEN CRAB.—The green crab (*Carcinus mænas*, Leach), which is readily distinguished from all our other east coast shore species by its bright green color, varied with spots and blotches of yellow, has only a limited range on our coast, from Cape Cod to New Jersey, but is one of the most common of all the European crabs. In Vineyard Sound, Buzzard's Bay, and Long Island Sound, where it often goes by the name of "Joe Roeker," it is sometimes very abundant on rocky or peaty shores near high-water mark, and is highly regarded as a bait for the tautog. In the two former localities it is said to have formerly been much more abundant than at present, and to have been collected in much larger quantities by the fishermen for bait.

In some of the European countries where it occurs, it is extensively employed for food and bait. On the English coast, according to White, "its predaceous habits inflict much injury on the salmon fisher. Trout and mackerel are often reduced to a skeleton in a very short time, and salmon are often rendered unfit for market by an unseemly sear, the results of its attacks. They are sometimes used as bait, especially while soft shell."

THE LADY CRAB.—The lady crab, sand crab, or squeaker crab (*Platyonichus ocellatus*, Latr.), as it is variously designated on different parts of the coast, occurs on most sandy shores from Cape Cod to Mexico, and being predaceous in its habits and feeding largely upon dead fishes and other animal matter, does efficient service as a scavenger. It is occasionally brought to the New York markets in the winter time, and is said to command a high price when in the soft-shell condition. It is also eaten at New Orleans, from which place we have received specimens purchased in the markets, but the extent of the supply is unknown to us. Along portions of the Atlantic and Gulf coasts, it may possibly be sold in connection with the blue crab, with which it corresponds in range and to some extent in habits. It is smaller than the blue crab, but equally abundant, and is said to be of good flavor.

Along the southern New England coast, and probably elsewhere, it is frequently employed as bait for the tautog and other species of fish.

THE SPIDER CRABS.—The spider crabs (*Libinia emarginata*, Leach, and *Libinia dubia*, Edwards) range from Casco Bay, Maine, to Mexico, living principally on muddy, but also to some extent on sandy, bottoms in shallow water. They are occasionally used for bait, especially on the New Jersey coast, but we have never heard of their being used for food.

THE SAND BUG.—The sand bug, bait bug, or beach bug (*Hippa talpoida*, Say), which is related to the hermit crabs, though differing from them considerably in general appearance, burrows in the sandy shores of our Atlantic coast from Cape Cod to the Gulf of Mexico. On the coast of Southern New England it is only locally abundant, occurring very plentifully in some localities

and being more rare or even entirely wanting in others. From New Jersey southward it is more common and it appears to be used for bait wherever it can be collected in sufficient quantities. It is reported as a common bait on the New Jersey coast.

THE HERMIT CRABS.—The three species of hermit crabs which occur most abundantly near shore on our Atlantic coast, and are therefore most available as bait, are the following: *Eupagurus Bernhardus*, which ranges from Cape Cod northward, in all depths from low water to 50 fathoms and deeper; *Eupagurus polliearis*, ranging from Massachusetts to Florida, and inhabiting the rocky and shelly bottoms of the sounds and bays and oyster beds; and *Eupagurus longicarpus*, which, though smaller than either of the above species, is more easily obtained, living as it does on muddy and sandy shores from between tide-marks to a depth of 10 fathoms; it ranges from Massachusetts Bay to the Gulf of Mexico. The hermit-crabs do not appear to have found favor as yet among our fishermen as a bait, but in England the *Eupagurus Bernhardus* is so used to some extent. They are sufficiently abundant to supply a limited demand at least, and at some future time will probably be utilized.

THE HORSESHOE CRAB FISHERY.

8. THE COMMERCIAL IMPORTANCE OF THE HORSESHOE CRAB.

RELATIONS.—This curious marine form, the *Limulus Polyphemus* of naturalists, although not regarded as a true Crustacean by many authors, will probably retain its association, in the minds of most people, with the true crabs, near which it was formerly classified, and we may, therefore, be pardoned for discussing it in this connection, from an economic standpoint.

QUALITIES AND USES.—The horseshoe crab has never grown into favor as an article of food for man, and by many who have eaten it, we are told that the flavor of its flesh is decidedly inferior. Either from this or from other causes, there has sprung up nearly everywhere a strong prejudice against its use for food, although we are informed that in some localities it is occasionally eaten. A few correspondents, however, have gone so far as to rate its flesh even above that of the lobster, a taste which it is difficult to account for. The principal uses to which the horseshoe crab is put, are as food for poultry and swine, as a bait for catching eels, and as a fertilizer, becoming of much commercial importance only in the latter connection.

EXTENT AND CHARACTER OF THE FISHERY; MASSACHUSETTS.—The practice of feeding these crabs to poultry and swine seems to prevail along many portions of the coast where they abound. At Wellfleet, on Cape Cod, Mass., the farmers or fishermen take them on the flats with improvised spears, and, throwing them into two-wheeled carts, haul them back to their houses, where they use them for this purpose. When fed to the swine they are cut up, but for the chickens the upper part of the plastron or shell is simply removed, so as to expose the soft parts. It is during the spawning season, or in June and July at this place, that they are taken on the shore, and the large number of eggs which the females then contain adds to their edible qualities. The flavor of the animals fed with the horseshoe crabs is said not to be greatly improved thereby.

NEW YORK.—In Great South Bay, on the southern side of Long Island, horseshoe crabs are very extensively used for baiting eel-pots and feeding chickens and hogs, and the farmers pay from 50 to 75 cents a hundred for them. Eelers pay 2 cents each for females, but do not buy the males. The season for them is May and June, when they crawl upon the beaches to spawn. They are picked up on the shores by hand at night, and speared with an iron pike in the daytime. A man can easily load a small boat with the crabs at a single low tide, during the height of the season. Probably about ten thousand are caught in this vicinity each year. In Peconic Bay, Long

Island, horseshoe-crabs are much used as bait for eels during May, when they are very abundant, and for the same purpose they are frequently utilized at many other places farther south along the Atlantic coast. We also understand that they are occasionally employed as a bait for bluefish and weakfish.

NEW JERSEY AND DELAWARE.—It is in Southern New Jersey and Delaware, however, that these sluggish crabs are most sought for, and during the limited season in which they can be conveniently obtained, enormous quantities are collected mainly for fertilizing purposes. At the time of writing, two factories, at least, in this region are engaged in pulverizing the crabs for market, and many farmers living upon the coast collect them and grind them up on their own account. The spawning season, during which the horseshoe crab visits the shores of southern New Jersey in immense numbers, continues through most of May and June, but during the remainder of the year they live for the most part away from the shore, where they could be obtained only with difficulty and by the use of special appliances. A comparatively small number of individuals, however, remain in the shallow waters during the entire summer. The crabbing season is, therefore, of short duration, lasting not longer than six or eight weeks at the most, and in fact, for only about twelve or fifteen days of this period are the crabs sufficiently abundant to render the business of capturing them at all profitable. They approach the shores to spawn in the greatest numbers during the spring tides corresponding to the new and full moons of May and June, and on the Delaware Bay side of New Jersey, where the fishery is most extensive (being in fact almost entirely limited to this part of New Jersey), a westerly wind is said to favor their approach while an easterly wind exerts a contrary influence. They crawl up the beaches with the flood tide and leave soon after the ebb, the males and females coming invariably together and generally in pairs, the males riding upon the backs of the females. The eggs are deposited in small holes in the sand, between tides, after which they are impregnated by the males, and the crabs desert the beach, not to return again in any numbers until the next spring.

CRAB-CATCHERS.—There are no professional catchers of horseshoe crabs, but during the season of their abundance every one so inclined engages in their capture. Nearly all of the farmers along the shores, together with their help, generally participate, and either sell their catch to the factories or prepare it themselves.

METHODS OF CATCHING HORSESHOE CRABS.—The crabs are so sluggish in their movements and crawl so far up the beaches that they are easily taken in the hands, and this is the usual method of capture in most places, although some prefer to spear them with pitchforks. They are usually gathered at night, and only about two hours of each night can be profitably spent in taking them.

In the vicinity of Dyer's Creek, however, large numbers of crabs are taken in pound-nets, constructed specially for their capture. These nets were introduced in 1870, and in 1880 nine of them were in use in this region. The leader is about 50 fathoms long, and there are two wings, each 25 fathoms in length. The pound proper, or bowl, is divided into two compartments, the first being intended for the king crabs, and the second, which is connected with the first by a funnel shaped opening too small to admit the crabs, is designed for fish. The lower part of the pound is made of stakes, embedded in the mud and extending a foot or more above it. To these stakes the netting is attached, the object being to keep it above the crabs, which would otherwise destroy it.

METHOD OF PREPARING THE CRABS FOR FERTILIZING PURPOSES.—The common method of treating the crabs is to first stack them up in piles and allow them to putrefy and become more or less completely dried, after which they are either ground up by the factories or broken up into small fragments by the farmers, who sometimes use their thrashing machines for this purpose.

At the factories they are heaped up in bins and allowed to remain from one to two months, after which they are roughly torn to pieces and thoroughly dried in a metal cylinder over a furnace. They are then ground up finely in a mill, and the product, called "cancerine," is generally composted with muck, lime, or other suitable material. It is also frequently used pure, especially by the farmers, who prepare their own supplies. It is highly recommended as a fertilizer for grain, and is also extensively employed by the fruit growers of Southern New Jersey and Delaware. The chemical composition of cancerine is given further on.

STATISTICS.—On account of the irregular manner in which the horseshoe crab industry is conducted, it has been impossible to obtain complete statistics as to its extent and value. A few figures obtained from some of the regions where it is carried on will, however, serve to give some idea of its importance.

In the neighborhood of Dennysville, Cape May County, New Jersey, about a hundred men engage in crabbing during the season, and make about $2 a day each. Within 15 miles of the town about 1,000,000 crabs were obtained last season (1879). Near Woodbury, N. J., about the same number of men are similarly occupied during the season, and take from 1,500,000 to 2,000,000 crabs yearly. Four dollars a ton, containing about 1,000 live (or fresh) crabs, is paid for them at the factories. At Goshen, N. J., about one hundred men were also engaged, and they take 500,000 or 600,000 in a season. At Fishing Creek the catch is much smaller, amounting to only a little over 100,000 each season.

STEAM MILLS FOR PRODUCING THE FERTILIZER.—Ten years ago there were three steam mills in the immediate vicinity of Dennysville for producing the crab fertilizer. Now, on account of the diminished supply of crabs, their number has been reduced to one, which uses up about 800,000 crabs a year. A great many crabs, however, are sent from Southern New Jersey to the Commercial Fertilizer Company's mill at Wilmington, Del., where they are extensively prepared.

DELAWARE.—On the Delaware State side of the bay the season for taking horseshoe crabs is the month of May, when about fifty men engage almost exclusively in the business. The crabs are principally taken between Mahone's and Mispillion Creeks, and are most abundant during about four or five days, at the full and change of the moon, in the night time. The fishermen work with scows built for the purpose, and which are about 16 feet long and 10 to 12 feet broad. Their capacity is about 300 bushels each. In the scows the crabs are carried to some convenient locality, where they are thrown upon the beach and allowed to dry. They are then sent to the factory at Wilmington. About 900 tons of these crabs, equal to about 900,000 individuals when fresh, are taken by the fishermen each season. The dried crabs weigh about one-third as much as the fresh. The prices paid to catchers is $3 per thousand fresh, or $10 per ton dried.

DECREASE.—According to the statements of many of our informants, horseshoe crabs are becoming constantly less abundant in Delaware Bay, owing to the practice of capturing, so far as possible, every individual that comes upon the shore.

ACCOUNT OF THE INDUSTRY BY THE STATE GEOLOGIST OF NEW JERSEY.—The following interesting remarks on the horseshoe crab industry of Southern New Jersey, extracted from the report of the State geologist of New Jersey for 1868, add many important facts regarding the value of this product:

"The Delaware Bay shore is remarkable for the immense numbers of this animal (the *Limulus Polyphemus* of the naturalists) which frequent it. At the season for depositing their eggs, which is in the latter part of May and in June, they come on shore in almost incredible numbers. The whole strand for many miles is covered with them, sometimes two or three deep. Thomas P. Hughes, of Town Bank, said that on his shore of 100 rods he could get 100,000 in a week: 750,000 have

been taken on about half a mile of the strand; and one year 1,200,000 were taken on about a mile. They deposit their eggs and then leave the shore entirely until the same season next year. But little, if anything, is known of their habits or localities during the interval. The number of eggs is very great. They are so thick along the shore that they can be shoveled up and collected by the wagon load. Great numbers are thus gathered and carried away to feed chickens. When they hatch, the sand is fairly alive with the little creatures. A year or two since a vessel took in a load of sand on the shore, and in two or three days so many of these young king crabs appeared in it that they were obliged to throw the whole overboard.

"The king crab is common on our whole Atlantic shore, and is taken by farmers in quantity, though it is not so remarkably abundant as in Delaware Bay.

"Hogs eat the crabs with great avidity, and it is the common practice all along our shores to gather them for that purpose in the proper season. It is common also to gather them into pens and allow them to putrefy and form a kind of compound to be used as manure. Other persons have composted them for the same purpose. For the raising of wheat they have been very successfully used. On land which would not grow wheat at all up to that time, crops of 20, 25, and even 30 bushels to the acre have been raised by the use of these crabs composted with earth. It has been thought by some that they injure the ground for the succeeding crops of corn or grass, and that they promote the growth of sorrel. Many persons, however, have continued their use for years in succession with success. William J. Bate, of Fishing Creek, uses them every year, and with the best effects, in compost on early potatoes. A remarkably fine and thrifty young orchard of his has been manured principally with crabs in their raw state. Mr. Springer, of Dyer's Creek, has used them for a number of years, composting them with sawdust, coal-pit bottoms, muck, and barnyard manure. With a compost of 7,000 crabs, twenty loads of muck, two coal bottoms, seven or eight loads of old hay, and manure applied on 6 acres of sandy loam, he raised 151½ bushels of wheat. On another field, where the crop succeeding that manured with crabs did not look thrifty, he sowed a light dressing of quick lime. The crop immediately began to improve, and turned out to be an excellent one. Levi Corson, of Dyer's Creek, has an acre and a half of sandy loam on which he has raised all the corn and wheat needed for the use of his family for the last fifteen years. He has it in two fields, and raises corn in one and wheat in the other every year, giving each field a two years' rotation. Occasionally he has plowed in the wheat stubble and raised a crop of buckwheat, thus getting three crops from the same ground in two years. The straw and stalks have all been taken off the field, and the only manure that has been applied has been a compost of 2,000 crabs with eight or nine loads of sods from the fence corners, each year. His corn crop has been at the rate of from 30 to 50 bushels an acre. The compost was all put on the wheat, no manure being used on the corn. The sorrel grew very rank in the corn, but by the diligent use of the hoe it was kept down. His first crop of wheat on 90 rods of ground was 16 bushels, weighing 65 pounds to the bushel, and his wheat has usually yielded at the rate of from 25 to 30 bushels an acre. He finally stopped gathering crabs and used lime, but his crops were not as heavy as before. He thought they were falling off while using crabs, but his neighbors said they had not fallen off more than was due to the variation in seasons.

"It is presumed these cases are sufficient to show the value of this manure. In regard to the methods of applying crabs there is room for much improvement. Allowing them to lie in piles and decompose by themselves is very wasteful, and the composts which are usually made have by far too small a quantity of absorbent material added, as is evident from the escape of the gases from the heaps, as well as from the results of experience in making composts in other localities. The crabs when alive weigh 3 or 4 pounds, and when thoroughly dried they average nearly, if not quite,

a pound each. To save all the gases which will escape from them in the course of their decay, not less than five times their weight of muck, sods, loam, or other absorbent material should be used; and a much larger quantity would not be injurious.

"The abundance of these crabs has suggested the plan of grinding them for use as a concentrated manure, and Messrs. Ingham & Beesley have erected a mill at Goshen for this purpose. They dry the crabs and grind them as fine as possible. Thus prepared, they are put up in bags and sold under the name of cancerine. Its price is $25 a ton at the works, and from 150 to 250 tons are made by them yearly. Another factory, at West Creek, makes an equal amount. It is applied on wheat, at the rate of 800 pounds per acre, and is fully equal to half its weight of guano, which would cost $18. The whole supply of it is not equal to the demand.

ANALYSIS OF CANCERINE.

Water	9.321
Organic matter	70.867
Lime	4.358
Phosphoric acid	2.714
Sulphuric acid	5.170
Alkaline salts	3.687
Sand	3.883
Total	100.000

Ammonia 10.75 per cent.

"The specimen analyzed was sent to me by Mr. Ingham. It appears to be pure crab. The ammonia was determined by an ultimate analysis. It does not exist in the cancerine ready formed, but the nitrogen from which ammonia is generated is in it, and, in accordance with the common practice of chemists, the amount of ammonia which the nitrogen will produce is calculated.

"Another specimen of the crab shells, unmixed with other matter, and only dried in the air, gave 10.78 per cent. of ammonia. Two other specimens of the cancerine gave 9.22 and 9.77 per cent. of ammonia. The phosphoric acid of the last two was 3.87 and 4.24 per cent.

"The establishment of this manufacture has been the subject of much interest. The increasing use of concentrated manures, the continued reports of their early exhaustion, and their enhanced price have drawn the attention of the public to other sources of supply, and every honest attempt to meet this want should meet with public encouragement. The agricultural value of the cancerine and its price compared with the Peruvian guano may be estimated. The following table gives the highest, lowest, and the average composition of thirty-two well authenticated specimens of Peruvian guano. It is copied from Morton's Cyclopedia of Agriculture:

	Highest percentage.	Lowest percentage.	Average percentage.
Water	22.68	8.88	13.09
Organic matter and salts of ammonia	58.82	37.78	52.61
Sand	2.95	1.17	1.54
Earthy phosphates	34.45	19.46	24.12
Alkaline salts	13.48	.61	8.78
Ammonia yielded by 100 parts	18.94	15.98	17.41

"Professor Way, an eminent agricultural chemist in England, and some in our own country, have computed the value of guano from the amount of ammonia and phosphates or phosphoric acid it contains, considering the other ingredients as of little comparative value. The phosphates are allowed by them to be worth about one-eighth and phosphoric acid one-fourth as much as ammonia. Taking these valuations as the basis of calculation, the ammonia and one eighth of

the phosphates of the Peruvian guano amount to 20.42, or are equivalent to that percentage of ammonia; the ammonia and one-fourth of the phosphoric acid in the cancerine are in the same way equivalent to 11.43 per cent. of ammonia; and the values of the two will be as the numbers 20.42 and 11.43; or when guano is worth $60 per ton, as it is now, the cancerine is worth $33.58. * * *

"The amount of the material (cancerine) which can be produced annually is not yet known. There is so little knowledge of the habits of the king crab that no judgment can be formed as to the effect that will be produced on a coming year's supply by the destruction of great numbers of those which come to the shore to lay their eggs. If the number is not materially diminished, the manufacture could be extended so as to produce many thousands of tons every year."

Table showing the extent and value of the horseshoe crab fishery of New Jersey and Delaware for 1880.

State.	Number of crabs taken.	Estimated weight in pounds.	Value to the fishermen.
New Jersey	3,400,000	6,800,000	$13,600
Delaware	900,000	1,800,000	2,700
Total	4,300,000	8,600,000	16,300

(b.) THE CRAB FISHERIES OF THE PACIFIC COAST.

9. CRAB FISHERIES OF THE PACIFIC STATES AND TERRITORIES, CALIFORNIA TO ALASKA.

California to Washington Territory.—There are six species of crabs living upon the Pacific coast of the United States south of British Columbia which are regarded as edible. They are as follows: The common crab (*Cancer magister*); the red crab (*Cancer productus*); the rock crab (*Cancer antennarius*); the kelp crab (*Epialtus productus*); the yellow shore crab (*Heterograpsus oregonensis*), and the purple shore crab (*Heterograpsus nudus*). Of these, however, only the common crab (*Cancer magister*) is extensively taken as food for the San Francisco markets. Both the red crab and the rock crab are said to be nearly, if not quite, as palatable as the common crab, but the fishery for them has been neglected, mainly for the reason that the latter species is the most abundant, averages much larger in size, and inhabits those localities and depths which are most resorted to by the fishermen. The yellow and purple shore crabs are much smaller than the other four species, and are eaten only by the Chinese. The kelp crab is eaten by the Indians, and probably also by the white inhabitants of the regions where it abounds.

Although the *Cancer magister* ranges from Sitka, Alaska, to Magdalena Bay, Lower California, San Francisco appears to be the only place where it is regularly marketed, the supplies coming mainly from the sandy beaches of the San Francisco side of the bay of the same name, and especially to the south of the Golden Gate, between the city and the sea. These crabs are caught in immense numbers, together with the red crab, the rock crab, and many shallow-water species of fish, in seines, and in crab-nets, baited with fish and offal. The red crabs and rock crabs so taken are not sent to market, but are thrown back into the sea or left on the shore to die. These two species, however, live mainly upon the more rocky shores of the northern side of the Golden Gate, where but little fishing is done, and the indifference shown regarding them is largely attributable to this fact. Notwithstanding the great numbers of the common crab which are constantly being taken, and the reckless manner in which the catch is wasted by most crab-catchers, the supply has not yet perceptibly diminished. Much fewer crabs are brought to market in winter than in summer. Three or four good sized crabs sell in the markets at retail for 25 cents. There

is no export trade in crabs. The annual sales of crabs in the San Francisco markets have been reckoned at about 300,000 by count, weighing on an average about 1 pound each, and netting the fishermen about $15,000.

The yellow and purple shore crabs, when eaten by the Chinese, are generally spitted and cooked over their open fires.

The large red rock crab (*Echidnoceros setimanus*) of the Farallone Islands is occasionally carried to the San Francisco markets and offered for sale as a curiosity. Formerly it brought as high a price as $10 apiece, but now its value is much less. So far as we are aware, it is no regarded as edible.

For the above information regarding the Californian crabs, we are chiefly indebted to Mr. W. N. Lockington, of San Francisco.

ALASKA.—According to Mr. Henry Elliott, several large species of crabs found on the coast of Alaska are eaten by the natives. Among these are species of *Chionœcetes* and *Hyas*. With reference to the former, Mr. Elliott states that along by the last of May or first of June of each year, great numbers of the females of *Chionœcetes* enter the village lagoon at Saint Paul's Island, evidently to spawn. They work in on the flood tide and are captured by the natives in their boats, who lean over the gunwales and pick them up in their hands as they are running in. This appearance of the crabs lasts about three weeks. They are singularly uniform in size, and will average about 10 inches in spread over all, the body alone measuring from 3 to 4 inches. The flavor of *Chionœcetes* is said to be exceedingly rich and agreeable. There is no trade in crabs in Alaska.

(c)—STATISTICAL RECAPITULATION.

10. STATISTICS OF THE CRAB FISHERIES OF THE UNITED STATES FOR 1880.

EASTERN AND SOUTHERN COASTS.

Name of species.	Estimated weight.	Value to the fishermen.
	Pounds.	
Blue crab, *Callinectes hastatus*	7,410,830	$322,622
Stone crab, *Menippe mercenarius*	12,000	450
Rock and Jonah crabs, *Cancer irroratus* and *borealis*	4,000	200
Horseshoe crab, *Limulus Polyphemus*	8,600,000	16,300
Total for the Eastern and Southern United States	16,026,830	339,572

PACIFIC COAST.

Common crab, *Cancer magister*	300,000	$15,000
Total for the entire United States	16,326,830	354,572

2.—THE LOBSTER FISHERY.

I. GENERAL REVIEW.

Among the marine invertebrates of the American coast, the lobster is second only to the oyster as an article of trade. No other crustacean along the region of its occurrence is utilized to any extent, either for food or bait, excepting at the South, where the blue crab fishery slightly overlaps that for the lobster. Two other species of crabs (*Cancer irroratus* and *Cancer borealis*), related to the edible crab of Great Britain, inhabit the same range of coast, but they are both

comparatively small, not generally abundant, and have never grown into favor for the table, although they are marketed to a slight extent in some places, and are occasionally used as bait.

The lobster probably formed an important element in the food supply of the New England colonists, and its abundance, size, and good qualities are often mentioned in the early records. As a distinct industry, however, the lobster fishery does not date back much, if any, beyond the present century, and until about 1840 it was mostly limited to a few sections of the coast. Since the latter date it has rapidly developed, and the area of the fishing-grounds has been enlarged to the utmost extent. The introduction of the canning process and the improvements made in the methods of shipping fresh fish have been most instrumental in promoting the growth of the fishery, which now, however, seems to have passed the period of its greatest production, if recent accounts, respecting a falling off in supplies, are to be relied upon.

In Section I of this report (Natural History of Aquatic Animals), Part 5, a brief popular account of the natural history of the lobster has been given as an introduction to the present report upon the fishery. That account deals mainly with the questions of distribution, habits, size, development, and shedding, all of which have a direct bearing upon the industry, especially as regards its protection and its increase by artificial means.

In the preparation of this, the first extensive official, report upon the lobster fishery of our country, many difficulties were encountered, and the results are not as complete and satisfactory as they might have been, had we possessed more data respecting previous years to serve as a basis for the work and as a means of comparison with the present fishery. The materials we have used were derived from several sources. The greater part was obtained by the special agents detailed to investigate the coast fisheries of the New England and Middle States, and much valuable information was secured by correspondence with lobster fishermen and dealers in all the principal districts. The author has also been able to personally inspect the fisheries in several important localities, and has had frequent interviews with many of the prominent dealers in the larger markets. A few reliable publications on the subject have also been largely drawn upon. The special agents for the coast of Maine were Mr. R. E. Earll and Capt. J. W. Collins, and despite the fact that their duties covered all the sea fisheries of that important State, the returns made on the lobster fishery and the statistics of the same were exceedingly complete. It is but just to Mr. Earll to state that it was his original intention to prepare the report on the lobster industry of Maine himself, and his notes were made with a view to that end; but other duties interfering, his field-notes were confided to my care. The statistics for Maine were, however, computed by him. Mr. W. A. Wilcox, Mr. A. Howard Clark, and Mr. Frederick W. True made the investigations for Massachusetts; and Mr. Earll and Mr. Fred. Mather, those for New York and New Jersey. The account of the fisheries of New Hampshire, Rhode Island, and Connecticut has been derived principally from correspondence, but in part also from personal interviews.

VALUE AND USES OF LOBSTERS.—Lobsters are among the most highly esteemed of the sea products of our Atlantic coast, and are everywhere in great demand for food. They are shipped long distances alive, and the canned preparations are carried to all parts of the world. On the sea coasts where they occur, except in the vicinity of large towns and cities, they are not generally much, if any, more expensive than the common fish of the same region, and they are, therefore, quite extensively eaten by all classes, and many of the fishermen and others also catch them for their own use. Away from the sea-shore, and even in many of the larger markets located near good fishing-grounds, the prices are generally much higher, placing this class of food beyond the reach of the poorer people, and often raising it to the rank of a luxury.

Lobsters also form an excellent bait for many of the species of fish taken with hook and line.

The soft shelled and smaller individuals are preferred, but in most places lobsters are now too valuable or too rare to be used very extensively as bait. Some of the lobster fishermen, who also engage in hook and line fishing, use the under sized, soft, or otherwise unmarketable ones for this purpose, and a few traps are also often left down out of season for the taking of bait lobsters only. Amateur fishing clubs, such as that at Cuttyhunk Island, Massachusetts, frequently depend largely upon lobsters for bait, and keep traps set for taking them, the smaller ones only being used and the larger ones sold. On the northern part of the New England coast, as far south as Cape Cod, lobster bait is favorably regarded for cod, hake, haddock, and sea perch; and south of Cape Cod, for cod, tautog, striped bass, sea-bass, scup, and bluefish. Old fishermen state that when rock cod refuse to bite at a bait of soft-shell lobsters, they cannot be taken with any means. On the coast of Maine, lobsters have sometimes been ground up and scattered upon the surface of the water to attract schools of mackerel, and in the same region they are occasionally fed to eels confined in ponds. For the latter purpose they are ground or broken into small fragments, and placed in small cars, pierced with holes, through which the eels can pass in and out at will. They are also used as bait in cunner traps at Cape Ann, Massachusetts.

Considerable difference of opinion exists as to what constitutes the best lobsters for eating. In most sea-port towns of the lobster region it will be observed that the inhabitants, as well as the fishermen, select the smaller lobsters for their own use, while the larger ones are shipped away to the markets and inland cities, where small lobsters find no sale. The fact that these latter places demand only large lobsters, and pay well for them, is probably one of the principal reasons why the smaller ones are mainly used at home, being, in reality, a cheaper grade. However, there is no question but that a preference generally exists for small lobsters along the sea-coast. In most markets there is no call for lobsters measuring less than about 10 inches in length, and frequently the larger they are the more readily they are disposed of. The run of lobsters at different seasons naturally influences the character of the demand, and in Boston the summer supplies average larger in size than the winter, so that the people have become accustomed to demand larger lobsters in summer than they can obtain in winter. It is natural to suppose that the lobster, like many other animals, would be most desirable as food before it had attained too large a size, but to what extent the flesh of the young and old differs does not appear to be known. The very small ones, however, would not be economical to use, from the small amount of meat they contain.

It has been stated that one sex is sometimes preferred to the other, but the only possible difference that could exist between the sexes would be with respect to the mature ovaries or "sweet bread" of the females. Capt. N. E. Atwood, in a paper published some fifteen years ago, relates that at that time male lobsters were preferred in Boston and female lobsters in New York. His paper was written in support of the statement that nine-tenths of the lobsters caught about Cape Cod, whence the New York supplies were mainly obtained, were females, while the same proportion from the "North shore," tributary to Boston, were males. This question has been more fully discussed in connection with the natural history.

Unlike the common blue crab, soft-shell lobsters are not generally regarded as edible, their flesh being described as thin and watery. They are, however, occasionally eaten, and are considered to form an excellent bait. It is customary in most regions to throw them overboard as soon as they are taken, unless they are in demand as bait, but even the slight handling to which they are subjected in removing them from the traps is said generally to injure them beyond recovery, unless the shell is somewhat hardened. Salt-water ponds or parks have sometimes been used for storing soft lobsters awaiting the hardening of their shells, but this practice is not common.

2. THE FISHING GROUNDS AND FISHING SEASON.

EXTENT AND CHARACTER OF THE GROUNDS.

LOCATION OF THE GROUNDS.—The distribution of lobsters and the depletion of many of the inshore fishing-grounds have been described in Section I of this report. The most southern grounds for lobsters on the coast are a few small banks or spots located off Atlantic City and Long Branch, which are mainly resorted to by the boat fishermen, and the yearly catch is not large. New York Bay and the waters about Hell Gate furnished a limited fishery at one time, but lobsters have been nearly exterminated there by overfishing and the pollution from factories. They occur and are fished for to a moderate extent on the western part of the Connecticut coast, but toward the eastward become much more abundant and afford a profitable fishery, especially in Block Island Sound and about the eastern end of Long Island. The fisheries of Rhode Island are carried on in some parts of Narragansett Bay and in moderate depths of water off the outer coast. The outer Elizabeth Islands, the region about Gay Head, and some localities in Vineyard Sound, Massachusetts, have yielded good fishing for many years, but probably the best grounds on the Massachusetts coast were originally those about the outer end of Cape Cod, in the vicinity of Provincetown. The history of this region is fully described elsewhere. Good lobster fishing is obtained in many portions of Massachusetts Bay as far north as Cape Ann, but the sandy shores from there to about Biddeford Pool, Maine, are much less prolific than the regions both to the south and north, and comparatively little fishing is done. The coast of Maine furnishes the principal lobster fishery of the United States, and good grounds are scattered all the way from Biddeford Pool to near Calais. The lobster production of Maine greatly exceeds in amount and value that of all the other States combined.

It is difficult to estimate the comparative value of the grounds on different sections of the Maine coast, but some are much more extensive and productive than others. The middle portion of the coast, including the Waldoboro, Belfast, and Castine districts, gave the largest results in 1880, and the fishery was more extensive and valuable in the eastern districts than in the western; but these facts do not necessarily indicate the location of the best grounds.

EXTENT OF THE GROUNDS.—As warm weather advances in the spring, the lobsters approach nearer the land and remain in comparatively shallow water until late in the fall. In the summer months they may often be found close to shore, and, in favorable localities, sometimes come within reach of a dip-net or gaff. During the earlier period of the fishery, especially on the coast of Maine, but also in Massachusetts, it was not unusual for large numbers to be taken with these simple appliances, and the shore fishery gave employment to many boys. At present, however, they are seldom seen in such localities. During the winter the lobsters live in deeper water, not necessarily at a great distance from land, but often in the deep and wide mouths of rivers and bays, which are common on the coast of Maine, and they also remain in the deeper parts of Massachusetts Bay, Vineyard Sound, and Long Island Sound.

The location of the fishing-grounds, therefore, changes somewhat at different seasons, being nearer the shore in summer and farther off in winter, and there is of course a corresponding change in the depth. The winter fishery is much more difficult than that of the spring, summer, and fall, and is not engaged in to a very great extent. In the Sheepscot River of Maine, which is quite deep, lobsters are caught as far up as Wiscasset Bridge, the traps being shifted out in the winter towards the middle of the river, not far from the summer grounds. With reference to

some regions, it has been stated that during mild winters, lobsters occasionally remain in depths as slight as 5 to 10 fathoms. The greater part of the summer lobster fishery of Maine is carried on in the passage ways and bays among the many islands and promontories that border the coast, while in the winter the traps are transferred to the waters outside. At Eastport, Me., from April 1 to the middle of May, lobsters are mostly taken outside of the island of Campobello, beginning in depths of 20 to 25 fathoms. As the season advances, the traps are gradually shifted into shallower water, and about the middle of May the fishermen begin upon the so-called inshore grounds, which extend from Lubec, Me., to near Saint John, New Brunswick. During the summer the pots are usually set in depths of 3 to 10 fathoms. In the western part of Maine, as near Biddeford Pool, the winter, or rather the early spring, fishery is sometimes carried into depths of 40 or 50 fathoms, while the summer fishery is conducted in very shallow water. In 1879, at Swan's Island, Castine, Me., some of the fishermen set their traps upon the eel-grass, where they were left partly exposed at low tide.

Lobsters occur all about the island of Vinal Haven, and no locality seems to vary much from the others. In the early spring they are taken somewhat off shore, but not far, in depths of 15 to 25 fathoms, but as the spring advances they move inshore, and during the summer and fall are found in all the coves, creeks, and inlets, good fishing being frequently obtained in water so shallow that the traps are exposed at low tide. The fishermen are rarely obliged to go more than a mile off shore at any season. The fishermen on the west side of Pemaquid fish in the waters of John's Bay and the Damariscotta River, shifting into deeper water in winter, while those on the east side and about Friendship find lobsters well up among the islands and coves between Saint George and Pemaquid, in spring, summer, and fall, but rather far out in winter, the best winter fishing-grounds being beyond the outer islands and headlands. While lobster fishing may be carried on in all depths down to 50 fathoms, it is probable that the greater part of all the lobsters taken on the coast of Maine come from depths of 2 to 30 fathoms.

On the coast of New Hampshire, the principal grounds are all within depths of 8 to 10 fathoms. Off Gloucester, Mass., the traps are set in depths of 5 to 10 fathoms in the summer and 15 to 20 fathoms in the winter, and off Boston in depths of 1 to 8 fathoms in the summer and 12 to 16 fathoms in the winter or early spring. Captain Webb, of Milk Island, Cape Ann, states that his traps are placed in a depth of 14 fathoms in April, and are gradually shifted inwards as the water becomes warmer, the summer grounds being in $2\frac{1}{2}$ fathoms. At that place the lobsters sometimes suddenly change their ground in time of storm, and Captain Webb relates that he has greatly increased his catch by moving his traps into deeper water when the signal at Thatcher's Island announced a high wind from certain directions, which produced a strong undertow.

The grounds off Provincetown, Mass., are bounded on the outer side by a belt of mud, which begins in a depth of 18 to 20 fathoms; at Yarmouth Port they sometimes fish in a depth of half a fathom, while in Vineyard Sound the grounds extend from 3 to 15 fathoms, and off Gay Head from 3 to 25 fathoms. On the coast of Rhode Island lobsters are taken in depths of 3 to 20 fathoms, and off Block Island and in Long Island Sound, in depths of 1 to 60 fathoms. The deeper places last mentioned are in Block Island Sound off Fisher's Island, being, in fact, deep holes which are frequented mainly by the Noank fishermen during cold weather.

On the New Jersey coast, lobster fishing is carried on only between Sandy Hook and Atlantic City, in depths of 5 to 11 fathoms, and is mainly limited to a few small fishing banks off Long Branch and Atlantic City.

CHARACTER OF THE BOTTOM.—Lobsters are fished for mainly on sandy, gravelly, and rocky bottoms, but are also said to inhabit muddy regions, especially in the winter. At Provincetown,

Cape Cod, the sandy belt bordering the shore extends out to a depth of 18 to 20 fathoms, where it is succeeded by soft mud. The fishermen there never go beyond the limits of the sand, though many of the lobsters are supposed to retreat to the mud as cold weather approaches. South of Massachusetts Bay, and even for some distance to the north of Cape Ann, the lobster grounds are mainly characterized by sandy and gravelly bottoms, though with the frequent occurrence of large loose stones. On the coast of Maine, and in some portions of Massachusetts Bay, lobsters are very common about the many rocky ledges, which afford them great protection. It is difficult, however, to set the traps where the bottom is very uneven, and comparatively smooth bottoms are preferred by the fishermen. In the winter some fishing is done upon the mud.

THE FISHING SEASON.

GENERAL ACCOUNT.—Lobsters may be found at all seasons of the year on most parts of the New England coast, though in deeper water in the winter than in the summer. The fishing season, however, generally lasts only a few months, its duration being influenced by one cause or another. The stormy weather of winter frequently prevents the fishermen from visiting the grounds for a month or more at a time; in some places the market smacks run for only a short period, when the demands are greatest and lobsters most abundant; and the laws of some States limit the length of the season as a means of protection. In many regions the men engage in lobstering only when other fisheries, which are more profitable to them, cannot be carried on. Stormy weather is frequently selected as the time for making and repairing gear and boats and in preparing for the next season. Some of the lobster fishermen are farmers and miners, who spend a part of the year in one pursuit and the remainder in the other, and the canning season of the coast of Maine regulates the fishery to a large extent in the waters of that State. In a few localities, lobster fishing is engaged in by only the very young or old men who are not hardy enough to enter upon the more active fisheries, and who tend their traps only in pleasant weather. The term "lobster season," as used by the fishermen, does not therefore signify the entire period during which lobsters may be taken, but only that portion of it in which fishing is regularly carried on.

COAST OF MAINE.—On the coast of Maine, prior to 1879, lobster canning was permitted at any time of year, but in consequence of the character and abundance of supplies at those seasons, it was mainly carried on between April 1 and August 1, and again between about the 10th or middle of September and the 1st of December, the length of each season varying somewhat, however, according to circumstances. The fishery and canning industry were then closely interdependent, and the latter was continued whenever supplies were sufficiently abundant. Since 1878 the State laws have limited canning to the four months from April 1 to August 1, and only during that period can lobsters of all sizes be taken and disposed of. This free license has practically established the principal lobster season between those limits, but lobsters are frequently not abundant in convenient depths before the middle of April, and are often not considered fit for taking after the middle of July. Outside of the above limits only lobsters exceeding 10½ inches in length could be trapped, but there was a sufficient demand for market supplies to continue the fall and winter fishery to a certain extent. In 1883 a close time was established which prohibited fishing from August 15 to November 15, but in 1885 this close season was reduced so as to extend only from August 15 to October 1. May and June are generally regarded as the best lobster months, although the fall fishery is often nearly if not quite as good.

On some sections of the Maine coast, the canneries are the only convenient markets for lobsters, and the fishery continues actively only so long as the canneries remain open. At some places, as in the vicinity of Bath, but few men fish for lobsters during the summer, while quite a number engage

in the fishery from November to April or May, with a break of about two months during the coldest part of the winter. In the region about Saint George's Island, the fishery lasts during the entire year, with the usual winter intermission. In the coldest months it is not alone the severity of the weather that interferes with the fishery, but the ice often makes around the cars moored near the shore to such an extent as to destroy the lobsters stored in them. Some fishermen who haul their pots in cold weather keep the lobsters in the cuddy of their boats near the stove until they reach land. The well smacks do not begin to run until about the 1st or middle of March, and cease running about the 1st of December; many do not make as long a season as this in the lobster trade, and but few continue active from the middle of July to the middle of September.

The above remarks indicate the principal causes that influence the duration of the lobster season on the coast of Maine, and account for its variability. In the coast review of this industry, the question is more fully discussed in connection with each district.

New Hampshire and Massachusetts.—On the coast of New Hampshire, the season generally continues only about four months, or from April 1 to August 1, the best fishing being obtained in May. At Cape Ann, Mass., fishing begins in March or April, and lasts until about the 1st of November, but not much is done during the summer. The spring fishery is the best. In Massachusetts Bay, the deep-water fishery is kept up during most of the year, with a short intermission in the winter; the shallow-water fishery begins in March or April, and continues until near December. Lobsters are abundant in Boston Harbor from about the middle of April until December, and are fished for during most of that period. The lobster season about Cape Cod extends from April 1 to November 1, the fishery off Provincetown continuing from May to October, with best results in July and August. At Truro it continues from April to September, and at Chatham from June to November. On the southern coast of Massachusetts, including Vineyard Sound, Buzzard's Bay, and the region about Gay Head, the season also extends from April to November, May and June being regarded as the best months in some localities, and July and August in others.

Rhode Island to New Jersey.—In Rhode Island the principal season is from May to October, but during the mild winters of 1879 and 1880 some fishing was also done. The best months are July and August. In Long Island Sound the fishery continues from March to December, with a small winter fishery at the eastern end. Most of the fishing is done between April and September or October. The season for New Jersey lasts about five months, or from May 1 to the last of September. A few traps are set both earlier in the spring and later in the fall.

Best time of day for fishing.—It is the prevalent opinion among fishermen that lobsters take the bait more readily at night than during the day, and it is considered most profitable to keep the traps set over night. It is probable, however, that the tides influence them somewhat, especially in shallow water, by causing them to move back and forth over the grounds where the traps are set. The customary method of fishing, however, precludes observation in this direction. The traps are usually visited early in the morning, or as early as the tide serves; and after the lobsters have been removed they are rebaited, if necessary, and left for another twenty-four hours. Sometimes, however, in seasons of great plenty, the traps are hauled twice a day. A correspondent at North Haven, Me., writes that "when we bait our traps in the afternoon and allow them to remain over night, the catch is better than when we bait them in the morning and haul at night." Another informant states that the best time for catching lobsters is on the flood tide, whether it occurs at night or during the day.

3. APPARATUS AND METHODS OF THE FISHERY.

THE FISHING APPLIANCES.

THE LOBSTER TRAPS.—Only two or three different kinds of appliances for taking lobsters have ever come into extensive use in this country, and at the present time the fishermen of all the more important lobster districts have quite universally settled upon the funnel traps as being the most convenient and remunerative. The so-called hoop-pot was, we believe, the earliest contrivance for catching lobsters, and it is even now used to a slight extent on some parts of the coast; but with the majority of fishermen, especially where the influence of competition has been felt, it has long given way to a closed trap, which permits each fisherman to cover much more ground than formerly, with considerably less labor. In early times, when lobsters were of more frequent occurrence on the shore, especially on the Maine coast, some lobster fishing in a small way was carried on by means of dip-nets and gaffs.

HOOP POTS.—The hoop pot, which was formerly in common use in many places when lobsters were more abundant than at present, is very simple in its construction. As used at Provincetown, Mass., fifteen to twenty years ago and earlier, it consisted of a hoop or ring, of about one-half inch round iron, from 2½ to 3 or more feet in diameter. To this hoop was attached a shallow net bag as a bottom, while two wooden half hoops were bent above it, crossing at right angles in the center, about 12 to 15 inches above the plane of the hoop. The bait was suspended from the point of crossing of the two wooden hoops, and the line for raising and lowering the pot was attached at the same place. This style of trap required constant watching, and had to be hauled at frequent intervals. It could not be left for a long time, as in the case of the lath or closed pot, at least, not with profit to the owner, for the lobster, as soon as he had finished his repast, could retire at pleasure.

Capt. N. E. Atwood, of Provincetown, describes the method of using these pots as follows: "The fisherman would go out perhaps at midnight, anchor his boat near the shore on the edge of the fishing-grounds, and put over his pots, of which he would have about six. At short intervals he would haul them in and remove whatever lobsters they might contain. If lobsters were abundant he would be kept busy hauling his pots all the time. By the time he had run through his series of pots once and had pegged the claws of all the lobsters, he would have to begin over again, and thus the night would be spent and he would arrive home about 8 or 9 o'clock in the morning, with 100 or 200 lobsters, more or less. Of late years lobsters have not come here in sufficient abundance for this style of pot, and it has been abandoned."

At Truro, Cape Cod, where this same kind of pot was also formerly used, the wooden hoops for the attachment of the bait and rope were replaced by several short cords, fastened to the ring at regular intervals and brought together in the center above.

Prior to the introduction of the lath pot, hoop pots were extensively employed all along the coast. At that time the relative number of lobsters was much greater, and they entered the pots more freely. Many more were then taken to a pot per day than now, and a fisherman could afford to devote his time to constantly tending his pots while they were set. They were generally set during the night or early morning, as lobsters were supposed to feed more at that time than during the day, and they were hauled about every ten or fifteen minutes or half hour. Although the hoop pots have almost entirely gone out of use, we have heard of their being occasionally employed at different points along the New England coast. They are still used to a slight extent in the crab fishery of the Southern States.

CLOSED OR FUNNEL TRAPS.—These are made of several different shapes and materials, though alike in principle, and possess this great advantage over the hoop pots, that when the lobsters once enter them they can seldom escape. They do not require to be visited oftener than once a day, or at the pleasure of the fisherman, who can, therefore, handle a large number at a time. On the Maine coast as many as eighty to one hundred are sometimes set by a single fisherman, and few fishermen there consider their outfit complete with less than fifty or sixty. These traps are generally made with a flat bottom and semi-circular sides and top, one or both ends having a funnel-shaped entrance, but are occasionally rectangular. They are nearly always constructed of narrow strips of wood, with funnels of twine netting, but on some sections of the coast they are entirely covered with netting.

LATH POTS.—The term "lath pot" is almost universally employed to designate the common forms of closed lobster traps, whether semi-cylindrical or rectangular in shape, providing they are constructed of laths or of any narrow strips of wood. Other names by which they are known to the fishermen are "box-traps," "house-pots," "stick-pots," and "lath-coops."

The semi-cylindrical lath pots are generally constructed as follows: They range in length from $2\frac{1}{2}$ to 4 feet, the latter length, which is the full size of the laths, being the commoner, and the shorter ones being seldom used on the coast of Maine. With the 4-foot pots the width is about 2 feet and the height 18 inches. Other proportions of width and height also occur. The framework of the bottom consists of three strips of wood, either spruce, hemlock, or pine (the first mentioned being the most durable), a little longer than the width of the pot, about $2\frac{3}{4}$ inches wide and 1 inch thick. In the ends of each of these strips a hole is bored to receive the ends of a small branch of pliable wood, which is bent into a regular semi-circular curve. These hoops are made of branches of spruce or hemlock, or of hard wood saplings, such as maple, birch, or ash, generally retaining the bark. Three of these similar frames, straight below and curved above, constitute the frame-work of each pot, one to stand at each end and one in the center. The narrow strips of wood, generally ordinary house laths of spruce or pine, which form the covering, are nailed lengthwise to them, with interspaces between about equal to the width of the laths. On the bottom the laths are sometimes nailed on the outside and sometimes on the inside of the cross-pieces. The door is formed by three or four of the laths running the entire length, either near the base on one side, or near the top. The door is hinged on by means of small leather strips, and is fastened by a single wooden button in the center, or by two buttons, one at each end. The openings into the pot, which in the case of those 4 feet long are two in number, one at each end, are generally knit of coarse twine and have a mesh between three-fourths of an inch and 1 inch square. They are funnel shaped, with one side shorter than the other, and at the larger end have the same diameter as the framework. The smaller and inner end measures about 6 inches in diameter, and is held open by means of a wire ring or wooden hoop. The funnels are fastened by the larger ends to the end frames of the pot, with the shorter side uppermost, so that when they are in place they lead obliquely upwards into the pot instead of horizontally. The inner ends are secured in position by means of one or two cords extending to the center frame. The funnels are about 11 or 12 inches deep, and therefore extend about half way to the center of the pot. They taper rapidly and form a strongly inclined plane, up which the lobsters must climb in their search for the bait. A two-strand tanned manila twine is most commonly employed for making the funnels. Cotton is also used, but is more expensive and less durable. The smaller pots have a funnel at one end only.

The bait holder is generally a sort of spearhead of wood or iron, with one large barb, and stands upright from the middle of the center frame; it is from 8 to 12 inches long. The pots are

weighted by means of stones or bricks lashed on the inside at the center or on both sides. Two bricks furnish the requisite weight for each pot.

These lobster pots are set both on single warps and in trawls of 8 or 10 to 30 or 40 pots. On rocky bottoms they are almost always used in the former way, and frequently also on smooth bottoms, especially where lobsters are somewhat scarce, for at every hauling they are shifted more or less from place to place. The distance apart at which the pots are set depends upon the character of the bottom and the abundance of lobsters. There is less uniformity in this respect when they are set singly than when arranged on trawls. By the latter method they are placed all the way from 10 to 50 fathoms apart and rarely nearer than 20 fathoms. The line by which they are lowered and hauled up, and which also serves as a buoy line, is fastened to one of the end frames of the bottom or sill, as it is called, at the intersection of the hoop. The buoy and trawl lines consist of six to nine thread manila cord, which may be purchased tarred or otherwise, the fishermen frequently preferring to prepare their own lines with coal tar.

The buoys generally consist of a tapering piece of cedar or spruce, wedge shaped or nearly spindle shaped, and measuring 18 inches, more or less, in length. They are occasionally painted in distinctive colors, in order that each fisherman may recognize his own, but are generally simply boiled in coal tar to prevent their becoming water logged. Another common style of buoy consists of a small keg surmounted by a flag, in order that it may be seen at a greater distance.

In the construction of the ordinary kind of pot, one bunch of laths will answer for about three pots. The cost of these pots on different parts of the coast varies from 75 cents to $1 each.

The rectangular lath pots differ from the semi-cylindrical simply in being square above instead of rounded, and they are generally of smaller size. They are not employed on the coast of Maine, but are used to some extent in Rhode Island and Connecticut.

At Rockport and elsewhere on the coast of Maine, the fishermen occasionally construct an enlarged form of the common round-top pot, with room for twice the quantity of lobsters. This style of pot, originated at Harpswell, Me., in 1879. A sample furnished the United States National Museum from Rockport differs from the common pot above described, in having a length of 7½ feet, five supporting frames at equal distances apart, instead of three, and two additional funnels, one funnel being attached to each of the frames excepting the center one, and all pointing inward. The lobsters must pass through two funnels before reaching the bait, and their chances of escape are thereby much lessened.

On some portions of the coast wooden funnels replace the net ones, though the latter are probably preferable. The wooden funnels are constructed of laths, converging inward from the rim of the pot to form a small squarish opening, about the size of that in the net funnels.

There is another style of pot, but rarely used, in which the essential feature is a trap-door on which the lobster must climb in order to reach the bait, and which suddenly gives way, precipitating him into a secure inclosure. We have not, however, been able to obtain details of its construction.

Complaints are occasionally made by the fishermen that, especially during certain seasons, their pots are badly eaten by "worms," either the ship-worm (*Teredo*) or one of the species of small boring crustaceans. A correspondent at Truro, Cape Cod, says they are subject to their attacks more particularly during September, when the pests are most destructive, often reducing the pots to mere fragments.

NET POTS.—The lath pot has been partly superseded on the New Jersey coast by another style of closed pot, introduced about 1872, by Mr. Charles Wooley, of Seabright, and called the net pot. The latter is constructed entirely of netting, supported upon three hoops as a frame-work.

It has a length of about 5 feet, and is about 2 feet across, that being the diameter of the hoops. The hoops are placed at equal distances apart, and facing one another in such a manner that one hoop supports each end, and the third hoop supports the middle of the pot. One end, constituting the entrance to the pot, is furnished with a funnel leading inward, as in the lath pot, and the second or central hoop also supports a funnel pointing in the same direction. The hinder end of the pot is covered with netting, having a central opening, which can be opened or completely closed by means of a puckering string. The bait is suspended from the central hoop at the mouth of the inner funnel. The lobster enticed into the pot by the bait generally finds its way into the last compartment, where escape is very difficult. It is then easily removed through the opening at the hinder end of the pot. These pots cost about $1.50 apiece.

THE ENGLISH POTS OR CREELS.—In Great Britain, according to Mr. Frank Buckland, "the fishery for crabs and lobsters is conducted in every part of the Kingdom in the same manner. Traps made of wicker-work, or of a wicker frame covered with netting, and usually known as 'pots' or 'creels,' are almost universally used. The pot is baited with some fish, fresh fish being preferred for crabs and stinking fish for lobsters, and sunk in from 3 fathom to 45 fathom water. The crabs or lobsters enter the pot in search of the food through a hole or pipe 4½ to 5 inches in diameter. * * * In some places as many as one hundred creels, in others as few as twenty, are carried by a single boat."

"Creels * * * have only recently been introduced into some places. The fishermen used to fish with a much more primitive and less efficacious engine. An iron ring had a small net attached to it in the shape of a purse. The net was baited and let down. The fishermen constantly examined the ring to see if there were any fish on it, and the pressure of the water upon the ring while it was being drawn up for examination prevented any lobsters or crabs which happened to have been attracted by the bait from escaping."

APPLIANCES USED IN NORWAY.—Prof. Axel Bœck gives the following account of the appliances used for catching lobsters on the coast of Norway:

"Formerly the lobster was caught on our sea-coasts exclusively with tongs. These tongs were made of wood, and had about the same shape as the common oyster-poles, being only somewhat longer, generally 2 fathoms. Such an implement was exhibited at the Bergen Exposition of 1865, and an illustration of it is given in the report. As these tongs were not very long, lobsters could not be caught at any great depth—only at a depth of little more than a fathom—and this sort of fishing was carried on during the early morning hours. But as lobsters taken with these tongs often got hurt, and died two or three days afterwards, because they cannot stand any pressure, this implement was not suited for those that were to be exported; and the Dutch, after the peace of Westphalia, when the lobster fisheries began to assume larger dimensions, endeavored to induce the fishermen to use other and better implements. Although baskets, through the influence of the Dutch, had thus become common in the neighborhood of Stavanger since 1717, tongs have been frequently used even in our century, and are perhaps in some places used to this day. Kryger, in his report on Ons, in the 'Budstikken' (a periodical) for 1820, mentions that lobsters were caught there with tongs for home consumption. Farther north tongs seem to have been the common implements for catching lobsters at a much later period; for, in the quinquennial report of the governor of the Romsdal district for 1840–'44, it is said that 'lobsters are taken with tongs, baskets not being thought to answer the purpose.' Lobsters were caught with tongs by small boys from ten to fourteen years of age, early in the morning, in calm weather, and, if successful, one night might yield an income of $2.25. Another very simple implement for catching lobsters is spoken of in the 'Budstikken' by Ström, who says that lobsters are taken with a hook fastened

to a pole, which hook is inserted in the belly, the softest part of the lobster. With this instrument, it cannot be taken at any great depth, and only when the sea is calm so that the bottom can be seen. Lobsters caught in this manner cannot be exported, as they could not stand the journey. The implements which I am going to at once describe, and which have almost entirely supplanted the simpler ones, are used by enticing the lobster with bait into a trap, out of which it cannot escape. The simplest of these traps is seldom used with us, although, according to Oetker, it seems to be in common use near Heligoland. It consists of a very thick iron ring, to which a net is fastened, so as to form a deep bag below. The bait is placed at the bottom of the bag, and it is lowered and taken up by means of a long line, which, when the bag is at the bottom, reaches up to the surface. To this line a piece of wood is fastened, which floats on the water and shows the location of the trap. If this instrument has been lying at the bottom for half an hour in a place where lobsters are known to abound, a sudden jerk is given to the line, so as to cause the lobster to fall in the bag, and it is rapidly pulled up. (The most successful time of the day for catching lobsters is generally in the morning, and also between 11.30 a. m. and 3.30 p. m. With this instrument, which the English call 'plumpers,' and the Germans 'Fallenkörber,' lobsters are taken in deep places.) With us the commonest implements for catching lobsters are baskets ('*Tejner*'). It seems certain that the Dutch first introduced them for catching lobsters; but they may have been used long before that, *e. g.*, for eels, as the name is Scandinavian, and is derived from '*tün*,' *i. e.*, the long and tough roots of the juniper tree. After 1713, a beginning was made in plaiting them of willow branches. Where these materials could not be readily obtained, they were, as Pontoppidan related in 1753, made of hoops, which were kept apart by pieces of wood. All round these nets are fastened, and at each end there is a long, narrow, trough shaped entrance, out of which the lobster cannot escape. On the one side there is a trap-door, which can be closed with a peg, and to another pin sticking in the basket the bait is fastened, while under the basket there are large stones to make it sink rapidly. To one of the uppermost pieces of wood a pair of tongs is fastened, furnished at the end with a piece of wood to indicate the location of the basket. Such are still in common use all along our coast. Still earlier, in 1746, the famous naturalist, Carl Linné, described similar baskets, which he saw in use on the coast of Bohuslen, in his 'West-Göta Resa,' p. 191. These were 2 yards long, 1 yard broad, and 1 yard high, resembling a half cylinder, with entrances on both sides; such are still used and could be seen at the Bergen Exposition. At this same exposition a basket was exhibited, differing somewhat from these in its shape; it was plaited of branches, and was shaped like a hemisphere, with an entrance at the top."

THE FISHING BOATS AND SMACKS.

About the same class of boats is employed in the lobster as in the other fisheries on the corresponding portions of the coast; but the variety of boats used in the former fishery is, necessarily, not so great as in the latter. The lobster boats may be conveniently divided into two classes; first, the smaller boats, with or without sails, used by the fishermen in tending their pots, and, secondly, the smacks acting as carriers to the different markets. The term smack is generally limited to boats above 5 tons measurement, which, according to law, must register at the custom-house. They are built either with or without wells, the former being used to carry lobsters alive to more distant fresh markets, and the latter to near markets, such as the canneries on the coast of Maine. The larger of the fishing boats are also usually called dry smacks, having no wells, and likewise frequently carry to near markets. The well smacks run mainly between the lobster grounds and the large distributing centers, such as Portland, Boston, and New York. Many of them,

however, engage directly in the fishery, setting their own pots, transferring the lobsters when caught to their wells, and, as soon as a full cargo has been secured, proceeding to market.

The fishing boats are generally small sail-boats, of sloop or cat rig, but row-boats are very commonly used on the inshore grounds. The principal kinds of lobster fishing boats are as follows:

THE MUSCONGUS BAY LOBSTER BOATS.—These are small square-sterned sloops, open in the after part, but with a cuddy forward. They are all built with center boards, and some are lap-streak while others are "set work." Around the after part of the standing room a seat is arranged; the ballast is floored over, and two little bunks and a stove generally help to furnish the cuddy. The length of these boats varies from 16 to 26 feet, and their width from 6 to 9 feet. Some of the larger ones measure nearly or quite 5 tons. They are good sailers and well adapted to the purposes for which they are intended—the lobster and shore cod fisheries. When used for lobstering they are managed by a single man, but in the hook and line fishery the crew generally consists of two.

When engaged in the winter lobster fishery, which frequently takes them a long distance from home, it is often necessary to keep the lobsters from freezing by means of the small stove in the cuddy. Upon the return the lobsters are transferred to floating cars, where they await shipments.

One of these boats, measuring 18 feet long, costs $80 to build, and one of 25 feet in length, $200. They are constructed principally at Bristol, Bremen, and Friendship, Me., and are mostly sold to parties in the vicinity of those places, but a few have found their way as far west as Cape Ann and Cape Cod, Massachusetts.

THE MATINICUS BOAT, which is employed in the lobster as well as the cod, herring, and mackerel fisheries about Matinicus Island, Maine, resembles, in a general way, both the Reach boat and the Muscongus Bay boat. It is sharp forward, round bilged, square-sterned, lap-streak, with center-board, wash-boards, and generally two thwarts. The bowsprit and mast are adjustable; an average length is 22 feet; width amidships, 7 feet; width at the stern, 3½ feet. These boats are always provided with oars and thole-pins, and can thus be rowed as well as sailed, though the latter method is generally preferred with a fair wind. They are fast sailers and perfectly safe.

THE CONNECTICUT LOBSTER BOATS are center-board sloops, ranging in length from 20 to 25 feet over all, and in width of beam from 6 to 9 feet. They are shallow, with a flat bottom, sharp bow, and wide heart-shaped stern. The shape of the hull is similar to that of the ordinary center-board eat-boats of New England. In the middle of the boat there is an elliptical open space, called the cockpit, about 12 feet long by 7 feet wide, in the clear; outside of the cockpit, the boat is decked over, forming a cuddy forward for the accommodation of the crew and storage of supplies; around the after part of the pit a seat is arranged. The bottom of the cockpit is floored over about 1 foot above the keelson, and on either side of the center-board is built a small box-like well about 3½ feet long, 1½ feet high, and 1 foot or more in width, in which the lobsters are kept alive. The draught of these boats is about 2 to 4 feet. They are used in lobstering in Long Island Sound, more especially on the Connecticut shore, about Noank and New London.

THE MAINE REACH BOATS, which are extensively used in the coast fisheries of Maine, are also, to some extent, employed in lobstering. They range in length from 10 to 18 feet, but the most common length is about 14 feet. They are sharp at the bow, round bilged, keeled, clinker or lap-streak, and have a square, heart, or V-shaped stern, with two or three thwarts, according to their size; they are as a rule entirely open, fore and aft, rarely having any wash-boards. They

are well adapted both for rowing and sailing, and all but the smallest usually carry one or more sprit-sails.

THE MARTHA'S VINEYARD CAT-BOATS.—These boats, which are extensively employed in the lobster fisheries of southern New England, have a sharp bow, round, flat bottom, broad beam, and square heart-shaped stern, with center-board. They range in length from 15 to 30 feet, and carry, as a rule, one gaff and boom sail of very large size. The mast is placed nearly in the eyes of the boat.

Some of the boats are nearly decked over, leaving only a small open space or cockpit in the after part; others, however, are more open, with the cockpit occupying nearly the entire boat. The cuddy is, therefore, sometimes so small as to answer only for storage, and again it may be large enough to serve as sleeping quarters for the men. Boats of this model occasionally measure as much as 5 tons.

THE PROVIDENCE RIVER CAT-BOATS, employed in the lobster and hook and line fisheries of southern New England, are sharp-bowed, round-bilged, deep-keeled, lap-streak boats, with square heart-shaped stern, and measure from 14 to 20 feet in length. One of these boats, measuring 20 feet in length over all, has an extreme breadth of 7 feet 8 inches, and a width at stern of 5 feet; the draught of water is about 2 feet 9 inches aft. They are open above, though having washboards, and are provided with a small well amidships for keeping lobsters and fish alive, while at the sides of the well are small, dry compartments, with covers, for the storage of lobsters when necessary. They carry one mast with a single large sail.

THE "TWO-SAIL" LOBSTER BOATS OF MAINE AND MASSACHUSETTS resemble, in the shape and construction of the hull, the Providence River cat-boats, but differ from them mainly in the arrangement of their sails, which are two in number, a foresail and a mainsail. The latter is about two-thirds the size of the former, and is provided with a boom, while the former is a lug-sail, having no boom. This is a common style of lobster boat on the coasts of Maine and Massachusetts.

Another form of these boats, which is also extensively used, retains the same arrangement of sails, but differs in the construction of the hull, which is more shapely, and resembles in miniature the celebrated sharp fishing schooners employed in the off-shore fisheries. The forward and after parts of the boat are also decked over, and wide washboards run along the sides, so as to leave an oval-shaped open space in the center, which is divided into two compartments, the forward one for fish and ballast, the after one for the fishermen.

These boats are provided with the means of rowing in calm weather. They vary in length from 16 to 20 feet on top, and are employed in the shore as well as the lobster fisheries. When lobstering they are usually managed by one man, who generally removes the main mast and leaves only the foresail set while hauling his pots.

THE DOUBLE-ENDER OR PEAPOD.—This is a small canoe-shaped boat, generally arranged for rowing only, although occasionally furnished with a sprit-sail and center-board. It has been introduced only recently into the region where it is used, and is said to have originated at North Haven, Me., about 1870. It is now very extensively employed in the lobster fishery of the coast of Maine, especially by the fishermen of the islands in Penobscot Bay. These boats are mainly built lap-streak, but a few are "set work." Both ends are exactly alike; the sides are rounded and the bottom is flat, being, however, only 4 or 5 inches wide in the center, and tapering toward each end, at the same time bending slightly upwards, so as to make the boat shallower at the ends than in the middle. This kind of bottom is called a "rocker bottom," and this style of boat rows easily in either direction, is safe, and can be quickly turned over; it is also capable of carrying quite a load. An average boat of this pattern measures about 15½ feet long, 4½ feet broad, and 1½ feet deep.

THE CAPE ROSEWAY WHERRY employed in the lobster and inshore fisheries of Penobscot Bay, Maine, especially in the vicinity of Castine, is a lap-streak boat with sharp bow, round bilge, narrow, flat bottom, and very narrow heart-shaped stern. It ranges in length from 12 to 18 feet, is entirely open, and seldom provided with sails.

THE DORY.—This well known style of small boat, in such common use among the fishermen of New England, is much used in the lobster fisheries, either as a tender to the smacks or alone, by fishermen who set their traps close inshore.

THE FISHING SMACKS.—The carrying smacks are described further on in connection with the account of the lobster markets. In 1880 forty-five registered smacks (between 5 and 20 tons measurement), of the class called dry smacks, were engaged both in fishing and in carrying to neighboring ports. These are additional to the fishing boats above described, and are apportioned to the several States as follows: Maine 8, Massachusetts 9, Rhode Island 5, Connecticut 22, New York 1.

THE LOBSTER CARS, AND METHODS OF HANDLING LIVE LOBSTERS.

CONSTRUCTION OF THE CARS.—The live cars used for the temporary storage of lobsters are plain wooden boxes, with open seams or numerous small holes, to permit of the free circulation of water. The buoyancy of the wood of which they are constructed keeps them at the surface of the water, though with little more than the upper side exposed, and with large cars it is sometimes necessary to attach a few empty casks to give them greater buoyancy. They are moored to wharves or stakes, or anchored in shallow water near shore.

The usual form of live car, such as is commonly employed by the fresh lobster dealers in most sea-port towns, is an oblong, rectangular box, the size and capacity varying according to the requirements of the trade. In New York these cars average 12 feet in length, 8 feet in breadth, and about 3 feet in depth. The frame-work consists of five rectangular frames, set upright and at regular distances apart. To these are nailed the boards forming the top, bottom, sides, and ends, and which are about 1 inch thick and generally not more than 6 inches wide. Interspaces of $1\frac{1}{2}$ to 2 inches are left between the boards, excepting on the top, where the boards are placed closer together. There are no interior partitions. The opening into the car is on the upper side, and is made very large, extending from one end to the other, so as to occupy the center half of the top. It is covered with four doors, arranged in pairs, each pair extending from the end to the center frame. These doors are hinged, or held in place by means of a cleat and staple only. At Fulton market, New York City, about forty-eight such cars, with an average capacity of 600 lobsters each, are in use.

Many of the cars used by the Boston dealers are much larger than the above. In connection with the Boston lobster markets, about fifteen cars are employed, with capacities ranging from 5,000 to 10,000 lobsters each. A car suitable for holding 10,000 lobsters measures 40 feet long, 12 feet wide, and 5 feet deep.

LOBSTER CARS AT EASTPORT.—At Eastport, Me., and elsewhere along the Maine coast, the dealers' cars are generally of large size and divided into compartments, to accommodate the large or market lobsters and the small or canning lobsters separately. One of the cars which we have examined at Eastport is about 25 feet long, 16 feet wide, and 5 feet deep inside, and has a capacity of 20 tons of lobsters. It is divided into six equal compartments, three lengthwise and two crosswise. The compartments opposite one another are connected by openings large enough for the lobsters to crawl through, and the car might therefore be said to contain only three double compartments. A large door opens into each. This car was moored alongside of a wharf, a long

spar lashed lengthwise to the car serving as a fender between them. The car was also given greater buoyancy by having three empty casks lashed to each end. Another style of dealers' car at Eastport measures about 20 feet long, 14 feet wide, and 4 feet deep, and is divided into three simple compartments, with a door to each.

METHOD OF HANDLING LIVE LOBSTERS AT EASTPORT.—When a smack arrives with lobsters, it runs up to the outer side of the car and ties to it. The doors on the outer line of compartments are then opened, and the men standing in the smack (which is always in that vicinity a dry smack), pick up the lobsters in their hands, measure them at a glance, and throw the larger ones, those measuring above 10½ inches, into the end compartments, and those under that size into the center compartment. The principal lobster trade of Eastport consists at present in the shipping of live lobsters in barrels to Boston. On each shipping day the lobsters are hoisted upon the wharf by means of a basket and tackle, and transferred to the barrels. The small lobsters are allowed to accumulate in the center compartment until a sufficient quantity has been obtained to warrant boiling and canning them. One of the objects in having an inner series of compartments is said to be that the more active lobsters generally crawl through from the outer compartments, leaving the less hardy ones behind; the latter can then be used first for shipment, and the others retained for a longer time, if need be.

LOBSTER CARS ELSEWHERE.—At Wood's Holl, Mass., the dealers' cars measure about 15 feet long by 6 feet wide. At South Harpswell, Me., they measure 10 feet long by 7 feet wide and 2½ feet deep.

THE FISHERMEN'S CARS.—The fishermen's cars generally resemble those of the dealers, in construction, but are made of smaller size. Old leaky boats, especially dories, furnished with a cover, are also frequently employed on many parts of the coast. If the open seams do not afford a sufficient circulation of water, numerous holes are bored through the bottom and sides. At Eastport, Me., the fishermen's cars have a capacity of 2 or 3 tons each; at Wood's Holl, Mass., they are about 6 feet long by 4 feet wide or slightly larger. At No Man's Land, Massachusetts, the cars are made of three shapes, and are moored to stakes, just off the beach, in front of the town, on the northern side of the island; they swing with the tide. As this area is much exposed to heavy seas during some months, the majority of the cars are constructed with special reference to breaking the force of the waves that may beat upon them. For this purpose, the top and bottom are made to converge towards one or both ends, which latter are, therefore, narrow and elongate. The body of the car is, however, rectangular, with the door on top, and is constructed like the ordinary pattern, which is also employed to some extent at this place, but is usually made of smaller size than the others. About thirty cars, being an average of about two cars to a man, are in use at No Man's Land. They average in size about 10 feet by 5 feet by 2⅓ feet deep, and have a capacity of 1,000 lobsters each. In the summer, however, it is not considered safe to put more than 500 or 600 lobsters into each at a time. They are emptied once or twice a week into well smacks running to New York. Outside of the lobster season they are hauled upon the beach.

REASON FOR USING LOBSTER CARS.—The process of freezing now so commonly resorted to for the preservation of fresh fish cannot be applied in the case of lobsters, and they must be kept in stock and shipped either alive or boiled. The use of ice in shipping live lobsters in barrels in the summer is not to freeze them, but to reduce their temperature presumably to nearly that of the water from which they have been taken, and great care must exercised in the packing to prevent the water from the melting ice coming in contact with the gills.

Lobsters generally ship best alive, and are almost always transported in that condition. The use of live cars by both the fishermen and dealers is therefore a necessity, resulting from the many

delays incident to making sales and shipments, and as long as the temperature and purity of the water remain favorable, lobsters may be kept alive in the cars for an indefinite length of time, providing they are not too much crowded. Fishermen who have to depend upon the smacks for disposing of their catch are seldom visited by them more than once or twice a week, and where they carry their own catch to market they can seldom afford to do so until a full load has accumulated. The wholesale dealers must also keep a surplus on hand to meet unexpected sales, and delays in receiving supplies.

Some of the fishermen and dealers also claim that they always retain the lobsters in the cars for at least two or three days after they are caught, in order that they may have time to rid themselves of the stale bait which would otherwise impart an unpleasant flavor to the flesh.

Entirely submerged lobster-cars are used in Norway, and in these the lobsters are said to have greater tenacity of life, but the objections raised against them by the fishermen in this country are, the extra labor required to lift the cars to the surface every time that lobsters are added and removed; and the voracity of the eels which readily attack and destroy great quantities of lobsters when they are confined upon the bottom.

While lobsters will often attack one another with their claws when piled in the dry smacks, unless their claws are so pegged as to hold them closed, they seldom do so in the cars, and the practice of pegging the claws, once in vogue among the fishermen, has been almost entirely abandoned.

THE BAIT USED IN THE LOBSTER FISHERY.

CHARACTER AND KINDS OF BAIT.—For baiting the lobster traps it is customary to make use of the commoner species of fish, which can be easily and cheaply obtained and are of little or no commercial value. Meat is, however, occasionally employed.

The opinion is prevalent among fishermen that lobsters are best attracted by fresh bait, and that old or stale bait, or such as has remained in the traps a considerable length of time, is less apt to tempt them. On the other hand, a few old lobstermen affirm that they use whatever fish happen to be at hand, whether fresh or old, and that they have never noticed any difference in the amount of their catch, which could be attributed to this cause. A very reliable informant at Provincetown, Mass., states that "old stale bait, having a strong smell, forms decidedly the best bait for lobsters." This man had followed the lobster fishery for many years, and had been one of the most successful of his time. Other fishermen expressed the same opinion. Along with fresh bait we must also class salted bait, which in some regions is very successfully used, at least during certain seasons.

With reference to the English species, Mr. Frank Buckland states that "neither crabs nor lobsters will go into the pots unless there is some scent in the fish bait. The crabs are very particular as to diet; they will not eat stale fish. Lobsters will eat any kind of bait, even dried fish or stock fish; they will even take a stinking bait."

The chief essential of a good bait is said to be a bright or attractive color, white being preferable, combined, if possible, with a strong odor. Oily fish like the menhaden possess this last qualification in a high degree, and the menhaden, where it can be obtained, is very favorably regarded. Cod heads, stripped of their skin, are sometimes employed successfully, as from their white color they appear to attract the lobsters, although retaining little or no edible portions. In attaching the bait in the traps, it is customary to arrange it with the bright side facing outwards, in order that it may be seen at a greater distance.

Lobsters appear to take the bait more readily at some seasons than at others. A correspond-

ent at North Haven, Me., writes that in the winter and early spring, when the water is cold, they eat but little, and must, therefore, be fished for with the best of bait, while in the late summer and fall they will take most anything placed in the traps. Salt herring is consequently much used in that section in the fall, but in the spring it is considered very poor bait. This opinion does not hold good for other districts even close at hand, for at Isle au Haut large quantities of herring are kept salted in barrels over winter for use in the spring lobster fishery.

MANNER OF CATCHING BAIT.—As above stated, the bait generally used consists of the more common and less esteemed fish of the region in which the traps are set. On the coast of Maine flounders, sculpins, herring, and fish heads are almost universally employed. Flounders and sculpins are abundant almost everywhere, in shallow water, and enter the inlets and coves in summer. Having no commercial value they serve well for this pupose. They are ordinarily taken by the lobstermen themselves, but herring are obtained from the weirs and are used both fresh and salted, though generally in the latter state. They are often brought from a distance. Fish heads of several species (cod, haddock, &c.) are commonly employed in regions where boat fishing is carried on during the lobster season. At Small Point, near Bath, Me., fish heads are used altogether. Some of the lobstermen, who are also boat fishermen, save the heads of the fish in cleaning their catch to use as bait. In some localities, as in the neighborhood of Mount Desert, Me., the lobstermen frequently assist the boat fishermen to dress their fish, taking the heads in payment.

Flounders and sculpins are caught by means of spears, seines, fyke-nets, and hooks and lines. In spearing it is essential that the water should be smooth, in order that the fish may be seen upon the bottom.

When the surface is roughened by a breeze, as often happens, the fishermen are obliged to resort to artificial means to overcome this difficulty, and in many places when in search of bait, each one carries along with him in his boat a bottle of fish oil, with a swab made by tying a rag to the end of a stick. Upon reaching the bait grounds he dips the swab into the bottle, and drawing it out, scatters the oil over the water, producing a "slick," which enables him to see the bottom as readily as though the water were calm. This simple device often permits him to obtain bait, when he could not secure it otherwise.

At Isle au Haut, Maine, when oil is used to render the surface smooth, it is not only thrown with a swab, but having provided himself with a bucket partly filled with blubber, the fisherman lands on a weather shore just as the tide begins to flow, and spreads the blubber very thinly on the rockweed for a considerable distance along the shore, and from low-water mark to some distance above it. It follows that when the tide flows, the slick made by the particles of oil in the blubber is driven from the shore by the wind, and the fisherman has smooth water continuously, enabling him to fish over a large area without stopping to throw oil. This is a decided improvement on the method first described, but is not always practicable, owing to the state of the wind. In some places, as at Bristol, Me., a "dark-water spear," as it is called, is occasionally used in the late winter and early spring (February and March) for taking flounders. It consists of a wooden head 14 to 24 inches long, attached crosswise to the end of a pole, 16 to 20 feet in length. The head or cross-piece is set along the outer side with a row of barbed spear points, about 6 inches long and 2 inches apart. At low water the fisherman goes out in his boat with one of these spears to some muddy place where the depths are slight and where flounders are supposed to occur, and by thrusting the spear down here and there into the muddy bottom, he is quite certain to obtain a supply.

At Bremen and Friendship, Me., many flounders are caught in fyke-nets, set in the coves

into which the flounders swim at high water. At low water the nets are left dry and the fishermen go out and secure their catch.

At Isle au Haut the nets used to catch flounders and sculpins measure 20 to 30 fathoms in length, 2½ fathoms deep, and have a 4-inch mesh. They are set mostly on the edge of the bar, where the water is about 3 or 4 feet deep, at low tide, and are generally set across the tide, in the following manner: Two stakes are driven into the flats at distances apart corresponding with the length of the net, and guy-lines, 10 to 15 fathoms long, are fastened to their tops by one end, the other end being attached to the extremities of the net, which are on the deep-water side of the stakes. The net is held on the outer side by lines fastened to killicks. This arrangement allows the top of the net to rise and fall with the tide, the lower part, being heavily weighted, always keeping on the bottom. The lower margin of the net being quite stationary, it follows that when the ebb tide sweeps across it, it forms a bight or curve, causing a large part of the net to lie spread out on the bottom; when the fish begin to move off from the bar on the ebb tide, they meet with this obstruction, and such as are not meshed settle down upon that portion of the net which lies upon the bottom; when the fishermen haul the net, at low tide, they pick up the bottom as well as the top, and by careful manipulation gather all the fish into one place, in a sort of bag, resembling a purse-seine. The net with its load is hauled into the boat, and the former is then disengaged. This method of fishing has recently come into practice, and not quite one-fourth of the fishermen have yet obtained the nets.

Flounders and sculpins are not as abundant now as formerly in many places, although there does not appear to be any immediate danger of the supply becoming exhausted. The use of fish heads in large quantities during the fishing season somewhat relieves the drain upon this important source of bait.

About some of the islands off Bristol, Me., where flounders are scarce, but where cunners abound, the latter species takes the place of the former as lobster bait. For securing the cunners a box-shaped lath pot, about 2 feet high, 18 inches square, and open above, is used. It is ballasted, baited with herring or some other kind of fish, and lowered to the bottom. It is usually hauled every five minutes, and by drawing it up quickly the cunners which have been attracted into it by the sight of the bait are prevented from escaping. By this method of fishing sufficient material for the baiting of the traps is obtained in a comparatively short time.

In addition to the above-mentioned species, many other kinds of fish are occasionally used for bait, when they can be easily obtained. A correspondent at North Haven writes that the heads and livers of sheep are also sometimes put to the same use.

Quantity of bait used in Maine.—The quantity of bait consumed in the lobster fishery is very great. At Bristol, Me., each lobsterman setting sixty pots uses about half a barrel of bait every time he hauls his pots, which, in fair weather, is once a day. In the neighborhood of George's Island, Maine, half a barrel of bait, on an average, is used for every fifty traps, baiting every other day, when the weather is favorable and the traps hauled daily. At Jonesport, Me., the average amount of bait used by each boat or set of traps during the season is estimated as follows: Herring, 17 barrels; sculpins, 10 barrels; flounders, 7 barrels; total, 34 barrels.

The total amount of flounders, sculpins, and herring used for lobster bait on the Maine coast in 1880 far exceeded 30,000 barrels, of which about 10,000 barrels were of flounders, 16,000 of sculpins, and 4,000 of herring. No estimate has been made as to the quantity of other fish and fish heads used for the same purpose. Herring are employed more commonly along the eastern part of Maine than along the western part. At Jonesport, 12,000 barrels of herring were consumed in 1879, and about 10,000 barrels of flounders and sculpins.

KINDS OF BAIT USED, NEW HAMPSHIRE TO NEW YORK.—On the New Hampshire coast many kinds of fish, including flounders and cod, are employed as lobster bait. The variety of fish used for the same purpose on the coast of Massachusetts is equally great, the fishermen taking those kinds which are supposed to answer best, and which at the same time are most easily and cheaply obtained. About Cape Ann flounders and sculpins are commonly employed in the summer, and cod heads and halibut heads in the spring. Fish heads are also much used about Cape Cod. In Vineyard Sound and Buzzard's Bay menhaden are considered to make the best bait, but in the same region flounders, dogfish, and other species are also employed. Throughout Long Island Sound menhaden are most commonly used as bait, but in the absence of menhaden the fishermen resort to other forms having little or no commercial value, such as flounders, skates, dogfish, &c.

THE METHODS OF FISHING.

MANNER OF SETTING AND HAULING THE TRAPS.—The boats used by the lobster fishermen are, as described elsewhere, of different sizes and of several different rigs, some having sails and others not. The pots are set both singly and in trawls. Originally they were always set in the former way, which is the simpler, but as the fishermen came to use a greater number of pots, they found it more convenient to arrange them on lines, which could be hauled continuously from one end to the other. The setting of the pots trawl-fashion, therefore, enables each fisherman to handle a considerably larger gang with less trouble and in much shorter time. The character of the bottom greatly influences the method of handling the pots, as does also the abundance of lobsters. It is difficult to use the pots in trawls on rocky bottoms as the lines are liable to be cut on the rocks, and the pots themselves become caught. As a rule, therefore, the pots are set on single warps on rough bottoms. On smooth bottoms they can always be handled more conveniently and rapidly attached in trawls, and in regions of this character this is the customary method of setting them. Where lobsters are not very abundant, however, the fishermen regard it as more advantageous to change the location of the pots a little every time they are hauled, and to do this they must be set singly. The drift of the boat by the tide, while each pot is being hauled up, baited and lowered, is considered to alter the ground sufficiently for this purpose. In hauling a trawl of pots some of the pots always remain on the bottom, acting like an anchor to retain the boat in about the same position.

The operation of hauling the pots set singly from a sail-boat is thus described by a correspondent at Bristol, Me.:

"As the fishermen have their pots set on single warps, unlike the fishermen to the westward of here, they keep their boats under sail while hauling. The pots are set in rows. In winter the inner pots will be somewhere near some of the outer islands or ledges, the line of pots extending off shore. The boats are sloop-rigged, and when the inner end of the row of buoys is reached, the fisherman hauls down his jib, eases off the main sheet, and shooting up alongside of the buoy, catches hold of it with a gaff and hauls the pot, while the boat lies to, drifting slowly to leeward. After the pot is thrown over again, he rights the helm, the boat easily fills away under her mainsail, and he goes to the next buoy and so on to the end. When the weather is very cold the lobsters are put in the cuddy to prevent their freezing until the boat arrives home."

Another correspondent, at Vinal Haven, Me., states that "both trawl and single buoy lines are used in that vicinity, the latter method generally having the preference, as the pots may thereby be scattered more where the lobsters are scarce, and the fishermen claim that by shifting them a little every time they are hauled, they fish better. As a rule, the pots are hauled in a row-boat, the cases of hauling with sail-boats being rare. A peculiar style of row-boat, called a 'pea-pod' or 'double-ender,' is used quite extensively in this fishery hereabouts."

The manner of setting and hauling the lobster pots in the vicinity of Bath, Me., is described as follows:

"At first the pots were set on single warps or buoy lines, but now the style of setting them trawl-fashion is almost universal. This method was introduced about 1865. It enables one man to handle a large gang of pots, and his boat is prevented from drifting much by the pots which remain upon the bottom. The old fashioned way of setting them on single lines required two men in the boat, one to hold the boat with the oars, the other to haul the pots and remove the lobsters; when one pot was emptied and thrown overboard, they pulled for the next, and so on. At present the fisherman rows out, takes hold of his buoy at the end of the trawl, and continues to haul without intermission until he finishes the job. In winter, however, two men go in each boat. The windy weather and the distances they go from the shore in winter often gives them hard pulls, and even when under sail in fresh squally weather it needs two men to handle the boat. For these reasons, two men are required, more as a matter of safety than from the difficulty of the work, for as soon as the good weather begins in the spring those that continue to fish go singly."

Number of traps used.—The number of pots used by each fisherman, or by each boat, sometimes including two fishermen, varies greatly on different parts of the coast, ranging all the way from ten to one hundred, and in some places as many as one hundred and twenty-five are said to be handled by a single person. There seems to be no rule regulating this matter, but the average is greater on the coast of Maine than elsewhere. The fishermen claim that they are obliged to set a greater number now than formerly in order to obtain the same catch. Many of the fishermen keep a surplus on hand, in order to replace those damaged or lost during storms. In the coast review of the lobster fishery, the average number of pots used on each section of the coast is indicated.

Time of visiting the traps.—The traps are generally hauled once a day, beginning early in the morning or about sunrise. In some places during seasons of great plenty, they are visited twice each day, early in the morning and again towards evening. A Gloucester correspondent states that it is customary in that vicinity to visit the pots in the morning during the winter and spring, and in the morning and evening during the summer. It sometimes happens on exposed sections of a coast that stormy weather interferes with the hauling of the pots for several days at a time, and they can be visited only during pleasant weather.

All fishermen do not hold to the custom of visiting their pots at a certain hour in the morning, but haul them at any time during the day when it is most convenient or when the weather is most favorable. In strong tidal regions the state of the tide has frequently to be considered, and the pots can often be visited only at or about slack water, low tide being preferred.

The hauling of the pots consumes but a small portion of the day, and the remainder is spent in procuring bait and making repairs, or in other occupations.

Other methods of capturing lobsters.—Lobsters are frequently caught in seines which are being hauled for fish, but we have never heard of seines being employed exclusively for lobsters on any part of our coast. Another kind of net which answers for catching lobsters upon smooth bottoms in shallow water is the beam-trawl, an appliance used by the Fish Commission in its sea-coast explorations. Having a wide scope and quickly entrapping whatever animals lie in its course, it frequently brings up from rich lobster bottoms such catches as would gladden the heart of any lobster fisherman. Fishing for lobsters with nets of this character would, however, probably never be permitted upon our coast, where the much more humble lobster pot has already proved so destructive in many localities.

4. THE FISHERMEN.

NUMBER OF FISHERMEN.—In the Coast Review the number of lobster fishermen is given for each district of the coast. Following is the summation by States: Maine, 1,843; New Hampshire, 44; Massachusetts, 595; Rhode Island, 129; Connecticut, 148; New York, 32; New Jersey, 28; total, 2,819.

OCCUPATIONS OF THE FISHERMEN.—As the lobster fishery is seldom carried on for more than a few months of the year, most lobster fishermen have other occupations in which they engage outside of the lobster season. In fact, for a large number of these men, lobstering is not the chief pursuit, and it is not unusual for this fishery to be carried on conjointly with some other. The resources of the region in which he lives greatly influence the lobsterman in his choice of occupation, as must also his natural tastes and early training. Very many of the lobstermen of the coast of Maine belong to the class of so-called "boat-fishermen," who engage chiefly in hand-line fishing for cod and haddock, and set lobster pots during a longer or shorter period, dependent upon the abundance of lobsters. By some, a portion of the day is occupied in hauling the pots and procuring bait, and the remainder in hand-line fishing or in tending the herring weirs or nets. At the close of the lobster season not a few join the Banks fishermen, the menhaden steamers or coasting vessels, while many remain on shore, turning their attention to farming or working in the quarries or mines, if such exist near at hand. The making and repairing of gear consumes much time just before the opening of the lobster season, and this work is generally done by the lobstermen themselves, often assisted by their families, the women frequently attaining great proficiency in knitting the twine funnels. If occupied in fishing during the entire year, work upon the lobster gear must be confined to stormy weather.

The following extracts from correspondence respecting the Maine lobster fishery will serve to illustrate the diverse occupations of the lobster fishermen:

At Cutler, in the Machias district, there are several men engaged in lobstering, who like the average lobster fishermen of that part of the coast, farm and fish for lobsters at the same time, selling their catch to smacks. Two-thirds of the lobstermen of Gouldsborough follow boat fishing after July, and the other one-third engage in various pursuits, such as farming, coasting, mining, &c. Seven-eighths of the lobstermen of Jonesport farm a little for their own use. After the lobster season a majority do a small amount of boat fishing; some ship on coasters during the winter, and many dig clams.

At North Haven, when herring are abundant, many of the men keep several herring nets set while lobstering, and take the fish from the nets before hauling the pots. During the fall mackerel season, it is customary to fish for mackerel in the latter part of the day, after hauling the pots and procuring bait.

At Vinal Haven most of the regular lobster fishermen do little else out of the lobster season than prepare their gear and boats for the spring fishery. Some cultivate small gardens and raise some stock; others engage in other kinds of fishing to a slight extent or work in the quarries. A large percentage of the professional boat fishermen engage exclusively in lobstering for several months of the year.

The boat fishermen of Bristol constitute the larger part of those engaged in the lobster fishery, but there are a number of men who own lobster boats and pots, and who ship in the shore and Bank fishing vessels or in the menhaden steamers, beginning to fish for lobsters in the fall, about October. A few follow this occupation all winter, but the majority omit from December to February or March.

Some of the lobster fishermen of Small Point raise a little produce; in the winter they engage in cutting and storing ice, and during the fishing season they leave off lobstering for days, and even weeks at a time, to catch mackerel when the latter are abundant near shore. At such times the pots are left down and hauled whenever an opportunity offers.

But few men engage in lobstering at Little Deer Island, and these handle only a small number of pots each. They spend about half of their time in tending the pots and the remainder mostly in digging clams.

The boat fishermen of the vicinity of Isle au Haut make a specialty almost of fishing for lobsters during a longer or shorter season. When mackerel are plentiful they fish for them quite generally, and the same is true with respect to cod and hake, the fishermen engaging for the time being in whatever fishery pays them best. No fishing is done in the winter, but that season is devoted to fixing the gear or spent in idleness, no other occupations being offered by these islands.

Manner of tending the traps.—The greater part of the lobstermen own their gear and fish singly. Frequently, however, they go in pairs, one to manage the boat while the other hauls the pots. The pots are more easily handled by a single person when set in trawls than when set on single warps. When working in pairs they may own the gear in common, or it may belong to one, who employs the other either at stated wages or on shares. In some cases the pots are tended entirely by hired help.

Manner of disposing of the catch.—The manner in which the fishermen dispose of their catch varies greatly on different parts of the coast, depending upon their distance from the markets and their facilities for reaching them. On the coast of Maine large numbers of the lobstermen are located near the canneries to which the small lobsters are directly carried. Those suitable for the fresh markets are retained for the market smacks, which make regular trips along the coast, or are disposed of to dealers in the neighboring towns who ship, by smacks and steamers or railroad, such as are not needed to supply the local demands. Dry smacks visit the fishermen who are located too far from the canneries to reach them in their own boats. These remarks, excepting such as refer to the cannery supplies, apply to the entire coast.

Earnings of the fishermen.—The earnings of the lobster fishermen upon our coast afford, at the most, but a meager living, and, according to all accounts, they have been gradually falling off during the past fifteen to twenty years. At Provincetown, Mass., we find a striking, though extreme, illustration of the decline in the profits of lobster fishing, consonant with the decrease in the abundance of lobsters, which has forced all the able-bodied men of that locality into other branches of fishery or other occupations. Elsewhere the decrease has generally been less marked, though none the less apparent. In this industry as in all others, the more energetic men using the best appliances are, as a rule, the most successful, while the older and less active ones make but small profits. Below we give a summation of the gross earnings of lobstermen for many portions of the coast, based upon the fishery census returns of 1880. In this connection it should be remembered that the lobster season continues actively for only about three or four months of the year in the principal districts, and the earnings stated are for lobster fishing only. To ascertain the actual profits in this one line, allowance must, however, be made for the cost and repair of traps, boats, and other appliances.

At Eastport, Me., the average earnings per man were from $25 to $30 a month; at Jonesport, about $150 for the canning season of four months, or from April to August; Gouldsborough, $30 a month; Rockport, $40 a month by the best fishermen; North Haven, $20 to $25 a month; Portland, $1.50 a day. According to Mr. R. E. Earll, who carefully studied the subject, the average daily stock or earnings per man in the different lobster districts of the coast of Maine in 1880

ranged from 75 cents to $1.25 for the spring and summer season of four months, April 1 to August 1, but in some instances it was as low as 60 cents and occasionally as high as $2. The lobstermen of Isle au Haut, who fish during nine months, or from March to December, stocked on an average about $300 for the entire period; those who continue for five months, March to August, stocked about $200; and those, finally, who fish from the middle of September to December 1, a period of two and one-half months, stocked about $75. At Vinal Haven the earnings for the full season of two and one-half months was about $85, and at Deer Isle for the same season about $150.

On the coast of New Hampshire the earnings ranged from $25 to $50 a month; and on the coast of Massachusetts they were estimated as follows: Gloucester, $50 to $75 a month, or about $200 for the season, some of the men hiring out at the rate of $35 to $40 a month; Provincetown, about $75 for the season of three months; Truro, $50 for the same season, and between Hyannis and New Bedford, $100 to $300 for the same season, in good years. In Rhode Island the earnings were about $400 for a season of five or six months; at Stonington, Conn., about $1.50 a day; New London, $25 to $30 a month; South Norwalk, $2 to $5 a day; New Haven, $8 to $14 a week.

5. THE FRESH LOBSTER MARKETS.

General review.—The demand for lobsters generally exceeds the supply, and the fishermen seldom have difficulty in disposing of their catch. For convenience, the lobster markets may be divided into three classes, the canneries, the towns and smaller cities located along the coast in the lobster region, and the large distributing centers for supplying the inland trade. The canneries are entirely confined to the coast of Maine and are fully described elsewhere. They generally receive only the smaller sizes of lobsters, such as are below the limit of 10 or 10½ inches in length, and which may be purchased at considerably reduced prices. The local demand takes whatever is brought in by the fishermen, in some places small lobsters, in others large ones being preferred. Custom, however, prescribes for the principal markets or distributing centers lobsters above a length of 10 or 10½ inches, which, from the fact that these are the only ones bought by the well smacks, have earned for them among fishermen the name of "smack lobsters." On the coast of Maine, as a rule, the smaller lobsters are sold to the canneries and the larger ones to the smacks, while either size indifferently is disposed of to the local trade. In other States, where the law prescribes the minimum size of lobsters that can be marketed, small lobsters are supposed to be thrown back into the water and only the larger ones sold.

Lobsters are carried to market in fishing boats and smacks, and by steamers and railroads. Wherever markets, whether large or small, are located very near the fishing grounds the fishermen of the vicinity generally bring in their catch in their own boats. Two of the largest distributing centers, Portland and Boston, are closely surrounded by rich lobster grounds, and both receive many supplies brought in from the neighboring traps in fishing boats. A limited trade of the same character once existed at New York, when the bay of New York furnished a small fishery, but that has long since ceased. Fishing boats and dry smacks supply the canneries of the coast of Maine and the small distributing centers scattered along the entire New England coast. From the latter and from the fishermen themselves, the larger part of the market supplies intended for the western trade is carried by well smacks to Portland, Boston, and New York. Steamers and railroads now transport to the same markets from many stations favorably located a large amount of fresh lobsters packed in barrels. The inland distribution of lobsters is made mostly by railroad.

The principal markets.—There are three principal markets or distributing centers for

fresh lobsters in this country, viz., Portland, Boston, and New York, in which are handled nearly four-fifths of all the fresh lobsters sold, and about two-fifths of all the lobsters taken and disposed of by the fishermen for all purposes. Portland derives its supplies entirely from the coast of Maine, and principally from between Portland and Mount Desert. In 1880, sixteen well smacks were engaged in carrying to this place, in addition to the fishing boats of the vicinity, and some lobsters were also received in barrels. Trade is most active between March and the middle of July. About 1,900,000 pounds of lobsters, valued at $70,000 fishermen's prices, and at $90,000 market prices, were received in 1880. Besides supplying many inland towns throughout the neighboring States and Canada, Portland made very large shipments to Boston and New York.

Boston receives lobsters from the entire coast to the eastward, including Nova Scotia, and from the coast of Massachusetts as far south as Chatham, Cape Cod. Most of the supplies come in well smacks, but thousands of barrels are received every year by railroad and steamer, and very many are brought in by the fishermen of the vicinity. The greatest number is received in April and May, and the smallest number about February. Very large quantities are received from Portland by railroad, where they are transferred from the well smacks, without passing through the Portland markets. The quantity of lobsters handled in the Boston market in 1880 was over 2,400,000 by count, or over 3,600,000 pounds, valued at $133,000 fishermen's prices, and $169,000 market prices. Lobsters are shipped from Boston both fresh and boiled, principally to New England towns and New York City, but also to the Middle and a few Western States, Chicago being about the western limit of fresh distribution.

Of the supplies received at New York City, from one-half to three-fourths come in barrels, principally from Boston and other markets in Southern New England, and the remainder in smacks. The receipts for 1880 amounted to about 2,500,000 pounds, worth $125,000 fishermen's prices and $175,000 wholesale market prices. Supplies are obtained from the entire lobster producing coast, including New Jersey, and trade continues throughout the entire year, but is most active during July, August, and September. During winter, lobsters are received in barrels only, and the same method of carrying prevails to a greater or less extent during the remainder of the year.

THE SMALLER MARKETS.—Of the smaller markets along the coast little need be said in this connection, as they are all described as fully as the data permitted in the coast review of the lobster fishery. Some of these markets are of considerable importance as distributing centers for neighboring sections of country, but nearly all are more or less tributary to the three larger markets above mentioned, which control the main part of the fresh trade. There are scarcely any lobster markets on the coast of Maine outside of Portland and the several canneries, as the fresh lobster trade is almost exclusively controlled by the market smacks, which buy for the most part directly of the fishermen. Eastport is an exception to this rule, and nearly all of the lobsters shipped from the Passamaquoddy district pass through the hands of a few dealers. In the winter time, however, when the well smacks are not running, lobsters are packed in barrels at a few other stations for shipment westward.

In New Hampshire, Portsmouth is the principal market. In Massachusetts, there are several active markets, like Gloucester and New Bedford, but the former sends nearly all its lobsters to Boston and the latter many to New York. Newport, R. I., and Stonington, Noank, New London, and New Haven, Conn., each do a considerable trade in lobsters, those not needed for local consumption or for supplying neighboring towns being shipped to New York. The local trade in many places is, however, very large, and for the southern New England markets probably exceeds their trade with New York. Noank is one of the most important sources of supply for

New York on the southern coast of New England, and also makes large shipments to New London and Norwich.

METHODS OF CARRYING LOBSTERS.—Reference has been made above to the methods of carrying lobsters. The well smacks at one time controlled the lobster trade, and on many portions of the coast to-day the fishermen are entirely dependent upon them for the disposition of their catch. They probably still carry the larger part of the fresh lobsters marketed. They make regular visits along certain sections of the coast, each smack generally resorting to the same district during the season, though often going elsewhere if the supply proves insufficient. Some engage both in fishing and carrying, and others in carrying only, and a large proportion remain in the lobster trade only during the principal season. The New York smacks visit the coast of Maine and the vicinity of Martha's Vineyard and Block Island. The Connecticut smacks seldom go beyond the southern coast of New England, and are principally fishermen. The Massachusetts smacks are all fishermen, and remain upon the coast of that State; while nearly all the Maine smacks are carriers merely, the well smacks running principally from the Maine coast to Portland and Boston, and the dry smacks to the canneries. The carrying capacity of the smacks varies greatly, dependent upon their tonnage. The smacks that supply Portland measure from 14 to 32 tons each, and carry from 2,000 to 8,000 lobsters at a trip. They are gone from one to two weeks, according to the weather and abundance of supplies. A New York sloop smack of 42 tons has a carrying capacity of about 20,000 pounds, or between 13,000 and 15,000 lobsters by count. It can carry this amount, however, only during cold weather, and in the summer makes but half fares. During the summer it buys of about ten men at Deer Isle, Me., tending in all 800 pots, and makes a trip about every two weeks. The remainder of the season it makes weekly trips from Cuttyhunk, Mass.

THE LOSS IN CARRYING.—The loss in carrying lobsters in the well smacks is stated to be comparatively slight, during the summer not averaging more than 200 or 300 in a cargo of 5,000, and in cold weather not over 100. It is said that the losses are not due to overcrowding, but to the occasional injuries which the lobsters inflict on one another.

THE USE OF CARS.—The lobster fishermen are all supplied with cars in which they preserve the lobsters taken, awaiting the smacks or an opportunity to carry them in their own boats to the nearest markets. These cars are of small size, but the dealers have much larger ones, according to the extent of their trade.

LIVE AND BOILED LOBSTERS.—Live lobsters are preferred for shipment, and but little boiling for the trade is now done in any of the larger markets outside of Boston. Nearly all the boiled lobsters sold in New York come from Boston, 5 to 10 per cent. of the lobsters received from the latter place being boiled. The Boston boiled lobsters have obtained a good reputation in New York, and are generally preferred to those boiled elsewhere. The demands of the retail trade in New York are, however, mainly for fresh lobsters, and the same is true in most of the other cities. Boiled lobsters are shipped both in barrels and boxes. During warm weather ice is used on the lobsters shipped in barrels, but in the colder months it is dispensed with. Live lobsters ship better than boiled ones in the summer, if freely iced.

MANNER OF BOILING LOBSTERS.—The old style of "set" boilers or "farmer's" boilers, being large iron kettles of various sizes up to a capacity of about 60 gallons, were formerly in quite general use for boiling lobsters for the trade. Even now the same kind of boilers are extensively employed by the smaller dealers all along the coast. In the principal markets, especially Portland, Boston, and New York, however, new and improved methods have been adopted by the larger dealers, whereby the process of boiling is greatly facilitated.

The boilers at the Boston establishments which we have examined are rectangular wooden tanks or vats of about 60 gallons capacity, lined with zinc and furnished with a cover. Heat is applied by the introduction of steam through a series of perforated pipes arranged in the bottom of the tank. The steam is generated in an ordinary boiler standing close at hand. The lobsters are not thrown directly into the vat, as the operation of removing them after cooking would in such an event be an exceedingly tedious one; but an iron framework basket of rather slender bars is made to fit the tank loosely, and is lowered and raised by means of a small derrick placed over the tank. This frame, which holds about 300 pounds, is filled with lobsters at the edge of the wharf from the floating cars, and is then carried to the tank and lowered into it, after the water it contains has reached the desired temperature, that of boiling. The water is first supplied to the tank, which is filled to about one-half or two-thirds its capacity; about a peck of salt is added, and then the steam is turned on. The same water suffices for several successive boilings, about two quarts of salt being added each time. The lobsters are allowed to remain in about half an hour, or until the proper red color indicates they are sufficiently cooked. With as little delay as possible after cooking, they are packed in barrels or boxes for shipment or are sold to the local retail markets. The barrels are usually covered with tea-matting or sacking.

Manner of selling lobsters.—Lobsters are sold both by weight and count, the latter method being probably the more common one among the fishermen, who generally have no means of weighing their catch. In some places they are also disposed of by the barrel. The canneries on the coast of Maine usually purchase of the fishermen by weight, though in some instances, as at South Harpswell, where the lobsters offered them average closely upon 1 pound each, they buy by weight or count, indifferently. The smacks that visit the fishing-grounds and buy directly from the fishermen purchase almost universally by count, taking only those above a certain size which are salable in the fresh markets. Lobsters shipped in barrels are generally sold by weight.

In the fresh markets, wholesale and retail, both methods of selling are recognized, one method prevailing in some places and the other elsewhere, this matter having apparently been regulated by long custom in each place. In the eastern part of the lobster region, however, the prevalent custom is by count, while to the westward it is by the pound. In the larger markets of Portland, Gloucester, and Boston, sales are mostly made according to the former method, and in those of New Bedford, Newport, New London, New Haven, and New York, by the latter. When selling by count in the retail markets the price is regulated by the size of the lobsters.

6. THE METHODS OF SHIPPING; PRICES.

The smacks.—The well smacks used as lobster carriers are, for the most part, remnants of the former large fleet of fishermen which, before the custom of icing fish came into common practice, were obliged to carry their fish alive to market, and many of them are quite old. These vessels have been fully described elsewhere in the fishery report, and we need, therefore, only refer briefly to their connection with the lobster trade.

Prior to 1860, when lobster canneries were less numerous than now, and the greater part of all the lobsters caught on the coast of Maine were carried fresh to western markets, the well smacks were of much greater importance than at present, and many more were required to dispose of the catch. Even now the larger share of the fresh lobsters carried to Boston and New York from distant fishing-grounds are transported in well smacks, which are destined to remain for some time an important factor in the lobster industry.

Within a few years it has been demonstrated that lobsters can be carried long distances alive, packed in barrels with ice, and at those fishing stations having direct communication

with the markets, either by rail or steamer, this method of transporting lobsters has become quite common. This traffic has greatly interfered with the business of the well smacks, but the majority of fishing districts will probably never have the advantages of steam communication with outside markets. Well smacks have not visited Eastport, Me., for some years back, as lobsters can be sent from there by steamer, in ice, much more quickly and profitably than in sailing vessels. As opposed to this, we may cite the case of No Man's Land and Gay Head, Martha's Vineyard, which localities must depend for some time entirely upon the smacks.

The total number of lobster smacks above 5 tons measurement owned upon the coast of the United States between Eastport, Me., and New York, is one hundred and two. Of these, thirty-six are well smacks and twenty-one dry smacks, employed in the carrying trade only, and forty-five are dry smacks engaged both in fishing and in carrying to neighboring ports. Seventy-one of all these smacks are schooner rigged, and thirty-one sloop rigged. In measurement they range from 5.77 to 45.35 tons each, in the number of the crew from two to seven men, and in value from $50 to $3,800 each. The combined measurement of the entire fleet is 1,862.43 tons, the total value $89,925, and the combined crews three hundred and thirty-two. Some of these smacks are very old, several having been built between 1830 and 1840. Not all of the vessels classed as lobster smacks engage exclusively in the lobster trade, but about one-half participate in other fisheries during certain seasons. Fifty-eight of the smacks are owned in Maine, twenty-nine being well smacks, twenty-one dry smacks, and eight fishing smacks. The well smacks carry to Portland, Boston, and New York, and the dry smacks to the canneries and other markets near at hand. Nine smacks, all of which engage in fishing, are owned in Massachusetts, and five smacks of the same character belong to Rhode Island. Connecticut has twenty-two fishing smacks and two well smacks, and New York one fishing smack and five well smacks. As on the coast of Maine, the well smacks of Connecticut and New York carry to the larger markets, especially New York, and the fishing smacks to near localities, but many of the latter class fishing in Long Island Sound carry directly to New York.

The dry smacks run much smaller in size than the well smacks, the largest one registered being of 20 tons measurement only. Many of these of the fishing class have been described in connection with the appliances and methods of capture.

Full statistical tables respecting the smacks are given in the account of each district and State in the Coast Review.

Shipping in barrels.—The practice of shipping fresh lobsters in barrels from the fishing stations to the larger markets has recently come into vogue in several places along the coast and has proved very successful. It requires somewhat rapid transportation, as by railroad or steamer, but, where possible, offers greater conveniences than the well smacks. Nearly all the shipments of fresh lobsters from Eastport, Me., the most distant fishing station of our coast, are made in barrels. Flour barrels which hold from 135 to 140 pounds, or about fifty-five lobsters, by count, are usually selected. A small hole is first bored in the bottom of the barrel to afford drainage. The lobsters are brought in from the cars in large baskets and emptied upon a table, at which there may be one or more packers, each filling a separate barrel. The packer seizes the lobster by the carapax with his right hand; with his left hand bends the tail up under the body, and quickly deposits it in the barrel with the back uppermost. The lobsters are stowed snugly together, so that they cannot move from the position in which they are first placed, rapid packing being necessary to accomplish this. A piece of ice weighing from 10 to 15 pounds is placed on top, and the barrel is covered over with a piece of sacking, which is secured by passing the upper hoop of the barrel over it. The packers often wear coarse woolen mittens to protect their hands from the spines of the lobsters. In cold

weather the ice is dispensed with. In taking the lobsters from the cars for packing in barrels, they are dipped up with large scoop-nets, rapidly examined to ascertain if they have enough life to stand the journey, and are above the legal limit in size, 10½ inches, and then with a quick movement tossed into the basket or back into the car, as the case may warrant.

The barreled lobsters are shipped from Eastport to Boston by steamer, the length of the trip being from twenty-four to thirty hours, but if properly packed they will live at least forty-eight hours in this way. As soon as they reach Boston they are transferred to cars or boiled. The regular steamers from Eastport leave there during the summer about noon of every other day, and it is customary to pack the lobsters in the morning of each steamer day, in order that they may start in good condition. But few are shipped at the end of the week.

Other stations along the coasts of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut, having railroad or steamboat facilities, have taken advantage of this new and rapid method of transportation.

Shipping fresh lobsters to Europe.—In 1877, Messrs. John Marston & Sons, of Portland, Me., made a successful shipment of fresh lobsters to Liverpool, England, in the Allan Line steamer Sardinia. Notwithstanding the great demand in Europe for American canned lobsters, it is not probable that an extensive trade in fresh lobsters will ever arise, owing to the great trouble and expense of shipping them, though the Messrs. Marston think that in time many will be sent in that way. The above consignment was cared for in the following manner: The lobsters, two hundred and fifty in number, were placed on the main deck in a large tank, 20 feet long by 8 feet wide and 3 feet deep, and constantly supplied with fresh sea-water through six faucets by means of a donkey engine, a waste pipe preventing any overflow. Fifty died during the trip and the balance were sold at from 60 to 75 cents per pound.

THE PRICES.

Canning lobsters.—The prices paid for lobsters at the canneries in Maine were, in 1880, nearly uniform for the entire coast, having been about $1 per hundredweight. At Eastport they ranged from 80 cents to 90 cents per hundredweight when taken directly from the fishermen's cars, or $1 delivered at the canneries. Since 1880, however, prices have increased considerably at Eastport, consequent upon the increased competition in the fresh lobster trade. The prices for 1882 were $1.30 at the traps, and $1.50 delivered at the canneries.

Market lobsters.—The "smack" or market lobsters, which are those above 10½ inches in length, and which, in 1880, were estimated to average nearly 2 pounds each in weight for the entire Maine coast, bring to the fishermen much higher prices, varying with the season and abundance, from 3 to 5 cents each by count. Prices are higher in the spring than in the summer. At Saint George's Island, Maine, the prices ranged, in 1880, from 4 to 5 cents each by count, from the beginning of the season to the middle of April, and after that time fell off to 3 cents. At Portland, the average prices were 4 to 5 cents each for large lobsters, and only 1 cent each for all under 10½ inches long. At Eastport, the dealers received about 3 cents per pound for lobsters shipped to Boston in barrels.

On the New Hampshire coast, the larger lobsters brought from 4 to 7 cents each, and the smaller three-fourths of a cent to 2 cents each, the average price being about 5 cents.

On the southern coast of New England, the smacks generally pay the fishermen about 6 cents each for all lobsters above 10½ inches in length, the season usually continuing from May to October. In the vicinity of Vineyard Sound, Massachusetts, the wholesale prices were 3 cents per pound, the retail 6 cents, but the smacks are charged 6 cents each by count. At New Bedford,

Mass., and New London, Conn., the customary price was 4 cents per pound. In Rhode Island, it ranged from 3 to 4 cents per pound for lobsters over 10 inches long, half price being charged for all under that size. In that State the prices advanced half a cent per pound from 1879 to 1880. On the New Jersey coast the fishermen received about 3½ cents per pound.

MARKET PRICES.—The dealers' prices in the three largest markets of the coast were about as follows, in 1880: Portland, about 7 cents each by count; Boston, about the same; New York, 6 cents per pound from May to December, 8 cents per pound during December and January, and 12½ cents per pound from February to May. The retail prices in New York for the same year and seasons in the order given above were 10, 12½, and 15 cents, respectively. During the summer of 1882, on account of the unusual demand, lobsters were sold at wholesale in New York at prices ranging all the way from 6 to 25 cents per pound.

The retail prices are usually much higher than the wholesale, even in many sea-coast towns located in rich lobster districts, being often nearly double. Boiled lobsters also bring a higher price than live ones.

7. THE CANNING INDUSTRY.

EXTENT AND CHARACTER OF THE INDUSTRY, HISTORY, &C.

REVIEW.—The lobster canning industry of the United States, with that of the British Provinces owned or controlled by American capital, is of great importance, and from the introduction of the lobster canning process at Eastport, Me., about 1842, dates the beginning of the extensive canning interests of the United States in all its branches. About two-fifths ($289,000) of the entire capital ($713,000) invested in the lobster fishery in the United States is directly applied to the canning interests, and of the products of the fishery as they enter into consumption about one-third of the entire value comes from the canneries.

Lobster canning in the States is confined exclusively to Maine, in which, in 1880, there were twenty-three canneries in operation. The capital stock of these canneries is mostly owned in Portland and Boston by five companies. The same companies also own or operate over forty canneries in the British Provinces. Portland interests in both the Maine and provincial canneries are greater than those of any other place in either Maine or the British Provinces, representing or controlling sixteen canneries in the former and thirty-one in the latter. A number of the Maine canneries are owned by the persons who run them, but most of these are operated in the interests of the Portland and Boston firms.

The products of the provincial canneries are shipped almost wholly direct to Europe, the duty of 18 cents per dozen cans (nominally on the tin) interfering with their importation into the United States. About one-half of the total amount canned in Maine is also exported to Europe, the balance going mainly to the Western and Southern States. The majority of the canneries of Maine do not limit operations to the canning of lobsters, but fish, clams, meats, fruit, and vegetables are also prepared. Many of the details respecting the Maine canneries are given in the coast review of the fishery.

HISTORICAL NOTICE.—It has been possible to prepare but a brief notice of the origin and progress of lobster canning in the United States, but, although the statements obtained regarding its early history were somewhat conflicting, it is believed that the following account is essentially correct:

Lobster canning was first attempted in the United States at Eastport, Me., shortly after 1840, and was made successful in 1843, the methods finally employed having been borrowed from Scotland, which country is said to have learned the process from France. For the successful

introduction of the process into the United States we are indebted to Mr. Charles Mitchell, now of Charlestown, Mass., a practical canner of Scotland, who had learned his trade of John Moir & Son, of Aberdeen, the first Scotch firm, it is claimed, to put up hermetically sealed preparations of meat, game, and salmon, their enterprise dating back to 1824.

Mr. U. S. Treat, a native of Maine, appears, however, to have been most active and influential in starting the enterprise and in introducing canned goods into the markets of the United States. Mr. Treat was, at an early period, engaged in the preparation of smoked salmon on the Penobscot River, and in 1839 removed to Calais, Me., where he continued in the same business. About 1840, he associated with him a Mr. Noble, of Calais, and a Mr. Holliday, a native of Scotland, who had also been employed in the salmon fisheries of the Penobscot River, under the firm name of Treat, Noble & Holliday. This firm moved to Eastport in 1842, for the purpose of starting the manufacture of hermetically sealed goods, and began experiments with lobsters, salmon, and haddock. Their capital was limited, their appliances crude, and many discouraging difficulties were encountered. The quality of the cans furnished them was poor, causing them often to burst while in the bath, and the proper methods of bathing and of expelling the air from the cans were not understood. The experiments were continued for two years with varying success, and in secret, no outsiders being allowed to enter their bathing room. Though fairly successful in some of their results, they could not always depend upon their goods keeping well.

In 1843 they secured the services of Mr. Charles Mitchell, who was then residing at Halifax, and who was not only well acquainted with the methods of bathing practiced in his own country, but also a practical tinsmith. He had been employed in the canning of hermetically sealed goods in Scotland for ten years, and came over to Halifax in 1841, where he continued for two years in the same occupation, exporting his goods to England. After Mr. Mitchell's arrival at Eastport, no further difficulty was experienced in the bathing or other preparation of the lobsters, and a desirable grade of goods was put up, but they found no sale, as canned preparations were comparatively unknown in the markets of the United States. Mr. Treat visited each of the larger cities with samples of the goods, and endeavored to establish agencies for them, but he was generally obliged to send on consignment, as few firms were willing to take the responsibility of buying on their own account. A patent was also applied for, but the claim was not pressed, and the patent never received.

In 1845, or perhaps earlier, Mr. Treat withdrew from the partnership, and the firm became Mitchell & Noble, with W. K. Lewis as agent. In 1846, Mr. Treat purchased the island between Eastport and Lubec, which has since gone by his name. On one side of the island he constructed a large herring weir, and in connection with it extensive smoke-houses. He did nothing, however, in the canning line for three years, and in 1849 leased his wharf to Mr. Henry Evans, of New York, whom he assisted in the canning of several kinds of fish. In 1852 he began again on his own account and on an extensive scale, and continued canning for eight or ten years, putting up lobsters, salmon, halibut, and vegetables. His New York agents were Wells, Miller, Provose & Co., and he also shipped to California from 1854 to 1856. In 1855 he first introduced the method of pressing herring for pomace and oil, and this branch of his business was kept up until 1873.

A Mr. Samuel Rumrey, of West Lubec, obtained employment in the Eastport cannery of Treat, Noble & Holliday soon after the process of canning had been made successful, and shortly after learning its secrets, he hired out to W. K. Lewis & Brother, of Boston, under whom he established a lobster cannery at Portland, Me. A few years later Mr. Rumrey left Portland and started another cannery at South Harpswell, in connection with Mr. Burnham, of the present firm of Burnham & Morrill.

About 1847, Mitchell & Noble sold their Eastport cannery to George K. Underwood & Co., of Boston, the contract stipulating that Mr. Mitchell should continue with the latter firm to superintend their works. This establishment was soon afterwards removed to a more western point on the coast of Maine. Mr. J. W. Jones began canning in 1856.

Since the first attempts made in Eastport, the business of preparing hermetically sealed goods has rapidly increased, and at the present time comprehends many kinds of fish, meats, fruits, and vegetables. In 1850 there were only three canneries in the United States, but now the number is very great, and they are scattered through all parts of the country. After the importance of the process of canning became known, several parties attempted to cover it with patents, but without success, although much money was used for that purpose.

In 1843 the 1-pound cans of lobsters sold at 5 cents each, and 3½ pounds live weight were required to make a 1-pound can. No lobsters under 2 pounds in weight were used.

About 1870 the capitalists of the United States interested in the lobster canning industry began to establish canneries on the coasts of the British Provinces. This movement was owing partly to the fact that a scarcity of lobsters was noticeable on portions of the Maine coast, and partly to the increased foreign demand for canned goods, which exceeded the production of the older canneries. At present the United States capital invested in provincial canneries exceeds that invested on the coast of Maine.

Concerning the period from about 1850 to date, sufficient data have not been collected to furnish a connected history of the progress of lobster canning.

NUMBER AND LOCATION OF THE CANNERIES.—In 1880 there were, as already stated, twenty-three canneries on the coast of Maine, and over forty in the British Provinces controlled by United States capital. The Maine canneries are as follows: In the Passamaquoddy district there are four canneries, all located at Eastport, and in 1880 they were putting up nothing but lobsters, though two or three engaged also in the fresh lobster trade. The total capital invested was $12,500. The oldest of the existing canneries was established in 1870. Machias district also had four canneries, located at Jonesboro', Jonesport, Cape Split, and Millbridge, and with a cash capital of $39,598. The Jonesport cannery engaged in the preparation of canned mackerel and clams in the proper season, but the other canneries were limited entirely to lobsters. In Frenchman's Bay district there were three canneries, one at Prospect Harbor, Gouldsboro'; one at Hammond's Cove, South Gouldsboro'; and one at South West Harbor, Mount Desert, with a capital of $55,150. The first mentioned factory canned lobsters only; the Hammond's Cove, lobsters and clams; and that at South West Harbor, lobsters, clams, mackerel, salmon, clam-chowder, and fish-chowder. There were five canneries in Castine district—one each in Brooklyn; Burnt Cove, Deer Isle; Green's Landing, Deer Isle; Oceanville, Deer Isle; and Castine—with a capital of $61,400. All the canneries, excepting that at Brooklyn, put up mackerel, and those at Green's Landing and Castine included clams also among their products. Belfast district had three canneries, located in Camden, North Haven, and Carver's Harbor, Vinal Haven, with a total capital of $31,925. Mackerel as well as lobsters were put up at all these canneries. There is one cannery in the Waldoboro' district, located at Port Clyde, South Saint George, where both lobsters and mackerel are canned; one at Booth Bay, in the Wiscasset district, canning lobsters, mackerel, and clams; and one each at South Harpswell and South Freeport, in the Portland and Falmouth district. The South Harpswell cannery prepared only lobsters in 1880, and the South Freeport, lobsters, clams, and mackerel. The combined capital of these four canneries was $36,661. The entire cash capital invested in the canneries of Maine, in 1880, was $289,834, making an average

capital for each cannery of about $12,500. The cost of the buildings and fixtures at each of the canneries ranged from $1,000 to about $4,000, the average cost being about $2,800.

The canneries of the maritime provinces owned or controlled by capitalists of the United States are scattered along a wide stretch of coast, being mostly located as follows: Nova Scotia—Grand Manan, Shelburne, Clarke's Harbor, Chester, Harrigan Cove, Carriboo, Little River, Petpiswick, Mary Joseph, Crow Harbor, Liscomb, Sonora, Brule, Beckerton, Wood's Harbor; Cape Breton—Arichat, Discouse; Prince Edward's Island—New London; New Brunswick—Shediac, New Mills, Bay Chaleur; Magdalen Islands; Newfoundland—Placentia and Buren. The capital is owned almost entirely in Portland and Boston, but we have received statistics of only seventeen of the canneries, which are owned in Portland. The combined cash capital of these is about $214,000, or an average of about $12,500 to each.

In addition to the cannery buildings, the several Portland firms have factories in that city for the manufacture of the tin cans and wooden cases, to supply their Maine canneries, and warehouses for the storage of the finished products.

PRODUCTS OF THE CANNERIES.—Many of the lobster canneries engage in the preparation of other kinds of canned goods, especially outside of the lobster season, these including fish, shell fish, fruits, berries, corn, &c. In the investigations, however, no account was taken of other than the sea products, which were mainly lobsters, mackerel, and clams. In Eastern Maine, however, several of the lobster canneries have become interested in the sardine industry since 1880. Of the twenty-three canneries in Maine, in 1880, ten prepared lobsters only; six, lobsters and mackerel; one, lobsters and clams; and six, lobsters, mackerel, and clams; one of the last also put up salmon, fish-chowder, and clam-chowder.

Several different preparations of lobsters are made, the standard and by far the most common grade, to which nearly all the canneries are limited, being that in which, after boiling, the lobster meat is simply picked from the shells and put in cans. "Deviled lobsters" in one-half pound cans, and "German flats" are prepared by one or more canneries, the former having been first put up in 1871 by the cannery at South West Harbor. In 1879, at the suggestion of London dealers, the South West Harbor cannery began to prepare lobsters in the shell for the export trade, for this purpose using two sizes, measuring 12 and 14 inches respectively. They are boiled, the tail bent under the body, and then packed in cylindrical tin cans, 12 and 14 inches long. They are put into the cans dry, bathed afterwards, and vented in the usual manner. These lobsters are used principally for garnishing dishes for the table.

The mackerel canning season occurs in the fall, following the lobster. As the fish have to be delivered at the works, the fishery is mainly limited to the boat fishermen of the vicinity of the canneries, at such times as the schools approach close to the shore. Occasionally, however, the fish are kept in pickle over night. The prices paid to the fishermen in 1880 averaged about $1 per cwt. The clam season varies in length on different parts of the coast. At Jonesport, in 1879, it continued through twelve weeks of December, January, and March, while at South Freeport it extended from October 1 to December 10. The clams are dug by residents near the canneries, who are paid from 25 to 35 cents a bushel; one bushel of clams in the shell is required to fill a dozen cans. During the clam season the canneries are generally run with a greatly reduced force.

THE CANNING SEASON.—Prior to 1879 there were two canning seasons for lobsters every year. The first generally began early in April, and extended to about July 1 or August 1; the second continued from about September 10 to the 1st of November or December. The length of the seasons depended greatly, however, on the state of the weather, the abundance of supplies, and the

condition of the market, the spring season often not beginning until the middle of April or the 1st of May. May and June were considered by most canners to be the best months for their business, probably because the weather was then most favorable for fishing. Mr. J. W. Jones, however, regarded the fall season as generally equal to the spring. All of the canneries did not participate in the fall fishery. The Maine lobster law that came into force in 1879 limits the operations of the canneries, so far as concern lobsters, to the four months from April 1 to August 1, but the season often does not begin until toward the middle or last of April, and frequently closes by the middle of July. April is often a stormy month, and fishing is more or less interfered with, often practically limiting the canning season to the three latter months. A law passed in 1885 does not permit canning after July 15. Nova Scotia also has a law, dating from 1879, which limits the canning of lobsters to the same months as on the coast of Maine.

After the lobster season is over, other branches of canning are sometimes taken up by the canneries, as elsewhere explained; many also make their cans and cases during the winter, but a large number lie idle for several months.

THE LOBSTER FISHERY IN RELATION TO CANNING.

CHARACTER OF THE SUPPLIES.—When lobster canning was first started at Eastport, the lobsters were said to have ranged in weight from about 3 to 10 pounds; after three or four years' time, however, the average weight was reduced to about 2 pounds, and for a considerable period no lobsters weighing less than 2 pounds each were considered fit for canning. At present even the maximum weight is much less for the entire coast, and most of the supplies consist of the smaller lobsters that are not suitable for the fresh markets. In many places these are called cullings, and they range in weight from about three-fourths of a pound to 1½ pounds each, the average weight in most localities being reckoned at about 1 pound; in others, from seventy-five to ninety lobsters by count are required to make a hundred-weight. Mr. J. W. Jones estimated the average weight of lobsters taken for all purposes within the canning districts, in 1879, as follows: Maine, 1½ pounds; Nova Scotia, 2 pounds; Straits of Northumberland and Bay of Chaleur, 2½ pounds; Magdalen Islands, 3 pounds. The opinion prevails at many of the canneries that lobsters are still as abundant as ever, though they have been constantly decreasing in size.

There is a great loss in weight in the preparation of canned lobsters, which is said to vary somewhat with the season. One hundred pounds of live lobsters yield from 17 to 25 pounds of canned goods, the average being about 22 pounds. Mr. J. W. Jones states that in May 4½ pounds of live lobsters will produce 1 pound of meat, but that in August 6 pounds live weight are necessary to make the same amount.

SOURCE OF SUPPLIES.—The canning lobsters are generally obtained in the neighborhood of the canneries where they are used, though supplies are frequently brought in from quite an extended area, as explained in the Coast Review. It is estimated that on an average about fifty or sixty fishermen, using from fifty to seventy-five traps each, are required to supply each of the canneries during the height of the season, though in some places the number is much less. The lobsters are brought to the canneries in the boats of the fishermen, or by small dry smacks sent out to collect them. These smacks have been elsewhere described; many of them measure less than 5 tons, but some are large enough to register, and a few exceed 15 tons. In 1879 one small steamer was employed in carrying lobsters to the Castine factory. Some of the smacks are owned by the canneries and others by the smackmen, and are valued all the way from $125 to $1,500 each, the average valuation being about $350. The average number of smacks running to each

factory is about two or three, with an average crew of two men each. The crew sometimes consists of one or two boys in addition to the captain, and occasionally there is but one smackman.

The manner of employing the smacks or crews varies somewhat at the different canneries. In some places the smacks are engaged for the season, at from $50 to $100 per month, in such cases the captain hiring all his help. In others they are paid by weight for all the lobsters brought in, at an average price of about 12 cents per cwt., or by count. Where the smacks are owned by the canneries, the latter may hire the entire crew or only the captain, who looks out for his help; and may pay regular wages, a certain price by weight or count, or a percentage on the lobsters carried. The wages of the chief smackmen range from $25 to $75 a month.

THE PRICES PAID FOR LOBSTERS.—The prices paid the fishermen for canning lobsters, in 1880, ranged from 65 cents to $1.50 per hundred pounds, varying somewhat on different parts of the coast and at different seasons, but averaging about $1. In some places the average was as high as $1.15 per cwt., and in others, where the lobsters averaged nearly one pound each, they were bought indifferently by weight or count, provided the fisherman would sell in the same way throughout the season, the price being $1 per cwt. or per one hundred lobsters. In a few localities they were purchased entirely by count.

THE QUANTITY OF LOBSTERS USED: NUMBER OF FISHERMEN.—It is reckoned that, in 1880, 9,494,284 pounds of lobsters, valued at $94,943 to the fishermen, were used at the Maine canneries. The number of fishermen supplying the canneries was not far from 1,200, but nearly, if not quite, all of these were also interested in selling to the market smacks, and the latter trade yielded much greater profits.

THE METHOD OF PREPARATION AND DETAILS OF CANNING.

THE PROCESS OF CANNING.—At some of the canneries it is customary to keep the lobsters in live-cars a day or more before canning, but at others they are used at once or as soon as a sufficient quantity is on hand. They are first boiled in a large vat or kettle, from ten to twenty minutes, after which they are heaped on large tables, usually with the backs up, care being taken to have the bodies more or less straightened out. The boiling is frequently done in the afternoon, in order that the lobsters may have sufficient time to cool during the night. Early the next morning the men designated as "breakers" commence to break off the "tails" and claws from the bodies, throwing the latter away, for the reason that, though the carapax contains some good meat, it is difficult to extract and clean it. The sweet-bread, however, when it is found, is taken from the bodies and generally put in the tops of the cans. The claws are then split by the "crackers," using a small hatchet or cleaver, which opens them so that the meat can be readily taken out. The meat is now punched out from the tail by means of a small "thole" pin, or other suitable pointed implement, but formerly the tail was split in a similar manner to the claws. The picking of the meat from the claws, the washing, and the filling of the cans is generally done by girls. The meat is thoroughly washed in water, the cans filled and weighed to insure their containing the required quantity, and then covered and cleaned, after which they go to the sealers, who solder the covers down. The bathing comes next, and is the most difficult part of the process. The cans are put into boiling water and kept there for about two hours, though the time appears to vary at different canneries from one hour to two and one-half hours. They are then taken out and vented, a small hole being punched in the cover to release the air, after which they are sealed again and bathed for two and one-half to three hours longer. "Running the bath" is the term generally applied to taking the lobsters from the first bath and venting. After the final bathing the

cans are allowed to cool over night, are tested to insure their being tight, and are then scoured, painted, and labeled. In packing them in the cases, each can is wrapped in brown paper.

One cannery, that at Oceanville, has used steam for cooking the lobsters, instead of boiling them in water. The lobsters are steamed about thirty-five minutes, but it appears to dry the meat too much, and in 1879 it was proposed to abandon that process.

HELP.—The help employed at the canneries consists of men, girls, and boys, whose labor is well systematized. The men attend to the heavier kinds of work and to those details which require the greatest skill, while the picking out and washing of the meat, the filling, weighing, scouring, painting and labeling of the cans is generally done by the girls. Great dexterity is often attained in the different branches of the business, and experienced hands work with astonishing rapidity. In the larger canneries, where the methods of work are most perfect, the help is classified more or less in the following manner: Superintendent or foreman, boilers, crackers, breakers, sealers, bathmen, tail pickers or shellers, arm-pickers, fillers, crowders, weighers, coverers, can-wipers, boxers, &c. In most of the canneries, however, but few of these designations are commonly used, and in the smaller ones the same persons may perform several kinds of work. Next under the superintendent or foreman, the sealers are supposed to be the most skillful of the help employed, and they generally have to make the cans as well as seal them. The boilers, breakers, crackers, and bathmen are generally all men and sometimes also the tail-pickers and weighers.

A few examples will serve to illustrate the character and amount of help employed at the larger canneries. At the Oceanville cannery, in 1880, eleven men and sixteen girls were employed. Of men there were one superintendent, one boiler, six breakers and crackers, two sealers, and one bathman; and of girls, five arm-pickers, four tail-pickers, three fillers, one crowder, one weigher, one can-wiper, and one coverer. The cans were painted, labeled, and put in the cases by girls, while the nailing and stenciling of the boxes was done by the sealers. At the Carver's Harbor cannery there were eighteen men and sixteen girls; the men consisting of a superintendent, one foreman, two boilers, one bathman, four crackers, two breakers, two tail-shellers, one weigher, three sealers, and one boxer. At the Boothbay cannery fifteen men and ten girls were employed. Of men, there were, in addition to the superintendent, boiler, and bathman, two crackers, two breakers, three sealers, two tail-shellers and three arm-pickers; of girls, one weigher and one coverer, and an average of five men and girls engaged in picking arms, two men in shelling tails, and two girls cleaning.

The average number of hands at each of the Maine factories owned in Portland was estimated as follows, for 1880: The Portland Packing Company, twenty to twenty-five girls and boys and eleven men, while fifty men were employed for four months making cans for all their factories; Burnham & Morrill, twelve girls and boys and eleven men; J. W. Jones, twenty-five hands, of which one-half are girls and boys. The number employed at the several canneries varies somewhat at different seasons. The help is mostly obtained in the neighborhood of the canneries, but some of the more skillful hands, such as the sealers, come from Portland or elsewhere. The men generally begin their labors somewhat earlier in the morning than the girls, as they have to prepare or lay out the work.

WAGES.—The men are paid much higher wages than the girls and boys, and the rates vary at the different canneries and somewhat with the seasons. The girls receive from $3 to $4 a week, their wages being more uniform than those of the men, who are paid from $6 to $15 a week, excepting the superintendent. The sealers or solderers have from $9 to $15 a week; the weighers and boxers, about $10.50; the boilers and bathmen from $7.50 to $10; the crackers, breakers, and tail-shellers, from $6 to $9.

CANS.—The cans used for the ordinary grade of canned lobsters are made in two sizes, the one to hold one pound of meat, the other two pounds. They are cylindrical in shape, the one-pound cans measuring 4½ inches in height and 3 inches in diameter, and the two-pound cans having the same height, but a diameter of 3½ inches.

The majority of the cans used at the factories owned by Portland capitalists are made in Portland during the winter, the tinsmiths who make them being sent to the canneries during the canning season to serve as sealers. Other canners usually have their cans made at the factories during the winter, by some of the men who are also employed during the lobster season. A few of the factories buy their cans, and some take contracts to put up the lobsters at a certain price per dozen cans, the cans and cases being furnished by the capitalists. Mr. J. W. Jones employed twenty men in Portland during four months of the winter to make cans for his factories, and Messrs. Burnham & Morrill kept about ten men at the same work for three months. The latter made on an average about five gross of cans per day, and received wages ranging from $10 to $12 a week. The cans for the South Harpswell factory are made at that place, and those for North Haven and Deer Isle are made at North Haven. At South Harpswell four men and one boy are employed, and at North Haven six men during four months; they are paid at the rate of 45 cents per gross. Eight gross could be made a day, but they are allowed to make but four gross. At Boothbay, where cans are made, about two thousand are put together as a day's work after the tin has been cut.

The weight of the tin cans appears to vary somewhat at different places, but averages for the one-pound cans about 3½ ounces. At Oceanville the filled cans were made to weigh 14½ ounces, and at Green's Landing 16 ounces.

CASES.—The shipping cases are made partly at Portland and partly at the canneries, the same as the cans. If made at the canneries, the shooks are generally received from Portland or from the mills at some other place. They are constructed chiefly of pine, but sometimes of spruce, and hold four dozen one-pound cans or two dozen two-pound cans of the ordinary grade.

THE REFUSE.—The refuse of the canneries, generally called chum or scrap, and consisting of the shells and such soft portions of the lobster as are not fit for canning, is often disposed of for fertilizing purposes, and is favorably regarded as a manure for hay and some other crops. It is also fed to hogs and poultry, but is said to give a reddish color and an unpleasant taste to the eggs of the latter. Mr. J. Winslow Jones states that in May, 1878, he sent twenty-four young pigs to his Boothbay factory, where they were fed almost exclusively on chum during the summer and fall, and thrived well. It was estimated that forty hogs could have been kept on the refuse of this one factory, and that by a short feeding of corn for about six weeks in the fall, they would range in weight from 150 to 400 pounds, or average about 250 pounds each.

When sold for fertilizing or other purposes the chum brings but a nominal price, and it is probably more frequently given away for the hauling. At many canneries it is dumped into the water, there being no demand for it. In some places, in 1880, the refuse of the entire season was sold for $10; in others it brought 25 cents a ton, or $1 a cord, and sometimes even as high as 50 cents a wagon load. At South Harpswell it was thrown into a scow furnished by farmers of the neighborhood, who obtained seventy-five such loads in 1880. About 175 tons were shipped to Portland for fertilizing purposes, in 1880, from the Boothbay factory. At Eastport the scrap was sold at 5 cents a barrel to the Red Beach Plaster Company, who dried it and ground it with plaster. Two thousand barrels were sold to them in 1879, and 1,500 barrels in 1880. For use on crops of hay it is also generally ground.

THE AMOUNT OF PRODUCTION, STATISTICS, ETC.

In 1880 about 2,000,000 pounds of canned lobsters, valued at $238,000, were put up on the coast of Maine. These included 1,542,696 one-pound cans, 148,704 two-pound cans, and 139,801 of other brands. The cost of the live lobsters used in their preparation was about $95,000, showing an enhancement in value by the process of canning of $143,000. In the enumeration of the help and of the wages paid at the canneries it was found impossible to make an exact calculation for the lobster industry because of the other interests involved, but it can be roughly stated from the combined statistics that the total number of persons employed was nearly eight hundred, and the amount paid them while engaged in the preparation of canned lobsters was between $50,000 and $60,000.

At one of the canneries the cost in labor of putting up one dozen one-pound cans was calculated to be from 28 cents to 30 cents, which for the 2,000,000 pounds produced would make the total cost about $50,000.

The cans cost in tin and labor 25 to 30 cents per dozen, and about one-third of the total cost of production of canned lobsters was expended in the labor of preparing them in the canneries. Where the goods were put up by contract, 90 cents per dozen was paid, the capitalists furnishing the cans. The selling prices, per dozen, for one-pound cans, during the past three years were as follows: 1878, $1.60; 1879, $1.45; 1880, $1.45. In 1880 two-pound cans brought $2.35 per dozen.

About one-half of the canned goods was exported to Europe, and a large part of the remainder was shipped to the Western and Southwestern States. Nearly all the canned lobsters produced were handled by the Portland and Boston firms already referred to, and which were as follows: In Portland—the Portland Packing Company, Burnham & Morrill, J. W. Jones & Co. In Boston—George K. Underwood & Co., W. K. Lewis & Brother. The Portland firms owned four or five small vessels, which were used in carrying the cans and cases to the factories and in transporting the canned goods to the Portland warehouses. Some of the canned goods were shipped by steamer, and New York received a few supplies direct.

No account of the total production of canned lobsters on the coast of Maine during past years is at hand for comparison with the figures herewith presented, but the fact of a very great falling off in the production from year to year is well known, and can be proved by the statistics of small sections. It is stated that the total production of 1880 was greatly exceeded ten years ago by that of a few canneries, and one of the principal reasons given for the transfer of capital to the British Provinces was the decrease of supplies on the coast of Maine. The question of decrease has been elsewhere discussed, and it is but fair to assume that the canneries have suffered in common with other branches of the industry. The increased traffic in fresh lobsters at some places, as at Eastport, has greatly interfered with the canning interests, and the canneries at that place are now run merely for the purpose of using up the small lobsters that could not be marketed otherwise. The decreased production since 1878 has been very largely due to the shortening of the canning season by the State law that came into force in 1879.

Further statistics of the canning industry are given in connection with the Coast Review of this fishery.

8. HISTORY OF THE LOBSTER FISHERY; DECREASE; PROTECTIVE LAWS.

GENERAL REVIEW.

One of the most important questions that entered into the present investigation of the lobster fishery was that respecting the relative abundance of lobsters as compared with former years. This question is of such extreme interest to so many of our sea-coast inhabitants, and so many different views have been expressed regarding it, some in support, and others again in refutation, of an alleged decrease in supplies, that an effort was made to obtain as complete data on the subject as was possible with the imperfect means at the disposal of those engaged in the investigations. The results were not entirely satisfactory nor conclusive for the entire region, but may be regarded rather as affording materials and suggestions for more elaborate studies in the future.

The manner of conducting the inquiries has been described elsewhere. It was impossible, from the lack of sufficient funds, to place many or large investigating parties in the field, and each of these was burdened with a score of other subjects, all of at least equal importance to the lobster fishery, and many of greater; that they should have accomplished as much in this line as they did, is a matter of congratulation. From places not visited by the field parties, much information was secured by correspondence.

It is not difficult to ascertain the facts respecting the details of an industry of this sort, its character, the methods of conducting it, its statistics, &c.; but when an attempt is made to determine its exact status, with reference to the supply, it seems impossible to obtain any reliable data, or at least to properly sift the worthless from the good. This difficulty is the greater when, as in the present case, we have no previously written history of the industry, and are dependent for the most part on traditions, or on the memory or judgment of individuals belonging to several classes—fishermen, dealers, and canners—which are somewhat at variance with one another in their immediate interests. Prejudice and a natural aptitude for exaggeration are also more or less characteristic of fishermen as of numerous other classes of persons, and without wrong intent many misleading statements are often made.

The weight of the evidence collected, however, leads to the conclusion that there has been a decrease in the abundance of lobsters within comparatively recent years, and in some localities this decrease has certainly been great enough to entirely change the standing of the fishery and render its pursuit unprofitable to the fishermen. Similar conclusions have been arrived at in Norway and Great Britain, the two most important lobster-producing countries of Europe, and strong efforts have been made for some time, at least in the former country, to arrest the decrease by a system of protection. Abstracts of reports bearing upon those two regions are given further on.

The idea of a serious falling off in the abundance of lobsters on our own coast is not of recent origin. Protective laws, covering limited areas, were enacted over half a century ago, and every State in the lobster region, excepting one whose fishery is of slight importance, has restricted the lobster fishery within its own waters by more or less stringent regulations. Probably no stronger argument in favor of a decrease could be adduced than this realization by one State after another of a perceptible change in the amount of its supplies, the failure of which would bring suffering upon many of its citizens. That there has been a great decrease in some districts, is admitted by all who are acquainted with the subject, but that this decrease has been general and serious enough to cause alarm, is not, in the judgment of many, sufficiently proved by facts, but the probabilities certainly favor such a view.

The decrease has been most marked in those regions which have been fished the longest, and especially in the shallow water areas near the coast, which are easy of access and which have been subjected to incessant drains. Numerous instances of this depletion of shallow-water grounds are

authenticated by the strongest evidence; yet it is claimed by many that the markets are constantly supplied with nearly, if not quite, as large quantities of lobsters as ever, and this fact is considered by them as entirely refuting the arguments in support of a universal and serious decrease. Unfortunately the statistics that are obtained of most industries are not of a character to make them of much value in the case of the lobster fishery, even if such statistics were extant. The increased quantity of lobsters now coming from any one region is only obtained through the agency of a greater number of fishermen, using a larger number of improved traps, while the average catch per man or trap may be much less than formerly. In respect to this it is often argued that a return to the former state of the fishery would bring about the same condition of affairs as originally existed; and the fact that the catch of each man or trap is now relatively less than it has been in regions where the number engaged in the fishery has increased, is certainly not a fair argument in favor of decrease. But there are other and more positive evidences of decrease, many of which are discussed further on, and the statements of persons thoroughly acquainted with the subject appear to furnish conclusive proof that the market supplies from our own coast have been constantly diminishing from year to year.

The marked decrease in the average size of the lobsters brought to market, as described in Section I, Part V, of this report, should probably also be regarded as an indication of decrease in abundance; and the wholesale slaughter of females with eggs, which has always been going on, would naturally have tended to diminish the supply. Not being truly migratory in their habits, but remaining on about the same grounds, as is supposed, year after year, coming into shallow water in the spring and retiring into deeper water near at hand in the fall, it is the commonly accepted opinion that the schools do not generally receive many accessions from other regions; and thus arises the possibility of any one region being readily depleted by overfishing. With migratory fishes the case is different, but the two have often been compared.

An illustration of the rapidity with which the lobsters of a small area may be caught up, is furnished by a salt-water inlet on the coast of Maine, in which lobsters were at one time very abundant. The basin opened directly into the sea, and was large enough to afford a remunerative fishery to several lobstermen. Two years' time was sufficient to reduce the supply of lobsters to such an extent that fishing became unprofitable. After an interval of about five years they became again abundant, and the supply was once more exhausted. Had this inlet not been so situated that it readily received accessions from without, it is probable that it would have required a much longer time to become replenished.

On a much larger scale has been the depletion of the once noted grounds about Cape Cod, Massachusetts, which at one time furnished nearly all the lobsters consumed in New York. In the early part of the century, this fishery was entirely in the hands of fishermen from other States, principally Connecticut, who came to Cape Cod with their smacks, and after catching a load carried it to New York or Boston. As early as 1812 the citizens of Provincetown realized the danger of exhausting the grounds about their town, and succeeded in having a protective law passed by the State legislature. More or less stringent regulations respecting the lobster fishery of Cape Cod have been in force from that time down to date, and they have probably done good service in prolonging the fishery, but the period of its prosperity has long since ceased, as continued overfishing has so exhausted the grounds, on almost every portion of Cape Cod, that they are no longer profitable even to the few men who still set their traps there. From the sketch of this region given further on, it will be seen that the decrease has not been a temporary one, although an entire rest for a long period of time might possibly allow it to recover more or less of its former abundant supplies. As it is, no large catches are now made and but few lobsters are carried away from the cape.

The immediate vicinity of Provincetown has suffered most in this respect, but scarcely more than any part of the coast from that town to Boston on the north side and to New Bedford on the south. A delay in the publication of this report enables the writer to add a note for the southern portion of this region, covering the period down to July, 1885. Vineyard Sound proper and the vicinity of Wood's Holl have afforded poor catches for a number of years, but the region about Gay Head and No Man's Land has continued to attract the lobstermen down to the present time. Each succeeding year, however, the lobsters have appeared to be less plentiful, and during the spring months and June of 1885 scarcely anything has been done. The fishermen are discouraged, and are forced to attribute the scarcity to overfishing, the possibility of which many of them have all along denied.

In the waters of Rhode Island and Connecticut a large decrease of lobsters is reported by many of the fishermen, and the increased catch for the few years preceding 1880 was only obtained by the use of a much larger number of traps than was employed formerly. Although the fishery in those States was begun very many years ago, it is only within comparatively recent times that it has been extensively carried on.

On the coast of Maine the evidences of decrease are very strong, especially as regards the shallower areas; but the rapid extension of the grounds into comparatively deep water, with the consequent increase or constancy in catch for a time, has made the actual decrease less apparent. The rocky bottoms of the coast of Maine are also supposed to afford the lobsters greater protection than the sandy ones to the south, and in many places the traps cannot be set so closely together; neither is it probable that the lobsters in such localities move about as much in search of food.

The greatest decrease has occurred within the past fifteen to twenty years, or since the establishment of numerous canneries and of the perfected methods of transporting fresh lobsters to all parts of the country. The demand being so much greater than the supply, there are no restrictions on the amount of the catch, beyond those imposed by the State laws or resulting from the scarcity of lobsters. Fish are among the greatest enemies of lobsters, and cod are known to consume enormous quantities, but nature has provided against their extinction by such means, and it is man alone who has disturbed the balance.

There are some fluctuations in the supply of lobsters in certain localities from time to time, and a year of scarcity may be followed by one of comparative abundance. Such changes must be carefully considered in connection with the question of decrease, as they are exceedingly misleading, and observations upon the subject are not of much value unless they have been continued for a number of years.

In submitting the material contained in the following pages, respecting the abundance of lobsters and the subject of protection, the writer has endeavored to state the evidence presented without prejudice or undue comment. As previously remarked, it was not within the power of those charged with the fishery investigations of 1880 to summon witnesses, even if they had had the time for it, and nothing was obtained except from willing contributors. One member of the party that conducted the investigations on the coast of Maine was not convinced that the decrease was as great or serious in that State as the accounts appeared to indicate. Opposed to him, however, is a mass of evidence from many reliable sources, which has been accumulating for several years. The only satisfactory way of determining the question would be to institute a thorough and careful investigation of the entire lobster region under the authority of the National Government or of the several States, and the lobster interests are of sufficient importance to justify such action. Such an investigation has recently been made of the coasts of Great Britain, and an abstract from the report of the commissioners is quoted on a following page. In Norway

the lobster fishery has also been carefully studied and its condition is well known. We commend the report of Prof. A. Bocek, on its history and prospects, from which we have largely quoted, to the attention of lobstermen in this country, as much valuable information, quite applicable to our own coast, may be obtained from it.

The question of how to protect the fishery is one most difficult of solution, and from the statements given by the fishermen and others, it will be seen that a great variety of opinions exists regarding it. None of the State laws now in force have been effective in stopping the decrease, although they may have retarded it more or less, and in any investigation it will be found more perplexing to decide upon proper laws than to establish the fact of a decrease.

It was found difficult to collect the data for a complete history of the lobster fishery, but many of the more interesting facts regarding its origin and progress are given in the following brief sketch:

HISTORICAL SKETCH OF THE FISHERY.

MAINE; GENERAL REVIEW.—On the coast of Maine the lobster fishery began about 1840, in the western part of the State, and gradually extended eastward, reaching the Penobscot Bay region about 1848 or 1850 and Eastport about 1855. At that time, and previously, lobsters were very abundant in all favorable localities close inshore during the summer months, and could be gaffed out at low tide from their favorite haunts under the shelter of rocks and seaweeds. This method of capture was resorted to mainly by boys, who could generally obtain a mess in a short time and with little trouble. It gave rise, however, to no regular fishery. In those early days lobsters were also more frequently reported from the fishing-grounds lying at short distances off the coast, where the depths of water are from 25 to 30 fathoms. They would seize the bait on the hooks of the fishermen or become entangled in their lines, and were often brought to the surface.

The regular fishery began with the use of hoop-net pots, which were generally of very rude construction. They were mostly made of the wooden hoops of hogsheads, measuring from 3 to 3½ feet in diameter, and with two wooden half hoops crossed above for the attachment of the bait and buoy-line. The bag usually had a depth of 18 to 24 inches. Contrary to what might be supposed, these open traps would often secure as many as four or five lobsters at a time. As a rule, two lobstermen went in each boat and used from twenty-five to fifty pots to the boat, setting them singly and marking their location with buoys, as is done with lath-pots. These pots were generally hauled twice a day, morning and evening.

The facility with which the lobsters escaped from the hoop-net pots led to their disuse as soon as the lath pots began to be introduced, and within a very few years from the time they were first employed, they had almost disappeared from the coast. The change, though rapid, was not at once completed, for a fisherman could not afford to give up his entire gang of old pots for new ones in the course of a single year, and so, for a short period, many of the fishermen were using some of each kind. The lath pots which superseded the hoop-net pots were essentially the same in construction as those now used on the coast of Maine, and each pair of fishermen handled between twenty-five and fifty.

Competition, rivalry, and the supposed decrease in abundance of lobsters, caused the fishermen to gradually increase the number of traps used by each, and the increased number of men who entered into the fishery from year to year also tended to the same results. Up to the time of the introduction of the method of setting the pots trawl fashion, the custom of fishing in pairs remained in vogue. It was supposed that two men were absolutely necessary to the work, one to handle the boat and keep it in position while the other hauled the pots.

Lobster pots were first set on trawls about the year 1865, several different persons laying

claim to the invention. The precise locality where trawls were first used is not known, but it was somewhere between Harpswell and Friendship, and probably at Georgetown. This innovation was in reality the result of competition, arising from the desire of one man to do the work previously performed by two. Experience also soon taught them that by the use of trawls, one man might set even more pots than had formerly been handled by two men. Each man would set his entire gang of pots in one or two strings where lobsters were abundant, but in a greater number where they were less plentiful. Since about 1870, the use of trawls in the lobster fishery has been decreasing, due to the fact that the lobstermen have discovered that they can often obtain a better catch by scattering their pots over a greater area, and shifting them a little every time they are hauled. Does not this fact indicate at least some falling off in the abundance of lobsters?

The following interesting facts regarding the early lobster fishery of Maine are furnished by Capt. Elisha M. Oakes, of Vinal Haven: In 1841, Captain Oakes began to carry lobsters from Curdy's Harbor and Horse Island Harbor, Harpswell, to Mr. Eben Weeks, at East Boston. He was then running a well smack, named the Swampscott, of 41 tons, old measurement. The season extended from the 1st of March until about the 4th of July, after which time lobsters were supposed to be unfit for eating; the black lobsters, or shedders, were even considered poisonous. During this season of four months, Captain Oakes made ten trips, carrying in all 35,000 lobsters, by count. He continued in this trade about six years, taking the combined catch of about five or six fishermen. At this same period the smack Hulda B. Hall, 50 tons, of New London, Conn., Captain Chapell, was carrying lobsters from Cape Porpoise, Maine, Gloucester, Ipswich Bay, and occasionally Provincetown, Mass., to Boston, making fifteen trips in the course of the season of four months, and taking about 3,500 lobsters each trip. Captain Chapell was supplied with lobsters by four men at Cape Porpoise, and by the same number at both Gloucester and Ipswich Bay. For four months following the close of the lobster season on the coast of Maine, or from July 4 until November, Captain Chapell ran his smack with lobsters to New York, obtaining the most of his supplies at Provincetown.

In 1847, Captain Oakes purchased the smack Josephine, with which he began running to Johnson & Young's establishment, at Boston, in 1848, buying a portion of his lobsters in the Penobscot Bay region, where this fishery had just been started. The quantity of lobsters carried by him that year was 40,000. The prices paid to the fishermen for smack lobsters was as follows: During March, 3 cents each; April, 2½ cents; May and June, 2 cents. In 1850 he began to obtain supplies from the Muscle Ridges, leaving Harpswell entirely, on account of the small size of the lobsters then being caught there. At this time the average weight of the lobsters marketed was about 3 pounds, and all under 10½ inches in length were rejected. The traps were made of the same size as at present, but were constructed of round oak sticks, and with four hoops or bows to support the upper frame-work. A string of bait, consisting mainly of flounders and sculpins, was tied into each trap. About fifty traps were used by each fisherman, and they were hauled once a day. The warps or buoy lines, by which the traps were lowered and hauled, were cut in 12-fathom lengths.

The Muscle Ridges, Me.—Captain Oakes states that lobsters were so abundant at the Muscle Ridges, at this period, that four men could fully supply him with lobsters every trip he made. In the course of ten days each man would obtain between 1,200 and 1,500 marketable lobsters. In Captain Oakes's opinion, the Muscle Ridges have furnished the most extensive lobster fishery of the Maine coast. He ran to this locality until 1874.

Capt. S. S. Davis, of South Saint George, informs us that about 1864, when he first began

buying lobsters at the Muscle Ridges, three men, tending forty to fifty pots each, caught all the count lobsters he could carry to market in his smack. He could load 5,000 lobsters at a time, and averaged a trip in seven to nine days. This traffic continued for six or seven years. In 1879 Captain Davis bought from fifteen men in the same locality, and at times was obliged to buy also of others in order to make up a load.

South Harpswell, Me.—Between 1850 and 1855, at South Harpswell, the fishermen were accustomed to go out two in a boat, each boat setting from fifty to seventy-five traps, and obtaining a daily average of from 400 to 500 lobsters of marketable size. All lobsters weighing less than 2 pounds were thrown away, and the remainder were sold to the canneries at an average price of 3 cents each in the spring, and 2 cents each in the fall, the canneries agreeing to take only those above 2 pounds weight. The fishing season lasted from March until May, and again from September until about the middle of November. When the factories were closed, the fishermen sold to the smacks running to New York and Boston, scarcely any of the lobsters being disposed of to Portland parties. The smacks paid about the same prices as the canneries, beginning in the early spring at 3½ to 4 cents, and falling later as low as 1½ cents, when the lobsters had become more abundant. Frequently, when the markets were dull, the fishermen, after culling out all lobsters under 2 pounds in weight, would bring the remainder to the smacks, where about one-third more in number would be rejected, only the larger individuals being bought. This would happen only late in a season, or during a very dull market. Marketable lobsters then averaged about 3½ pounds each.

Boothbay, Me.—Mr. Emerson McKown, of Southport, says that in 1856 lobsters were found very plentifully and of large size about the islands of Boothbay Harbor. He was then fourteen years old, and engaged in the lobster fishery, setting his pots close to the shore, in from 8 to 11 fathoms of water. In the course of two and one-half months (March 1 to May 15) he could easily make $100. In those days the lobsters were sold entirely to the smacks, which carried them to New York. The season lasted six months, from March until the last of May, in the spring, and from about the 1st of September until December, in the fall. During this season one man, tending fifty pots, could make $500, and frequently made more. The price paid by the smacks was 2 to 2½ cents each. As the number of lobstermen increased in this region, the lobsters began to decrease both in abundance and size. By 1869 they had so diminished in numbers that the average income per man for the season of six months was not above $175. This caused the fishermen to try further out from land, and in deeper water, and the fishery is now largely carried on in depths of 25 to 35 fathoms, although in the summer the lobsters approach nearer to the land.

At all points along the coast, from Cape Small Point to Pemaquid Point, the fishermen are agreed in saying that formerly lobsters were very abundant and of large size, and that overfishing has reduced them both in size and in numbers. They are quite unanimous in the opinion that if the present State law is continued, it will be better for the fishermen.

Matinicus, Me.—Lobster fishing was introduced at Matinicus Island in 1868.

North Haven, Me.—At North Haven the fishing began in 1848, but during that year there was only one man setting traps. The number of lobstermen has, however, rapidly increased since then up to the present time. At first the entire catch was sold to Boston smacks, at the rate of 2 to 2½ cents each. The largest and smallest lobsters were not taken by the smacks, the former because they were considered not to be able to survive the long trip. Connecticut smacks followed soon after the Boston smacks, and later on large quantities of lobsters were shipped annually to New York. In 1856 or 1857, canning operations were begun on this island, but they were continued only two years at that time.

DEER ISLE, ME.—Lobster fishing began at Deer Isle in 1852, the men of that locality being first induced to fish for lobsters by smackmen from Portland and Boston. The first cannery in the district was established at Oceanville a short time prior to 1860. The lobster-pots were first set on trawls in 1864, and for some years this method of handling them was continued to a large extent, but it has since been abandoned. The use of nets for catching flounders and sculpins for bait began in 1874. The lobster fishery was started at Isle au Haute about 1855, or about three years later than at Deer Isle.

SWAN'S ISLAND, ME.—The fishery for lobsters was begun at Swan's Island, according to Mr. David Smith, by four men from Gloucester, Mass., who employed others to assist them. They made only one trip, however, but the inhabitants of the island at once took up the fishery, and ten men engaged in it up to 1855. Then came an interval of inactivity, which continued three or four years. In 1860, eight or ten men were again lobstering, and setting from thirty to forty pots each.

EASTPORT, ME.—The process of canning lobsters was introduced at Eastport, in 1842, but at that time lobsters were not known to occur in that vicinity in sufficient abundance to induce the people to fish for them. Smacks were, therefore, sent far to the westward for supplies, stopping at the different fishing stations along the coast. In 1855 they first began to fish extensively for lobsters about Eastport, and from that date until about 1865, the fishery continued to develop, reaching its height about the latter year. Since 1865, however, it has greatly fallen off on the American side of this district, although it has proportionally increased among the British Islands of the vicinity. The canning interests gave an increased impetus to the fishery about 1872. Formerly the greater part of the catch was sold to the canneries, but since the great demand for fresh lobsters in Boston and New York has reached this most distant point of our coast, the largest and best lobsters have all been shipped westward.

PROVINCETOWN, MASS.—A complete history of the industries of Provincetown, Mass., would afford an exceedingly interesting chapter regarding the origin, development, and subsequent decline of one of the most important fisheries of the New England coast, the once famous lobster fishery of Cape Cod, which for a series of years furnished New York City with nearly all of its supplies. Unfortunately, however, our record is very fragmentary, though interesting as far as it goes.

The following account of the lobster laws and regulations of the town, to 1850, was prepared by Mr. Frederick W. True:

A description of Provincetown in 1802 contains the following statement: "Lobsters of an excellent quality are obtained in great abundance on both sides of Long Point. Five vessels are constantly employed in catching them, and carrying them to the market of New York. Two smacks go with them to the Boston market. Several barrels are pickled and sent to the former place."*

Lobster fisheries were carried on without restriction until the year 1812, when the citizens of the town, entertaining fears that the constant encroachments of their neighbors would speedily effect the extermination of the species, prevailed upon the legislature to pass an act "to prevent the destruction of the lobster fishery in the town of Provincetown in the county of Barnstable, and to preserve and regulate the same in the waters and shores of said town." This act provides that "it shall not be lawful for any person living without the jurisdiction of this Commonwealth to take

* A Description of Provincetown, in the County of Barnstable, September, 1802. Coll. Massachusetts Historical Society, viii, 1802, pp. 198-200.

any lobsters within the waters and shores of the town of Provincetown for the purpose of carrying away from said waters in smacks and vessels owned without said Commonwealth, without first obtaining a permit in writing from the selectmen," and imposes a penalty for offenses. It also provides for the appointment of a number of fish wardens, whose duty shall be to prosecute all offenses against the act. This law, however, did not meet all the requirements of the case, and this fishery was frequently the subject of legislation in later years.

After the passage of the law in 1812, restricting the lobster fishery, many subordinate regulations were made from year to year at the town meetings. In 1815 it was voted that "the fish warden take no notice of a lobster fisherman for lobsters, without they take them upon their own risk," and that the town "defend the fish warden in the lawful discharge of the duties of his office." This latter clause was probably added because the fishermen from New York and other distant points were slow in recognizing the authority of the warden, and attempted to resist him. In the same year it was voted that "Benj. E. Atkins be fish warden for the town the year ensuing, and have $10 on a hundred for his fees," and that "he pay what money he collects into the town treasury once in three months, except his fees." In 1820 the fees of the warden were increased, and he received "18 per cent. on the amount of the same for his trouble, or $18 on a hundred dollars." It appears that the duties of the warden were not sufficiently well marked out in the State law of 1812, and consequently, in 1824, the citizens passed a law defining them more precisely. At the same time Elisha Freeman, jr., was voted in as "collector of lobster money," and the rate of compensation was reduced to 8 per cent. The law referred to provides that it is the duty of the collector of lobster money "to board every smack or vessel within the limits of Provincetown, agreeable to the laws of this Commonwealth, once in every twenty-four hours, and at such times as his judgment dictates the most proper. If the collector shall find that any smack or vessel thus visited hath taken a part of a load at or in any other place or waters than Provincetown, the said collector is authorized by the vote of the town of Provincetown, March 1, 1824, to charge a sufficient sum to be equal to $1 for every hundred lobsters which said smack or vessel shall or can carry, and every such smack or vessel which shall take her whole load in and from the waters of Provincetown shall pay 1 cent for every lobster. If, through the negligence of said collector, any smack or vessel does abscond, not having accounted for the lobsters on board from the waters of Provincetown, then said collector shall account with the treasurer of said town for said load."* It soon became apparent, however, that this method of obtaining the dues was defective in many respects and made the position of collector a very laborious one. Hence, two years later, in 1826, the town passed another law, according to the provisions of which, every smack or vessel taking lobsters at Provincetown should pay 50 cents for each ton burden, which money "must be specie or Boston money at the time the permits are given, which must be before commencing to take said lobsters."

In 1850 the lobster fishery again came under discussion, and it was voted in town meeting that the selectmen should be instructed "not to charge the citizens of this town any fee or charge whatever for taking lobsters from the waters under the jurisdiction of the town."

The following notes on the lobster fishery of Provincetown were furnished by Captain N. E. Atwood, in 1880:

"I remember that, as early as 1815, smacks belonging to New London, and other Connecticut ports, were fishing here for lobsters, which they carried to New York. They continued to visit this place for many years thereafter, the crews themselves catching the lobsters. Our own fish-

* Town Records.

ermen did not engage in lobstering, as nearly all the lobsters found in these waters were females, which had no sale in the Boston markets. In 1847 I employed some of our fishermen to catch me two loads, which I carried to New York. The next year they engaged regularly in the fishery, and I carried 25,000 lobsters to Boston and New York. Two years later the Connecticut smacks discontinued fishing and bought of our lobstermen. This new fishery gave employment to a great many men during the summer. Lobsters were very abundant, and continued to be so until about fifteen years ago, since when they have rapidly decreased in numbers from year to year until now they are nearly all gone. All of our fishermen in those earlier times used the so called hoop-pots. Fifteen to twenty years ago, and before then, the fisherman would go out perhaps at midnight, anchor his boat near the shore, on the edge of the ground, and put over his pots, some half dozen in number. From time to time he would haul them up and empty them of their contents. If lobsters were abundant, it would keep him busy all the time, and he would return to town by 8 or 9 o'clock in the morning with perhaps one or two hundred in number. The price for many years was 2 cents each. The hoop-pots have since been abandoned for the more economical ones made of laths. At present the lobster fishery is carried on only by old men who cannot engage in harder kinds of work. In 1880 only eight men were thus engaged, and they made an average stock of about $60 each."

During the cholera season of 1849, according to Captain Atwood, the sale of lobsters in New York and Boston was entirely discontinued, and the fishery was interrupted, buyers breaking off from their contracts.

North Truro, Mass.—Prior to ten years ago (or before 1870), many New London smacks came to this vicinity for lobsters. At that time the hoop-net pots were still in general use, the fishermen of the vicinity using only as many as they could manage from their small boats, hauling them continuously. The smackmen, however, set a great many in all directions, marking their positions with buoys. About 1860 it was not uncommon for a boat-load to be sold at the rate of a cent apiece. Lobsters are very scarce at present.

Boston, Mass.—According to Capt. E. M. Oakes, the first regular lobster dealer in Boston was a Mr. Benjamin Simpson, who kept a restaurant in the basement of a house at the south end. He used to go out in the harbor, in a little boat, and catch them in the vicinity of Castle Fort, and then peddle them about the city. In the course of three or four years a Mr. Newcomb also went into the business, hiring men to catch the lobsters, which he carried up to the city in a small smack, of 10 tons (o. m.), called the Roxana. The lobsters were boiled and peddled through the streets by venders, who received about 25 per cent. on their sales. Boston began using lobsters through the entire summer, fall, and winter, in 1855, Mr. Martin M. Johnson having been the first man to continue their sale beyond the spring and early summer. He was also very instrumental in starting, at about the same time, the important lobster trade between Boston and New York. In 1856 several Boston firms bought lobsters during the entire year, making a few shipments to New York.

An item in the Boston Journal, in 1857, states that there were at that time only three lobster-boiling establishments in Boston. During March, April, May, and June, 200,000 lobsters were boiled there. The quantity of lobsters brought in during the year 1856 was about 1,200,000, by count, worth $60,000 to the fishermen, and $84,000 to the retail trade. Two hundred men were then catching for the Boston market. The lobsters came mainly from the region of Cohasset, and were carried in fifteen smacks, each with a crew of five men, and seven additional men to tend the pots. There was a dory to each man, and they handled fifty pots apiece. "The man in the dory rows among his traps, takes out the lobsters, pushes a wooden plug into the joint of

each claw, to guard against their belligerent acts, rebaits the trap, and sets it again." Instances of lobsters measuring 3 feet long, and weighing 35 pounds each, are mentioned.

SALEM, MASS.—The same journal also states that there were three boiling houses in Salem, for which forty-two men and eighteen boys were employed in procuring supplies. The average daily catch for one thousand traps was 3,000 lobsters, worth 3 cents each to the fishermen. The total catch for Salem, in 1856, was estimated at 150,000 lobsters.

The Barnstable Patriot, for August 4, 1857, referring to the lobster trade of Salem, says: "Mr. D. B. Davis, since March 1, last, has boiled at his establishment 320,000 lobsters, costing $30 per thousand, at fishermen's prices. Other establishments in Salem are boiling large numbers."

SWAMPSCOTT, MASS.—According to the Gloucester Telegraph of October 26, 1870, the trapping of lobsters was first practiced at Swampscott by Ebenezer Thorndike, in 1808.

LYNN, MASS.—The former abundance of lobsters about Lynn is noticed by Lewis and Newhall, in their history of Lynn, in a note written by Mr. Wood in 1663, as follows: "The Bay which lyeth before the Towne, at a lowe spring tyde, will be all flatts for two miles together; upon which is great store of Muscle Banckes, and Clam Banckes, and Lobsters amongst the rockes and grassie holes."

THE ELIZABETH ISLANDS AND VINEYARD SOUND, MASS.—The following item refers to the Elizabeth Islands region in 1807.* "The fishes are the same as those of the vicinity; but lobsters, which are scarce at Martha's Vineyard, are caught in great abundance at all the Elizabeth Islands."

Mr. Frank M. Cottle, of West Tisbury, Martha's Vineyard, says that twenty years ago there was but one vessel engaged in the lobster fishery on that part of the coast, while now there are a dozen. Then the business was not regarded as of any value, and but few men entered it at all. Within the past fifteen years, however, it has rapidly improved, and now there are some sixty men or more in that vicinity who depend upon it almost wholly, during the season.

Mr. Vinal N. Edwards, of Wood's Holl, states that the lobster fishery began in that vicinity as early as 1840.

RHODE ISLAND.—The lobster fishery in this State is of long standing, and is said to have been begun by the early settlers, but we have not been able to obtain any details regarding its growth. The number of lobstermen has greatly increased during the past twenty years, and they now use, on an average, twice as many traps apiece as at that time.

CONNECTICUT.—The lobster interests of this State date back to the early part of the present century, and certainly to before 1810. The lobster fishery within the waters of the State was never very extensive, however, until comparatively recent times, but the Connecticut lobstermen have long been active in the pursuit of their vocation on the coast of Massachusetts, and especially about Cape Cod, as already explained. The important lobster trade which existed for so many years between Cape Cod and New York City, was largely due to their enterprise.

NEW YORK.—The following extract regarding the lobster industry of New York City, in 1853, has come to our notice:

"The annual trade in lobsters and crabs amounts to about $8,000, four fifths of which is for lobsters. Crabs are more generally used for bait than for eating, and there is only one stand that deals in them to any extent. Lobsters come chiefly from Cape Cod and Massachusetts Bay; some from New York Bay. Formerly lobster fishing was more extensively pursued by New York fishermen, but it has turned out to be so unprofitable that it has been almost entirely abandoned. An attempt was made some years ago to revive it, but it was given up as a losing speculation."

NEW JERSEY.—According to the statements of the fishermen of Long Branch and Sea

* Coll. Mass. Hist. Society, Vol. III, second series, page 79.

Bright, the lobster fishery was extensively carried on as early as 1860, the catch being sold to carters for their local trade. The business gradually declined, however, until, in 1870, it was almost wholly abandoned. About 1872 it began to revive, and it has continued to increase in importance up to date.

THE PRESENT RELATIVE ABUNDANCE OF LOBSTERS AS COMPARED WITH THAT OF FORMER YEARS, ACCORDING TO THE STATEMENTS OF FISHERMEN AND OTHERS.

EASTPORT, ME.—Mr. Thomas Holmes, who has been in the fresh lobster and canning business for over ten years, is very firm in his conviction that lobsters are steadily decreasing in abundance from year to year, and that stringent laws are required to protect the fishery. Many more small lobsters are now brought in than formerly, and four times as many traps are required to obtain the same catch. The decrease has been most marked in the several rivers of the region and in the coves and bays that border them. Formerly a large part of the fishing was done in the Pembroke and Calais Rivers, in the former river to within two miles of the town of Pembroke and in the latter as far as Robbinston and Doshe's Island. These rivers were once famous fishing grounds, but now very few lobsters are taken above their mouths. Broad Cove, back of Eastport, was also a rich locality, though now yielding but a small quantity. The lobsters from the Pembroke River averaged very large, and catches were often made in which but few individuals weighed less than 4 or 5 pounds. Lobsters are more abundant this year (1882) than they were in 1880 and 1881. Mr. Holmes roughly estimates the decrease for the past ten years as about two-thirds. He is in favor of a more stringent law, prohibiting the taking of any lobsters under $10\frac{1}{2}$ inches in length. This would for a time affect the interests of the fishermen, who would be unable to dispose of their small lobsters to the canneries, but the fresh lobster trade would not be disturbed, and the former abundance of large lobsters would in time be restored. The canning interests would thereby be seriously interfered with, but no money is now being made in the canning business at Eastport.

Mr. Frederick Holmes thinks there has been little or no decrease, though he admits that many more fishermen in the vicinity are now supplying the markets. His practical experience dates back but a few years.

Mr. William Martin is of the opinion that there has not been a very perceptible, if any, decrease in the abundance of lobsters, though they now run smaller in size.

Mr. George R. Ray, from careful computations based upon the books of Messrs. Pike & Faben, canners, estimates the average catch per boat in the vicinity of Eastport, for the season of 1879 (April 20 to August 1), at 3,939 pounds, the lobsters averaging one pound each. These are important figures for future reference, but we have no data with respect to former years with which to compare them.

MACHIAS, ME.—It may be said that Machias Bay is a very good fishing ground, the statements of several persons warranting the belief that the average daily catch falls but little, if any, short of two lobsters to a pot. A statement is made by Mr. O. S. Church, of Cutler, that one of the boats fishing from that place in 1879 was paid by an Eastport firm for 6 tons of lobsters (about 11,000, by count), being the catch for one season.

JONESPORT, ME.—Lobsters are not abundant enough for the use of trawls, although Mr. G. W. Smith claims that there has been no apparent decrease in abundance during the past ten years. They do, however, run smaller now than formerly. The average season's catch per boat in 1880 was stated by one informant to be about 9,250 lobsters, and by another 10,000 lobsters.

GOULDSBORO', ME.—Mr. J. M. Williams states that lobsters are less abundant than for-

merly. A large daily catch for one man now is 400 lobsters; twenty years ago it was 800 to 1,000 lobsters. The average daily stock at present is said to be about 200 lobsters.

OCEANVILLE, DEER ISLE, ME.—"Lobsters are very small, scarce, and high. This season will finish them. Three years at the most will close up every lobster factory in the State, if something is not done to protect them. The State law amounts to no protection whatever."*

SWAN'S ISLAND, CASTINE, ME.—In 1855 they used to obtain 200 to 250 lobsters daily from forty pots, the smack-lobsters averaging 3 to 3½ pounds each. In 1879 the average catch to forty pots was 75 lobsters, the smack-lobsters averaging 2 pounds each.

ROCKPORT, ME.—Capt. John D. Piper states that lobsters are very much less abundant than formerly.

NORTH HAVEN, ME.—Mr. N. D. Wooster considers that 400 pounds of lobsters is a large daily catch for one man now, while twenty years ago, with the same amount of gear, he could obtain as many as 1,500 pounds in a day.

MUSCLE RIDGES, ME.—Captain Davis, of South Saint George, states that about 1864, when he began buying lobsters at the Muscle Ridges, three men, tending forty to fifty pots each, caught all the count lobsters he could carry to market in his smack. He averaged a trip in seven to nine days, carrying about 5,000 lobsters in number each trip. These three men would catch lobsters as fast as he could market them, and this state of affairs continued for six or seven years, the lobsters during this time averaging about 2½ pounds each, or a trifle more. At present (1879) Captain Davis takes lobsters in the same locality regularly from fifteen men, tending sixty pots each, and at times has to buy of others in order to make up a load. The lobsters carried by him now average about 2 pounds each.

BOOTHBAY, ME.—The growth of the lobster fishery and the decrease of lobsters in this locality have been discussed above in the historical sketch. The summer lobster fishery of this region is now of comparatively little importance. In some places, as in Boothbay Harbor, a few men continue to catch lobsters through the summer. The greater part of the fishermen, however, stop lobstering in May, or perhaps earlier.

BATH, ME.—Mr. R. E. Earll reports, upon the authority of numerous persons, that, notwithstanding the increased amount of gear at present used by the fishermen, and the additional risks and hardships to which they are subjected, they now find the business far from remunerative; but as most of them have their gear, and can fit out with little expense, they are induced to engage in this fishery during the winter season, as it offers, in many places, the only chance of making a living. At present $75 is considered a fair average profit to a man for the winter season, November to April.

WESTPORT POINT, ME.—Mr. Giles R. Gifford says that lobsters are less abundant now than they were in former years.

GEORGETOWN, ME.—One correspondent stated that he had hauled fifty pots for ten lobsters, and thinks one to a trap is a fair average at present, of all sizes. He spent the entire time from September, 1878, to May, 1879, fishing sixty pots, and made only $160, which is, however, much better than most fishermen do in this region.

SMALL POINT, ME.—Lobsters have grown very scarce during late years, and a large share of those taken are unfit for market. The fishery is now carried on by only a few men.

PORTLAND, ME.—Mr. A. L. Johnson writes: "A good catch per day to a man tending fifty pots would number one hundred lobsters; twenty years ago it would have reached four hundred."

* Report of Boston Fish Bureau, Monday, May 8, 1882.

J. Marston & Sons state that, "A large catch per trap now is five lobsters; twenty years ago it was twenty lobsters."

The information obtained by Mr. R. E. Earll, in 1880, lead to the following conclusions: A fair average catch to a pot per day is one marketable and three small lobsters. Formerly the catch was much larger; twenty to twenty-five years ago the average was about seven lobsters to a pot, averaging in weight from 4 to 6 pounds each. A fair average weight now for marketable lobsters is about 2 pounds.

BIDDEFORD POOL, ME.—The opinion is universal among the lobstermen of this region that lobsters have greatly decreased in abundance and size during the present generation. It is probable that lobsters were among the products of the early fisheries at this place, which began in the first part of the seventeenth century; but as a distinct and separate industry, the lobster fishery is said to date back only about thirty years. "At that time," according to Mr. D. B. Le Gallee, of Biddeford Pool, "there were only two or three men, with about thirty traps each, fishing during the summer to supply the local trade, and tending their traps twice weekly. This fishery continued until about eight years ago, never employing more than eight or ten men at a time, the same men engaging in the trawl line fishery in the winter. But lobsters became scarce near shore and the men were induced to begin a winter fishery. There have been, since then, as many as thirty men and five smacks, of about 20 tons each, engaged in the winter fishery, and forty men with two thousand traps, in the summer fishery." With reference to the injurious effects resulting from the right to sell small lobsters, Mr. Le Gallee justly remarks: "There is no factory located at this place, but smacks come here in the summer to supply the factories farther north. They pay on an average 1½ cents each for lobsters, which five or six months later would bring from 4 to 7 cents each, thereby causing much injury to the fishermen. Likewise, the months when the law is not in force are the only ones when soft lobsters are caught in abundance, and at these times the small lobsters are also the most plentiful. Thereby the destruction of the lobster is greatly furthered by the existing laws."

The average daily catch per trap at present is said to be about two lobsters, which is considered to be one-third the average catch of twenty years ago. As to the decrease in size, it is said that in 1876, only sixty-five lobsters, on an average, were required to fill a barrel, while now eighty are necessary. Fifty dollars per month is regarded as fair earnings for a lobster fisherman.

WELLS, ME.—Lobsters have not been abundant in this locality for several years past.

YORK, ME.—The catch has greatly fallen off in late years, and lobsters have also become reduced in size.

NEW HAMPSHIRE.—Mr. Richard Fowler, of Seabrook, states that lobsters are now small and scarce. Mr. A. C. Locke, of Rye, writes as follows: "A large catch now would be one hundred lobsters to a haul; twenty years ago it was two hundred to a haul. The decrease during the past twenty years has been one half."

"The catch of lobsters thus far in New Hampshire has been only about two-thirds that of last season at the same time. The scarcity of lobsters puzzles the oldest fishermen and seems to be wholly unaccountable."*

GLOUCESTER, MASS.—In former times the fishermen made as high as $500 in a season, but now their season's stock seldom exceeds $200. Nearly all the fishermen consulted in the Gloucester district claim that there has been a marked decrease in the abundance of lobsters during the past twenty years, amounting in the estimation of some, to about 75 per cent. Capt. Epes W.

* Cape Ann Advertiser, June 23, 1871.

Merchant states that "in 1818 a man could wade off at low water, at Bass Rocks, Cape Ann, and catch any quantity of lobsters with a common gaff."

Capt. S. J. Martin says: "One man now, with fifty pots, won't catch over one hundred large lobsters a day; twenty years ago, with fifty pots, he would catch four hundred lobsters.

Mr. D. N. Mahlman is of the opinion that "a large catch for a man now per day would not be over twenty-five lobsters. Twenty years ago it was one hundred."

MARBLEHEAD, MASS.—Many of the lobster fishermen affirm that lobsters have greatly decreased in abundance during the past few years.

BOSTON, MASS.—The fishermen all report a considerable decrease in the abundance and size of lobsters, which they say has been going on steadily from year to year. The cause assigned is overfishing.

Mr. James A. Young says: "For one man, with eighty traps, a large catch now would be three hundred lobsters daily. One man twenty years ago, with thirty traps, would catch the same number, but twice the weight."

Mr. J. W. Marston states: "Present catch, one hundred and seventy-five lobsters of marketable size. Twenty years ago, with the same number of traps, the catch would probably have been double."

According to Mr. G. L. Sampson, of Point Shirley, "one hundred a day of marketable size would be a large catch for a man, while twenty years ago only seventy-five of marketable size would be taken; but we set more pots now than then."

Mr. Charles E. Gove, of Nahant, states that "fewer lobsters are caught about here now than was ever known before."

SCITUATE, MASS.—According to Mr. William Bates, the present catch is about two hundred a day; twenty years ago it was four hundred.

PLYMOUTH, MASS.—"A writer in the Boston Transcript says that 'the strange changes in the amount of yearly production of lobsters is very puzzling to fishermen. In Plymouth Bay they used to find good-sized lobsters very plenty, while now the production both inside and upon the coast is very much diminished, both in size and numbers. They attribute it partly to the raking of the rocky bottom for Irish moss, which is now carried on to a great extent. By this means the young lobsters are uncovered and often destroyed, as they need the refuge of the moss both for growth and safety.'"*

Information from the fishermen corroborate the above statement, the lobster fishery at one time having been very extensive.

BARNSTABLE DISTRICT, MASS.—This district, including all of Cape Cod as far south as Falmouth and Wood's Holl, was at one time the most important one upon our coast as regards the lobster fishery, but now it is among the least productive. The history and decline of this fishery, especially about Provincetown, has been quite fully treated of in the foregoing historical sketch and in the coast review, but we present below a few additional statements from fishermen and dealers.

PROVINCETOWN, MASS.—Captain Bowley writes as follows: "For many years lobsters were very plentiful about Provincetown, and men could anchor in the harbor and catch three hundred or four hundred a day. Thousands were let out of the cars because they would not bring a cent apiece. Now (1879) seventy or eighty pots can be hauled without obtaining more than eight or ten lobsters daily. The lobster fishermen cannot gain a livelihood by selling their catch at 7 cents apiece."

* Forest and Stream, vol. iv, 1875.

NORTH TRURO, MASS.—"It is unusual to get forty lobsters in a day (forty-five traps), but fifteen are often taken."

YARMOUTH PORT, MASS.—Mr. Benjamin Lovell states that "twenty years ago, with half the number of pots, you could catch 5,000 in a week. This season (1880) only about 5,000 have been caught in all."

WOOD'S HOLL, MASS.—According to Mr. V. N. Edwards, "we use ten times as many pots now as formerly, and do not catch as many lobsters."

EDGARTOWN DISTRICT, MASS.—A full account of the history of lobster fishing in this district is given in the Coast Review, further on. The principal lobster grounds are in Vineyard Sound, and off Gay Head, No Man's Land, and Cuttyhunk. The fishery began in the vicinity of Gay Head about 1860, but has attained its present proportions only within a few years. It is an interesting fact that, within this period, lobsters have steadily decreased in size and abundance in the upper part of Vineyard Sound, while there has been a proportionate increase in numbers, and the size has remained constant farther out. This apparent change is evidently due to the more recent development of the outer fishery, as the inner grounds became depleted.*

Mr. F. M. Cottle, of West Tisbury, writes that "the catch is now less, because of the 10½-inch law. There would be no difference, providing the same traps were used without restriction."

Mr. D. Vincent, of Chilmark, states: "We probably catch about two-thirds as many as when we first began."

NEW BEDFORD, MASS.—Mr. A. G. Mayhew says that "the catch is now less than formerly. Twenty years ago a man would average four hundred lobsters a day; now the average is two hundred a day."

RHODE ISLAND.—Mr. Christian Francis, an intelligent lobster fisherman of Narragansett Bay, states that the season of 1880 was the best he ever experienced in the lobster fishery, although the seasons of 1878 and 1879 were not far behind in the extent of the catch. This increased production resulted from the use of a greater number of pots, as Mr. Francis affirms that there has been a marked decrease in the abundance of lobsters during the past six years. The testimony of many other fishermen was to the same effect, but very few thought that relief could be gained by the enactment of protective laws. At this same period (1880), when the inquiries regarding the lobster industry were being made, the fishermen complained that their fishery was being destroyed by the visits of fishermen from other States, who set more pots than they did, and covered the most of their ground. Since then stringent laws have been passed by the legislature of the State, forbidding the capture of lobsters in the public waters belonging to the State, by fishermen of other States, and also prohibiting the capture and sale of lobsters under 10 inches in length.

Mr. J. M. K. Southwick, of Newport, states that there is no doubt but fewer lobsters are taken to a pot now than formerly. He based his conclusions on the statements of many fishermen of the vicinity.

Dr. Horatio R. Storer, of Newport, has written as follows: "My neighbors here (I live in the midst of the fishermen) are exercised because crews come here from other States, and remain for months at a time, in the spring for lobsters and in the winter for cod, and they think that the lobsters are rapidly decreasing, perhaps, in part, from their own stupidity, for they often break to pieces the small ones to prevent their entering the pots and stealing the bait."

CONNECTICUT.—Most of the lobstermen of Connecticut agree that there has been a decrease in the abundance of lobsters during the past few years, and that the greatly increased catch has been realized only through the use of a much greater number of pots, the number of fishermen

* For more recent information respecting this region see page 698.

having also increased at the same time. The decrease is variously stated to have amounted to from one-third to one-half within the past five years. The majority of the fishermen are, however, opposed to the law limiting the fishery. One section of the law, that prohibiting the capture and sale of lobsters with spawn from the 1st to the 15th of July, is especially ridiculed by the fishermen, who claim that during that period not one lobster in a thousand will be found with spawn.

STONINGTON, CONN.—Mr. Franklin Noyes writes: "Present catch per man about 50 pounds a day; twenty years ago, about 200 pounds a day."

NOANK, CONN.—Mr. J. H. Latham states: "I think more are now carried to market than ten years ago, but there are ten pots now where there was but one ten years ago." Another correspondent at the same place states that the average daily catch is now about 500 lobsters against 150 twenty years ago; but the gear is much better now.

NEW LONDON, CONN.—Mr. George P. Harris states that lobsters have decreased about one-third.

SOUTH NORWALK, CONN.—Mr. Francis Burritt says sixty pots should catch 100 lobsters now; five years ago, 200 would be taken.

NEW HAVEN, CONN.—Mr. William Fuller writes: "It would be hard to tell what was a large catch twenty years ago, for they were so abundant; but now 300 pounds a day is a good catch for one man. Sometimes a string of a dozen or twenty pots will be hauled and not get half a dozen marketable lobsters; perhaps the next day there may be from fifty to one hundred."

Mr. H. S. Merwin, of Merwin's Point, states that twenty years ago the catch was much larger than now.

NEW YORK.—According to Mr. Eugene G. Blackford, of Fulton market, lobsters were once abundant in New York Bay and Hell Gate, but now they are virtually extinct. The causes are stated to have been both overfishing and the pollution of the waters by neighboring factories.

NEW JERSEY.—From this State there is a reported decrease in size, but lobsters are supposed to be nearly as abundant there now as formerly. The fishery, however, is of slight importance.

THE BRITISH COAST PROVINCES.—Although the lobster fishery of Nova Scotia, as a regular industry, is of more recent origin than that of New England, there had already been, prior to 1880, numerous complaints of a falling off in the supply. According to some writers the decrease was so marked as to seriously threaten the interests of the canneries, and the matter was taken in hand by the Dominion commissioner of fisheries. In 1879 a law was enacted imposing a close time from August of that year to April, 1880. We have received some correspondence respecting the abundance of lobsters on the coast of Nova Scotia, but as it refers to only a few localities, it seems best not to include it here.

In New Brunswick and Newfoundland, the same subject has been under discussion during the past two or three years, with a view of ascertaining the best means of preventing any injury to this industry by overfishing, and great interest has been displayed in the matter by both legislators and fishermen.

THE DECREASE OF LOBSTERS ON THE COAST OF EUROPE.

NORWAY; REPORT BY AXEL BOECK.—In a very interesting paper on the Norwegian lobster fishery and its history, by Axel Boeck, published in 1868 and 1869,* that author gives a detailed account of its gradual growth from earliest times, of the early recognized decrease of supplies,

* Om det norske Hummerfiske og dets Historie of Axel Boeck; in Tidsskrift for Fiskeri, 3 die Aargangs, Kjobenhavn, pp. 28–43, 1868, pp. 145–189, 1869.

and of the important measures taken to protect this important food product. Every part of this lengthy historical sketch contains facts worthy of consideration in connection with our own fishery, but want of space forbids our reproducing here more than that portion bearing upon the period from 1820 to the date of publication of the report. This, however, is the part of most value for our consideration, as it contains conclusive evidence of the possible decrease in the abundance of lobsters, which many of our fishermen have been led to deny, and also discusses the probable causes of such decrease, and the effects of legislation in preventing it and in renewing the supply.

Professor Boeck's report is as follows:

"The number of lobsters exported in 1821 and 1822 amounted to over a million a year, and increased still more during the following years, although it was not so large in 1823 and 1824, on account of the unfavorable weather. From 1825 to 1830 the average number of lobsters exported annually was 1,268,000, and in 1827 and 1828 the highest number was reached, viz., 1,500,000. These large numbers, however, were caused not so much by the fisheries being just as productive, or more so, in the old lobster stations, but by the circumstance that new English companies, seeing the great profit to be derived from this trade, commenced to export lobsters from places from which they had never been exported before. Thus, lobsters began to be exported in 1828 from the district of Tönsberg, and from Söndmör in 1826, and during the two following years from Molde and Christianssund. The exports from Stavanger and Egersund meanwhile decreased very much, having been reduced to 67,000 per annum in the latter place in 1827, when the exports from the whole of Norway amounted to 1,429,703. After 1830 the exports began to decrease even in the new districts, so that the annual average quantity of lobsters exported during the five years 1831–'35 was only 640,000. The only places that kept the lobster trade alive were the new districts, while all the old ones decreased rapidly, some of them to such a degree that according to the governors' reports the lobster trade must be considered almost extinct in 1835.

"When the attention of the fishermen was directed to this decrease of the lobsters in the old districts, people began to be afraid that the poor fishermen would entirely lose this means of earning a living; and it was supposed that the decrease was chiefly due to the fisheries being carried on during the spawning season of the lobster. In 1830 Mr. T. Lundsgaard, member of the Storthing (Norwegian Parliament), therefore made the motion to pass a law forbidding the catching or exporting of lobsters from June 15 to October 1. The committee which had this matter in charge proposed that the motion should be laid on the table, because Mr. Lundsgaard had not produced any information which might enable the committee to judge with certainty to what extent this dreaded decrease of the fisheries really existed, and whether the evil could be remedied by the measures that were proposed. The committee likewise thought that such a measure would be too great an encroachment on the rights of many places on the coast, taking away from these regions their only source of income. The Government, however, thought that the matter was of great importance; and as the report of the committee showed that only want of information had prevented any action being taken, it requested those districts in which the lobster fisheries were carried on, to have the matter examined by the local officers and other competent men, and to send in a report stating whether it would be useful to pass a law on the subject; and, if so, to state the objections to Mr. Lundsgaard's proposition. All the reports which reached the Government in answer to this request agreed that the lobsters had decreased in size, but some supposed that the great masses of spring herring coming near the coast might have had an influence on it, or that this decrease in the size of the lobsters might be caused by their young ones being disturbed by the cutting of seaweeds for manure; others advised not to pass any law against exporting lobsters

from June 15 to October 1, fearing that the exports to England might thereby be hindered, as the companies would naturally not consider the lobster trade profitable unless it was steady; and the fishermen would lose their income during the time when exportation was forbidden, or they would evade the law, continuing to fish and keeping the lobsters till exportation was again permitted. Others again raised objections based on their knowledge of the natural history of the lobster, considering it doubtful whether the lobster spawned and shed its shell during the time indicated, and even if it were the case, that the time was too long. Reports from other districts, such as Stavanger, said that such a law was unnecessary, as no fishing was, anyway, going on during that time. These objections to such a protective law could not have much influence, especially those founded on the natural history of the lobster, for they could not be proved. But even the fear of an entire stoppage of the lobster trade would be causeless, as such an event would be much more injurious to England, whose inhabitants had accustomed themselves to this luxury, than to Norway, which received but little money for her lobsters. From other sides it was said, in favor of the law, that such a protection would be useful, as the lobster very easily dies during the season when it spawns and sheds it shell, although this season is not the same everywhere. Those who might suffer from limiting the fishing season would be fully compensated for this, by the greater number of lobsters that would be taken during the season when fishing was permitted; and the fishermen should, at any rate, during summer devote their attention more to working their small farms and to the herring fisheries. The Government found that the whole matter was not yet sufficiently clear to say with certainty whether such a prohibition of lobster fishing during the season when the lobster spawns and sheds its shell, would prove generally useful. The districts where lobster fishing was carried on were, therefore, requested to have those fisheries thoroughly examined for several years by competent men, and then again send in reports as to whether such a prohibition would be useful. It was likewise requested that an opinion should be given regarding a proposition made by some people in the district of Nedernees and Raabygdelagen, to divide the coast into small districts, where lobster fishing should be alternately protected, so that if a district had enjoyed the privilege of fishing for three years, fishing should there be forbidden during the three following years. The reports coming in, in answer to this request, contained a very extensive prohibitory law, recommended by the above-mentioned district, suggesting that fishing should be prohibited from March 1 to October 1, and advising that no lobsters measuring less than 8 inches should be caught; the length of time when fishing was to be prohibited should be three years in each district. Another district only wanted to have fishing prohibited from July 1 to November 1, but was not in favor of alternating the time between the districts. The Stavanger district reported that as fishing was going on there only in April, May, and June, no law would be required, and none would be desirable, especially if it were to forbid fishing during the month of June, when the weather was favorable and the fishermen had most time for it. The lobster did not spawn on that coast till August and September. It was also thought that the number of lobsters had not diminished, but that they now staid deeper in the water, finding enough food in the roe left by the herrings; alternating protection was not thought advisable. The report from the South Bergen district was essentially the same, and the Romsdal report said that lobsters were only caught from the end of May till the end of July. As there were, moreover, many different opinions regarding the time when the lobster spawns and sheds its shell, the Government resolved to get the opinion of scientists on this point, and requested Professor Rathke, Prof. C. Boeck, and Professor Sars (at that time a clergyman) to make a report on the nature of the lobster. Professor Rathke in his report said that, in his opinion, the pairing season of the lobster was over before midsummer, and that the shedding of the shell took place later, but he thought at the same

time that the mass of lobsters that came near the coast during the spawning season was so large that the comparatively inconsiderable number that were caught would scarcely be noticed. He also thought that it would be so difficult to enforce the law, that it would be more injurious than useful. Professor Sars thought that a thorough investigation of the spawning process of the lobster would be the only safe basis of any law; but this process was still very much enveloped in obscurity. He supposed, however, that fishing could be carried on till the eggs came out of the ovary, and were fastened under the tail, which took place in June, and fishing should consequently be prohibited from June 1 till September 15. He did not think that the number of lobsters had decreased, but that it only seemed so, because nowadays more people were engaged in fishing, and fewer lobsters consequently fell to the share of each fisherman. He thought, however, that the lobsters had diminished in size. In a later report he expressed his opinion that lobster fishing should be prohibited from June till the middle of September. Prof. C. Boeck gave in his report, in the first place, a description of the lobster's mode of life, and a criticism of the reports on the condition of the lobster fisheries, sent by the governor. He showed from statistics that a decrease in the number of lobsters was both possible and probable, on account of the increased fisheries during the past years. The lobster is a coast animal, and only stays where it can easily get a sufficient supply of food, therefore near the coast, and only as far from it as sea-weeds are found, among which it finds the animals that constitute its food. Even if it wanders about, it does not go far, moving in winter into a greater depth, and during summer into the shallow water near the coast. It then swims about on the surface of the water, but never goes very far, its structure not being adapted for longer journeys. The fact of the matter is, therefore, that a certain number of lobsters belong to a certain extent of coast, which, by propagating freely, may increase if they have sufficient food, or decrease from a natural mortality or too much fishing; and in this latter case, the losses cannot easily be made up by lobsters coming in from the adjoining districts. There can, consequently, be no doubt that the lobster can, on a given stretch of coast, be exterminated by continued persecutions, or its number, at least, be diminished to such a degree as to make lobster fishing unprofitable. Such an event would occur all the sooner if the coast in question be not favorable to its increase. From the reports which had come in, it seemed that certain places were less favorable to their propagation, or possible immigration from adjoining districts, than others, and from such districts the complaints concerning the decrease in the number of lobsters had come. In other places the bottom of the sea along the coast was a convenient place of sojourn for the lobsters, and the number caught was but a small part of those that lived and were born there. In such places the fisheries would be productive and steady. But even there continued exhaustive fishing would diminish their number, especially if there should be an unfavorable year for the growth and development of the lobster. Prof. C. Boeck considered it, therefore, not only desirable, but even necessary for the even maintenance of the fisheries, that there should be certain limitations, so that lobsters should not be caught to such a degree as to make an entire stoppage of the fisheries for a period of time necessary. He believed that the proposed law, in obedience to which lobsters should only be caught at certain seasons of the year, would not fully answer the purpose, especially as no fishing was going on during the proposed time of prohibition in those districts from which there were the loudest complaints of the decrease of the lobsters. He thought, on the other hand, that a law prescribing that only lobsters of a given minimum size should be exported and sold, would keep the fisheries in an even condition. Regarding the size of the lobsters that were to be offered for sale, sold, and exported, he thought that, even if it could not be definitely settled at what age and what size a lobster was capable of spawning, it could, to some extent, be ascertained from an analogical comparison with the river crawfish. This is supposed to

be fully developed sexually in its third year, when it is 4 inches long, but it may attain an age of twenty years and a length of 6 inches. He, therefore, supposed that the lobster becomes capable of spawning when it is three years old and has reached a length of about 8 inches, while lobsters measuring less are seldom found to have any roe. In order, therefore, that the lobster before being caught may not only reach the size when it may be considered fully grown, but might also be supposed to have contributed something toward the propagation of the species, a minimum size of a little more than 8 inches should be agreed upon, for lobsters which might be caught and exported. Possibly 8 inches might be sufficient, as the English generally do not buy any from the fishermen which do not have this size.

"In consequence of this report, the ministry petitioned His Majesty to recommend to the next Storthing the passage of a law forbidding the offer for sale and the sale of lobsters that did not measure 8 inches in length, inclusive of the head and tail.

"The following royal proposition for a law limiting lobster fishing was thereupon published November 5, 1838:

"'We, Carl Johan, &c., make known, &c.:

"'§ 1. That it shall be forbidden in this kingdom to offer for sale or sell lobsters which do not have a minimum length of 8 inches, inclusive of the head and tail. For every lobster offered for sale or sold which shall not have this length, a fine of 24 cents shall be paid, half of which shall go to the police or custom-house officer, or any other person denouncing the offender, and the other half to the poor. All cases of this kind are to be brought before the police courts.

"'§ 2. Lobsters which do not have the above-mentioned length, shall not be exported.'

"The Storthing committee which had to consider this matter hesitated to recommend to the Storthing the passage of this law, basing their objections on several reports from the lobster districts and on Professor Rathke's report. Their chief objection, however, was that the fishermen would consider such a law as limiting their liberty, and, not being able to understand its utility, would thereby only be encouraged to follow the dictates of selfishness and transgress the law. It was, moreover, thought that it would be difficult to exercise any sufficient control, and that the trade would be injured thereby. The law was therefore not passed. This was the fourth time that a moderate proposition had been made to protect the lobster in order to avoid the total ruin of the fisheries. In the *first* proposal, by Judge Lom, it had been suggested that the lobster should be protected at certain seasons of the year, when it spawns or sheds its shell, and likewise that those lobsters should be protected that had not reached a certain length. In the *second*, by Mr. Gjertsen, only a certain annual season of protection was suggested; as was also done in the *third*, by Mr. Lundsgaard. The *fourth*, or Government proposal, only suggested that lobsters below a certain size should not be caught.

"It was not long before there were again numerous complaints of the decrease in the number of lobsters, which, according to the testimony of impartial men, was owing to lobsters being caught at a time when they spawn and shed their shell. Before anything further was done in the matter, a fishery commission that had been appointed made a proposal regarding the lobster fisheries which must be mentioned here. In 1840 the Government appointed a commission to revise the fishery laws. The following were members of this commission: Judge Landmark, Consul Meltzer, Messrs. Tangen and Moses, merchants, Rev. (now Professor) Sars, and Chief Pilot Monsen. One passage of the law proposed by this commission reads as follows: 'On their own property, as far as 10 fathoms from the coast at low water, the owners shall have the exclusive privilege to catch all small fish, lobsters, and oysters, but any one may catch lobsters outside of unimproved land bounding the sea without regard to the distance from the coast.'

"In this proposition, which, however, never became a law, the old idea is revived that the lobster fisheries, properly speaking, belong to the land-owners, which, in spite of the decree of 1728, had formed the subject of discussion all through the last century. Even if this proposition had become a law, it would not have exercised any great influence on the lobster fisheries, which are almost exclusively carried on along unimproved coasts which can scarcely ever be subjected to cultivation. No new law regarding the protection of lobsters was introduced in the next Storthing, but in 1845, when the Storthing had assembled, the department of finance and customs received a letter from the agent of the English lobster company in Stavanger, that another English company intended to continue the lobster fisheries, which, in that district, usually cease toward the end of June, during July, August, and September, hoping thereby to gain over the lobster fisheries, and thus to destroy the trade of the other company. As this agent was afraid that fishing during those months would ruin the lobster fisheries in this district for several years to come, he urged the department to introduce the royal proposition of a law in the Storthing, forbidding lobster fishing from June 15 to October 15. The department requested the governor to give his opinion on the subject. He stated, as he had done on a former occasion, that such a law would be unnecessary, as the lobster is not fit to eat during those summer months, and none could therefore be exported. During this and the following years lobsters were, nevertheless, caught and exported during those months, as the two companies vied with each other, each endeavoring to secure the trade. The price of lobsters rose considerably, and all those that were caught were bought up, even during the season when they spawn and shed their shell, although every one saw what injury was being done, and although the mortality among the lobsters was great, and the consequent loss considerable. All this soon bore its fruit, but few lobsters being caught in 1847 in those places where in 1845 fishing had been going on till the end of August, while the fisheries were productive in those places where they had ceased in July. All were now agreed that it was injurious to catch lobsters during the season of the year when they spawn and shed their shell, which, in the districts in question, was supposed to take place in August and September, and it became evident that such continued fishing would in a short time drive the lobsters entirely from the coast. To prevent such a misfortune the governor at last resolved to request the department to issue a provisional regulation, forbidding lobster fishing during the months of August and September. The department, however, again considered it necessary to get reports from the lobster districts and from the agents of the English lobster companies. Some of these reports declared that lobster fishing should be forbidden from the middle of July till the middle of October; others that there should be no fishing during August and September. The agent of an English lobster company in Jarlsberg and Laurvig, however, advised against any prohibition of the lobster fisheries, saying that such a prohibition during the summer months would cause the English lobster companies to stop this trade, ice hindering the fisheries in winter and spring, and storms those in the latter part of autumn, so that the fisheries commenced gradually in May and lasted till the end of September. They are most productive in July, August, and September. The decrease of the lobster fisheries he ascribed not to the summer fisheries, which were said to diminish the number of lobsters, but to the circumstance that the people of the district devote their attention more to the profitable mackerel fisheries. The governor was of the same opinion. A totally different opinion, however, was entertained by other competent and trustworthy persons in Laurvig and the neighborhood, who, from information obtained by the lobster fishers of that district, judged that such a prohibition of fishing from the middle of July till the middle or end of September would have a favorable influence on the preservation of the lobsters. The governor of the Lister and Mandal districts showed in his report, by examples from the years of war, that the more the lob-

sters are protected the more will they increase in number; and their decrease since 1830 was almost unanimously ascribed to the summer fisheries, which are going on at a time when the lobsters spawn, although the spawning does not occur at the same time in every place. Such a prohibitory law would therefore be of great importance for the lobster-fisheries. It was true that, on the other hand, the trade would be somewhat inconvenienced by such a law, the prices would fall, and it would be necessary to modify the time when fishing should be prohibited, according to different local circumstances. The reports that came in from the other districts likewise favored the prohibition of fishing during the months of July, August, and September, some even advising an extension of this time from May till October. Another agent of an English lobster company, however, warned against any interference by law with this trade, particularly on account of the fishermen, who would not be able to earn their living during a great part of the year. The decrease of the fisheries was, in his opinion, chiefly caused by the fact that fewer men were employed in them, the increase of navigation and the rich herring and mackerel fisheries employing so many men. He supposed, moreover, that a law prohibiting the catching of lobsters during a certain period would not prove beneficial to the lobster trade, but that an undoubtedly more productive fishery during the months when fishing would be allowed would have a very injurious effect on the market. The Bergen Board of Trade were of opinion that such a prohibition, if it did not extend to the months of May, June, and July, would not disturb the fisheries in the Bergen district, which are chiefly carried on during these months, but that it would not be advisible to forbid fishing during these months. If it was absolutely necessary to pass some law for the preservation of the lobster, they would advise the Government to take up the old proposition not to catch and sell lobsters measuring less than 8 inches. The governor of the North Bergen district considered it desirable that the lobsters should be protected from the middle of July till the middle of September. In Romsdal, however, no prohibition was desired between June 15 and September 15, since fishing was going on during this very period. As so many different opinions had come from the different parts of the country, and as it seemed desirable to hear the opinion of several naturalists, Professor Rasch was requested by the Government to prepare a law for the preservation of the lobster, giving the full reasons for such a law. In his report to the department he first of all gave his view regarding the pairing season, and then regarding the time which elapses between the pairing and the emission of the eggs from the ovary. He found that the pairing season of the lobster extended over a long period of time, viz, from the time it first sheds its shell in September till April or May, but that the embryo does not develop till the heat of summer sets in, no matter whether the spawning has taken place in autumn, winter, or spring. Most of them have their eggs hatched in July and August, and the young lobsters leave their mother from the middle of August to the middle of September.

"He had found, moreover, that the lobster was capable of propagating before it had reached a length of 8 inches. He would therefore propose—

"SEC. 1. His Majesty may take measures for protecting the lobsters during a continuous period of two to three months annually in every district of the Kingdom, at the request of the respective governors.

"SEC. 2. The season of protection shall in every case embrace the whole month of August.

"SEC. 3. The protection may extend both to males and females, or only to the latter.

"SEC. 4. Whoever catches lobsters, or offers them for sale, during the close season, in the district or districts where there is such a law, shall pay a fine of 24 cents for every lobster which is caught or offered for sale contrary to the law.

"SEC. 5. In the district or districts where the protection extends only to the female lobsters,

a fine of 24 cents apiece shall be paid by every one who, during the season of protection, allows female lobsters to be caught and offered for sale, or in any way trades in such.

"SEC. 6. The same fine shall be imposed on lobster dealers or their agents if they receive and ship lobsters caught during the close season, in accordance with the law in force in the district in which the lobster station is located.

"SEC. 7. The sums realized by these fines go half to the person who denounces the transgressor, and the other half to the poor fund of the respective district. All such cases must be brought before the police court.

"Professor Rasch has given his reasons for the provisions of the above law as follows:

"'Although there are frequent complaints that general game and fishing laws are not suited to all the districts of this large country, where the different degrees of latitude and local circumstances produce great differences with regard to the pairing season, the periodical arrival, &c., of the same races of animals, he had in most cases found fewer differences than one in general might be led to suppose. He proposed section 1, so that every district should have the season of protection best suited to its circumstances.'

"Regarding section 2 he says:

"'As in his opinion it seemed sufficiently proved that the most prolific hatching season occurs in the month of August, even in the most northerly portions of the country where lobster fishing is carried on, he thought that, in all cases, this month should be included in the season of protection.'

"Regarding section 3, he thought that the strictness of the protection might be relaxed a little in those districts where the summer fisheries, on account of peculiar circumstances, cannot be entirely stopped without immediate loss to the poor coast population. He thought, moreover, that by protecting only the female lobsters, the purpose of the law with regard to the preservation of the species will be just as fully answered as by protecting both sexes during the same period of time. The objection may be raised that it will be difficult to distinguish between a female without outside roe and a male; but the difference of sex is so great that a fisherman may be able to tell it at the first glance. Nor would he only protect those lobsters which have outside roe, as this may easily be scraped off. Irregularities of the normal sexual relations will be of very little importance, as most of the females which have been protected will be caught by the fishermen when the season of protection is over, as they go but a short distance from the place where they stay. The objection made to the law, that it would force the fishermen to return the products of the sea to it, he considers to be of great importance, but he hoped that they would see what a great risk they ran by unlawful fishing, and be convinced that protection will in the long run benefit their trade.

"From the above it will be seen that, with the exception of the governors of Jarlsberg and Laurvig, and two of the lobster-agents, all local authorities and competent men were in favor of the opinion that the decrease in the number of lobsters noticed during the last few years, had been caused by too extensive fishing during that part of summer when the lobster spawns, and had considered a law prohibiting lobster fishing during a certain period of summer and autumn as the only effective means of protecting this important animal. But others, we see, wished to have the protection extended from June or May till October; others only from July to September; and others, again, only to August and September. Both in Sweden and Heligoland there are laws prohibiting the catching and selling of lobsters from July 1 till September 15, and in Scotland it is forbidden, under a penalty of £5 each, to catch lobsters from June 1 till September 1; and in England no lobster is allowed to be sold which measures less than 8 inches. The Gov-

ernment also considered that protection during the season of the year when the hatching is chiefly going on would answer the purpose, and that it could be more easily maintained than a law prohibiting the fishing and selling of lobsters below a certain size. As the young are chiefly hatched during the month of August, but also during July and September, the Government thought that August should be included in every close season, while it should be left to the local authorities, with royal approbation, to extend this legal season of protection to July and September, in accordance with the local circumstances of every district. By adopting these measures, the trade would not be restricted to any serious extent. This was also granted by the commissioners of the English lobster companies, and, as far as the fishermen are affected, they can easily find work in nearly every part of the Kingdom during August, while, on the other hand, the protection of lobsters during a certain period will make the fisheries all the more productive during the months when fishing is allowed. With regard to the other objections to limiting the fisheries during the summer months, viz, that in the districts of Romsdal, Jarlsberg, and Laurvig, they are only carried on from the beginning of spring or summer till some time in the fall, the Government remarked that this could scarcely be caused by any special arrangements of the lobsters on these parts of the coast, but is a natural consequence of the circumstance that the fishermen in the district of Romsdal during spring and autumn are employed in the great fisheries, while in the districts of Jarlsberg and Laurvig this is caused by the natural hindrances of ice and storms during spring and autumn. But especially in these districts a law prohibiting fishing during the month of August could not limit this trade very much, compared with the beneficial consequences which such a law would have. The Government thought that the prohibition should extend both to male and female lobsters, which opinion was finally also shared by Rasch. The Government also proposed that the law forbidding the export of lobsters should extend the time when export was not allowed eight days beyond the end of the close season, so as to enable the fishermen to fish up to the very commencement of the close season.

"On January 26, 1848, the King signed the following proposition for a law for the protection of lobsters, to be laid before the Storthing during its next session:

"'We, Oscar, &c., make known:

"'For some time complaints have been made that the number of lobsters on the coasts of the Kingdom has decreased considerably, especially since the year 1830. Competent men have been consulted as to the possible causes of this phenomenon, as likewise as to the means by which the lobster might be preserved, and a royal proposition for a law forbidding the catching or export of lobsters measuring less than 8 inches in length was laid before the Storthing, but was not passed. Renewed complaints of the great decrease in the number of lobsters have recently come from several parts of the country, petitions have been sent in asking that the catching of lobsters at certain seasons of the year might be forbidden, and from the information received on this point it has been considered absolutely necessary, for the preservation of the lobster, to fix by law a certain season of protection for this marine animal.

"'His Majesty would therefore invite the attention of the Storthing of the Kingdom of Norway to this subject, and ask them to pass a law regarding the protection of lobsters, in accordance with the accompanying draft:

"'*Draft of a law regarding the protection of lobsters.*

"'1. It shall be forbidden to catch or sell lobsters during the month of August.

"'2. In accordance with a request made by the respective local authorities, the above-mentioned period may be extended in the different districts by the King, but it shall in no place last longer than from July 1 to September 30.

"'3. The fishing or selling of lobsters during a period when it is forbidden in accordance with sections 1 and 2 is punished with a fine of 24 cents for every lobster caught or offered for sale contrary to law.

"'4. All cases arising from transgressions of the regulations contained in sections 1 and 2 must be brought before the police courts. If any one is accused of such transgression, the chief of police in the district shall get his declaration whether he is willing to pay the fines. If he is willing and does not possess the necessary amount of money, it shall be levied on his property. If, on the other hand, the accused denies his guilt, or refuses to pay, the above-mentioned officer shall have the matter investigated and settled. The fines shall be divided between the informer and the local poor-fund.

"'5. During the period when, in accordance with sections 1 and 2, it is forbidden to catch or offer for sale lobsters, as well as during eight days following the end of this period, it shall likewise be forbidden to ship lobsters to foreign parts. Attempted or actual transgressions of this article shall be punished in the same manner as provided in the law of September 20, 1845, regarding attempted or actual smuggling.

"'6. This law shall take effect January 1, 1849.'

"In the committee to which the royal proposition was assigned for consideration, the first two articles were changed, so as to make the season of protection stricter. In the royal proposition the local authorities could under special circumstances propose that the season of protection be extended to the months before and after August; but the committee were of the opinion that the law should be enforced during a longer period, but in special cases the local authorities might propose that it should be limited to the month of August, to such a degree had public opinion changed in favor of such protective law.

"When the matter was discussed in the Storthing April 29, 1848, not a voice was raised against a protective law, but the discussion was chiefly as to whether the law should be adopted in its stricter form as recommended by the committee, or as proposed by the Government. The law was finally adopted in the form recommended by the committee, modified by an amendment that the season of protection should last from July 15 to the end of September. The first portion of section 5 was also changed so as to read as follows: 'Eight days after the beginning of the period during which, in accordance with sections 1 and 2, it is forbidden to catch lobsters or offer them for sale till eight days after the end of this period, it shall be likewise forbidden to ship lobsters to foreign parts.' As for the rest, the law was passed in the shape recommended by the committee; a motion to change the above-mentioned eight days to twelve days or three weeks being lost, as likewise another motion that the law should not come in force till January 1, 1850.

"The law, which was adopted in the same shape by both houses of the Storthing, and was sanctioned by the King, came to read as follows:

"'1. It shall be forbidden to catch or offer for sale lobsters during the period from July 15 till the end of September.

"'2. In accordance with a request from the respective local authorities, this period may be limited in different districts by the King; but the season of prohibition must in every case embrace the whole month of August."

3 and 4 are precisely as in the royal proposition.

"'5. From eight days after the beginning of the period during which, in accordance with 1 and 2, it is forbidden to catch lobsters or offer them for sale, till eight days after the end of this period, it shall likewise be forbidden to export lobsters to foreign parts.

"'6. This law shall come into force January 1, 1849.'

"By this law, which forbids all fishing during two and a half months, the yield of the fisheries was of course somewhat diminished during the first years following its passage, till the protected young could reach the necessary size. Thus fewer were exported in 1849 and 1850 than during the preceding years, so that, while from 1846 to 1848 about 600,000 were exported, the number had fallen off to 408,310 in 1849 and 427,600 in 1850. This decrease, however, is not merely owing to the circumstance that the number which were usually caught during the close months remained in the sea, but likewise to the fact that the English joint stock company which carried on the exportation from the districts of Jarlsberg and Laurvig, began to pay a lower price for the lobsters, so that the fishermen resolved no longer to catch any even during those months when they were permitted to do so. While from this district there were from 1846 to 1848 on an average about 26,000 exported every year, only 7,960 were exported in 1849, 1,664 in 1850, and none at all during the following years; but, in 1855, 14,470 were again exported, chiefly to Copenhagen. Since 1850 the lobster trade has steadily increased, and the governors, in their quinquennial reports on the economical condition of their respective districts, state that protection seems to have produced this result.

"In the district of Stavanger the exports rose from 1850, when they amounted to 120,653, to 204,803 in 1854; in the South Bergen district it is also stated that the fisheries have increased. Of the following years the least productive was 1858, when the exports from the whole Kingdom only amounted to 553,238, on account of unfavorable weather during the whole fishing season; but in 1860 the number had again risen to 1,333,037, and kept tolerably steady during the following years, so that the exports during these years were about the same as during the years 1825–'30, when they were at their highest, only to decrease very rapidly during the following years. In 1860 the exports rose to 1,000,000, and increased constantly, till in 1865 they very nearly reached 2,000,000, viz, 1,956,276.

"The complaints regarding the protective law have now ceased, since the Government has, in several districts, limited it by royal decrees, and in many places the people are rather inclined to extend the season of protection than to limit it, as in the district of Stavanger, where two years ago public opinion was in favor of prohibiting all fishing during autumn and winter, as it was thought that thereby the spring and summer fisheries would become all the more productive. As a general rule, no lobsters are exported from there in autumn and winter, except when some new English companies want to get into the lobster trade, and therefore buy the lobsters at a higher price than is usually paid, so as to ruin their rivals. Then all the lobsters that can be obtained are generally bought during autumn, as was the case in 1845 and 1846, and to some extent in 1864 and 1865. During the last-mentioned year such a large quantity of lobsters was caught, on account of the unusually calm weather, that the Englishmen who had urged the fishermen to fish could not take more than one-third of all that had been caught, and the rest died, without being of use to any one. One reason why the fishermen wish to see this autumn fishing forbidden by law is, that even if they were unanimous as to its injurious character, all of them would, though unwillingly, take part in it, (if a small number of fishermen moved by covetousness were to catch lobsters, and there was a chance of selling them at that season. They would suppose that those lobsters which they might otherwise get in the spring would now be caught by others in the autumn, resulting in great injury to their trade.

NORWAY: REPORT OF G. VON YHLEN.—The following extract respecting the decrease of lobsters on certain portions of the Norwegian coast is from a report of more recent date than the above:

"It cannot be denied that the lobster fishery is gradually decreasing, whether the size or the number of lobsters caught be considered.

"It is irrefutably a necessity that the time of prohibition should be extended in the fall, when conjugation generally takes place; and also that the minimum size of lobsters allowed to be caught should be so determined that their first spawning be protected.

"The English Parliament has lately resolved that 8 inches shall be the minimum size, and it would also be well to adopt that as a law with us."*

NORWAY: REPORT OF PROF. G. O. SARS.—Prof. G. O. Sars, one of the best informed of Norwegian authorities on the sea fisheries and a naturalist of the highest standing, whose opinion is worthy of careful consideration, has published the following views respecting the best methods of protecting the lobster industry:

"The principle which has been followed in framing laws for the better protection of the lobster is the same which forms the basis of all similar protective laws, viz, a desire to let the propagating of the lobster go on as undisturbedly as possible. If one considers what an enormous quantity of roe an adult female lobster carries under her tail, and also that all this roe becomes impregnated, and that, consequently, every egg develops into a lobster, it is very natural to suppose that if only a sufficient number of female lobsters could hatch their young undisturbedly, ample compensation would be made for the number of grown lobsters caught every year. It was also very natural to suppose that the decrease in the quantity of lobsters, which had been observed in various places, was caused by catching grown female lobsters during the hatching season. With other fisheries the use of certain fishing implements has proved hurtful to the fish; but the implements employed in lobster fishing are of such a kind as to preclude this possibility.

"On general principles, the above-mentioned view seems to be entirely justified and logical. There is no doubt but that if the lobster is left undisturbed during the hatching season a number of young will be produced large enough to compensate, under favorable circumstances, for all the lobsters that are caught. It is, therefore, only right that the lobster should be, as far as possible, protected during the hatching season. It is, likewise, possible that indiscriminate fishing during the hatching season will hinder the increase of the lobsters. It must be remembered, however, that there are many other disturbing causes. I have already, on another occasion, shown that the young lobster, during the earliest period of its life, is exposed to many dangers, and that probably a large number perish, on account of unfavorable influences during their development. If, therefore, in spite of protective measures, a decrease in the quantity of lobsters has been observed in various places, it must not be supposed that the only cause of it is lack of protection or too short a season of protection. The season of protection is, in my opinion, correct on the whole, and if I now consider it best to set it a little earlier, viz, to begin the 1st of July, I do this from another reason, that is, out of regard for the shedding of the lobster, which begins during the first days of this month. The lobster is, at that time, entirely unfit for transportation, and may die even in the boxes. I believe that if the lobster is thoroughly protected during the months of July and August, there will be some guarantee at least that a sufficient number of young ones will be produced to make up for all losses occasioned by the lobster fisheries during the other months of the year.

"But no laws and no protective measures can change the unfavorable physical conditions which have caused a decrease of lobsters on certain portions of our coast. The only means to be employed under such circumstances is the artificial raising of lobsters. I shall have occasion to return to this point, and merely to avoid misconception, will say here that I consider a reasonably arranged protection of the lobster not only desirable but also necessary; but the protective measures should be somewhat uniform in the different districts. At any rate, on that portion of the

*Report on the Sea Fisheries of the Län of Göteborg and Bohus in the year 1877, by Gerhard von Yhlen.

coast which I visited, I found but very little difference both with regard to the time of hatching and the time of shedding. Thus, there is no reason for having a different season of protection in these districts. But as memorials have been sent to the Department of the Interior from several places, asking for an extension of the protective season, it will probably be best, in order to avoid dissatisfaction, to leave it to each community to extend the protective season wherever there is a very general demand for it. But I must say that if protection is to answer its purpose, it will be necessary for the different districts to organize a system of superintendence, so that the laws may be strictly carried out. As matters now stand, there is—and I speak from personal observation—as much fishing going on on our southern coast during the season of protection as at other seasons. Where the protective season lasts only a month, those lobsters which have been caught when fishing is prohibited are generally kept in large boxes until the protective season is passed, when they are brought to market. But many of these closely packed lobsters die in the boxes, and those which are left are so lean and miserable that they are of little or no value, and are necessarily thrown away."*

GREAT BRITAIN.—The fishery commissioners of England, in the years 1875 and 1876, made a thorough inspection of the crab and lobster fisheries of the English and Scottish coasts. All the principal fishing stations were visited, and from personal observations and the testimony of fishermen and dealers a very elaborate report, embodying every detail of their investigations, was prepared and published in 1877.† The conclusions at which they arrived regarding the state of the fishery and the suggestions made for its improvement, are contained in the following extract from their report:

"In a great many cases it is not very easy to conclude whether the fishery is falling off or not. The increase in price is certainly in almost every case greater than the decrease in the supply. The take in many cases is not so large as it used to be, but in nearly every place it is more valuable. The increased price and the greater facilities which railways have afforded for bringing the fish to market, have attracted more fishermen to the pursuit, and have induced them to follow the crabs and lobsters into much deeper water than formerly. It is no easy matter, therefore, to compare the results of the fishing now with those which were experienced fifty or twenty-five years ago. The take now is divided among a greater number of fishermen. The area of the fishery has been greatly extended. On the whole, however, we believe that we are in the right in concluding that in small fisheries, or fisheries in confined areas, there has been in every case a marked decrease of fish; while in large and exposed fisheries there has been no decrease whatever. Take, for example, the fisheries off the Land's End, the Lizard, and the Start. All these fisheries comprise large areas of sea bottom, all of them are in exposed situations, and the powers of man have been hitherto incapable of exhausting them. But there are other fisheries in an exactly opposite position. A description will be found, for instance, in the evidence which we received at Wembury, relating to a small fishery off the Eddystone Rocks. The fishery is contained in a few acres, and, though the situation is exposed, the area is so small that the fishermen have been able to exhaust it. The same conclusion is true of the fisheries which are situated in confined bays, such, for instance, as that at Falmouth. The fishermen there, exposed to no bad weather, are able to pursue the fishery at every season of the year. High prices have induced them to increase the efficiency of their gear, and the gradual decay of the fishery, which overfishing has occasioned, has compelled them to fish harder and harder to earn a livelihood. The fishermen in

* Reports made to the Department of the Interior, of Investigations of the Salt-Water Fisheries of Norway during the years 1874–1877, by Prof. G. O. Sars.

† Reports on the Crab and Lobster Fisheries of England and Wales, by Frank Buckland and Spencer Walpole, Esqrs., * * * of Scotland, by Frank Buckland and Spencer Walpole, Esqrs., &c. London, 1877.

these cases are themselves conscious of the loss which they are themselves producing. But without the aid of Parliament they are unable to enforce the regulations which in their judgment would restore the fishery.

"As regards the lobster fishery, three suggestions have been made to us for its improvement, viz: the institution of a gauge; the enactment of a close season; and the prohibition of the sale of berried lobsters; but the suggestion which has found most universal favor is the institution of a gauge. In Cornwall and Devonshire, in Yorkshire and Northumberland, the fishermen have almost without exception suggested that no lobster should be sold under a length of about 8 inches. The same recommendation was made to us by the great fish merchants who are established at Hamble, and by the great salesmen in Billingsgate Market. * * * On the northeast coast of England it was suggested to us that no lobster should be taken under 4 inches in the barrel (carapax). In the rest of England the almost unanimous recommendation was that no lobster should be taken under 8 inches in length. These two recommendations are practically very similar. A lobster 4 inches long in the barrel is usually more than 8 inches in length; but, as it is always undesirable to interfere with local customs, we see no reason why both gauges should not be inserted in any act of Parliament that may be passed. It would then be illegal to sell any lobster which did not measure either 8 inches in length or 4 inches in the barrel.

"If the gauge be adopted, it is in our judgment essential that it should apply to all the fish markets. The only practicable means of enforcing a gauge is to enforce it in the markets, and the gauge must therefore apply to all lobsters sold in those markets, wherever they may be taken. The only practical difficulty in enforcing the gauge arises from the large importation of Norwegian lobsters, and we think it would be unwise to attempt any legislation without consideriug the effect which it might have on this trade. * * *

"It will be seen from the foregoing remarks that an 8-inch gauge has already been proposed in Norway. Of the two merchants engaged in the Norway trade, whom we had the advantage of examiuing, Mr. Fisher, of Billingsgate, was of opinion that an 8-inch gauge would interfere with the Norwegian fishery, but that a 7½-inch gauge would be desirable. Captain Harnden, of Hamble, on the contrary, concluded that an 8-inch gauge would ultimately be beneficial to it. With Captain Harnden's evidence before us, we think that Parliament may fairly enact that, with one exception, no lobster shall in future be sold in this country under 8 inches in length.

"The exception which, we fear, must be made to this rule applies to Bognor. Lobsters of a very small size are taken in large numbers off Bognor, and the application of an 8-inch gauge to Bognor would destroy the fishery for lobsters at that place. The fishermen at Bognor desire the institution of a 6½-inch gauge; we have, ourselves, little doubt that a 7-inch gauge would be large enough for the Bognor fishery. If, however, the Bognor fishermen are allowed to take 7-inch lobsters, their sale should be confined within the limits of the county of Sussex. * * *

"Two other recommendations have in some places been made to us for the improvement of the lobster fishery. It has been suggested to us that a close season should be instituted, and it has also been suggested that the sale of berried lobsters should be prohibited. A universal close season is impracticable, because the season which would suit one part of the coast would be quite inapplicable to other parts. In a great many places the storms of winter afford by themselves a sufficient close season. On the coast of Cornwall, again, the pilchard fishery practically entails a close sea on. * * * On the east coast of England, again, the herring season affords a natural close time. * * * A close season is, then, for all intents and purposes, already established in some places. In others, no close season is necessary, on account of the extent and situation of the fishery. No universal close season need, therefore, be imposed by act of Parliament. * * *

"We are also unable to indorse the other recommendation which has been made to us, viz, that the sale of berried lobsters should be prohibited. In the first place, if it were illegal to take berried lobsters, it would not pay the fishermen in many cases to pursue the lobster fishery. In the next place, the lobster when berried is in the very best possible condition for food, and it would be as illogical, therefore, to prohibit its capture as to prohibit the taking of full herrings. In the third place, if its capture were illegal, Mr. Scovell's evidence at Hamble shows that the fishermen would probably remove the berries. * * *

"We recommend, therefore, the institution of a gauge as the only remedy universally applicable for the improvement of our lobster fisheries."

OPINIONS OF THE FISHERMEN AND OTHERS RESPECTING PROTECTIVE LAWS.

INTRODUCTION.—In the circulars sent out respecting the lobster fishery, and in personal interviews on the subject, the opinion of each person was asked as to whether he was satisfied with the existing laws, and if not, in what manner he would desire to have them changed. Comparatively few replies were obtained, and these may not be regarded as of much value; but it has been thought best to insert them here. The names of most of the correspondents have been omitted, and with reference to a few localities the opinions as here stated are drawn up from the statements of several individuals.

Three classes of individuals are interested in the lobster fishery on the coast of Maine—the fishermen, the fresh-lobster dealers, and the canners—and each regarding the fishery from a somewhat different standpoint, according to individual interests, it is not strange that opinions as to the present and future needs of this industry should be somewhat at variance. It is the fishermen's interest to make as large captures and sales as possible; the fresh dealers cater to a trade that demands only lobsters above a certain size (about 10½ or 11 inches), while the canners use all that are large enough to pay them for the handling, although those that are suited for the fresh markets are generally too expensive to put into cans. Elsewhere on the coast the influence of the canneries is not felt and the problem involved in the preparation of suitable protective laws is much simpler.

Many of those directly interested in the lobster fishery, even though conscious of an apparent decrease, are opposed either to legislation or to any change in existing laws, and this is especially true of the coast of Maine. The objection generally raised by the fishermen to laws governing the size of marketable lobsters is that it is difficult either to measure or weigh the lobsters as they are taken from the traps, and that unscrupulous fishermen would kill those taken under a standard size in order to prevent their entering the traps a second time. When spawning lobsters are caught, the same fishermen, it is argued, could easily remove the eggs, and in this manner evade the law. To most persons, a close time presents the simplest method of protecting the industry; but a close time to serve the most good should come at that season of the year when the fishery is most profitable for the fishermen.

GOULDSBORO', ME.—A correspondent writes: "I think there should be no lobsters caught in July and August."

ROCKPORT, ME.—Mr. John D. Piper writes as follows: "My reasons for expressing a belief that the law should be so changed as to restrict the taking of lobsters to thrifty marketable lobsters of not less than 10½ inches in length, are that the factories use lobsters of from 3 to 7 inches in size, and these are taken in shoal water where they are feeding in large quantities. Could these small growing lobsters be protected until they are 10½ inches, the increase of the catch would be wonderful. I would prohibit the canning of soft-shell lobsters because it is an imposition upon

the consumer, and in the end will injure the reputation of the canned lobster as an article of food. The soft-shelled lobster, if protected, would soon grow to be a good fish worth catching, while it is of little or no value if used when soft."

NORTH HAVEN, ME.—"It is my opinion that the sale of lobsters under 8½ or 9 inches should never have been permitted, and that it should be prohibited in the future. The canneries and well smacks should be governed by the same restrictions."

GEORGE'S ISLAND, ME.—The fishermen almost universally approve of the present law forbidding the sale of small lobsters, except from April to August, for canning purposes, and a large majority would favor a modification of the law, so that no small lobsters could be saved for any purpose. They argue, and with some force, that the canning of the small ones during the summer practically destroys the good results intended by the law, as very many are caught up at such times, and comparatively few remain to attain the adult size. They claim that many lobsters measuring only 6 inches in length and weighing but ½ pound are caught for canning at an average price of only half a cent each, while, if saved, they would in two years at the most be of good marketable size, and would bring from four to ten times as much. The destruction of small lobsters is quite extensive in the vicinity of Muscle Ridges.

WESTPORT, ME.—"It would be as well if the prescribed length was 10 inches instead of 10½ inches."

GEORGETOWN, ME.—At this place the fishermen strongly favor the law and would prefer an extension of its provisions so that no small lobsters could be sold at any time.

PORTLAND, ME.—The Maine law that went into effect August 1, 1879, is heartily approved by the fresh-lobster dealers, and they are eager in their demands for an extension of the protection to young lobsters, so that at no period could any lobsters be saved or sold smaller than 10½ inches in length. They claim that the canneries now have all the time they would naturally require for canning and that they are destroying the fisheries by buying up enormous quantities of the small lobsters which are virtually of no value, or, at the most, supply but very little meat, while if left in the water for another season they would attain a good size, and a much smaller number would then furnish as much meat as is now obtained from the vast number of small ones. They claim to have learned by experience that there is absolute necessity for stringent legislation, as the fishery is being rapidly destroyed.

The canneries, on the other hand, considering the question from their point of view, while acknowledging the necessity of protection and manifesting a strong sympathy with the law as it now stands, would oppose any measure tending to further restrict the time during which small lobsters might be canned. They claim that the present law affords the lobsters ample time for growth, and that with the laws rigidly enforced the fishery will prosper. Their interests suffer for the time being by the close season, and this year (1880) they will not put up over two-thirds as many cans as last. They think, however, that in time, with the resulting increase in size, they will be able to obtain as many as formerly. They would oppose the throwing out of small and seed lobsters during the canning season, on the ground that it would require much time to examine each lobster and would cause general dissatisfaction among the fishermen, who, in their shortsightedness, are thinking only of present necessities and would work in every possible way against the interests of those canners who were strict in enforcing such laws and in favor of those who might be disposed to slight them.

BIDDEFORD POOL, ME.—"The existing law in this State is a mere farce, so far as protecting the lobster fishery is concerned. It benefits the canneries to the injury of the fishermen, and will result in the extinction of the lobster. Although there are no canneries in this place, smacks

come here in the summer to procure supplies for those in other localities. They pay on an average 1½ cents apiece for lobsters, which five or six months later would bring 4 to 7 cents apiece. The months during which the law is not in force are the only ones in which soft lobsters are caught to any extent, and this is also the season when small lobsters are the most plentiful, thereby furthering the general destruction. In my opinion the Massachusetts law is the most beneficial to the fishery."

"There should be a law to protect the small and soft lobsters the entire year."

RYE, N. H.—"I would be satisfied with the existing law if it were enforced, but it is not; therefore, the lobsters are not at all protected. I think it would be better if all lobsters with spawn were thrown back into the water; but it would be useless for me to do so, when others would catch them, pull off the spawn, and thus evade the law. A provision to that effect would therefore, I think, be of no value."

Mr. A. C. Locke states that "the law of New Hampshire, as it now stands, is but a dead letter; it gives us the right to catch all lobsters over 10½ inches long, at all times of the year, and I venture to predict that at the end of ten years, under the present law, a new one will be necessary, giving us the right to catch all lobsters above 8 inches long, if any such are left. We are catching them too fast, and at the present rate of decrease we shall soon have to seek other employment. We are taking every lobster just as soon as it becomes large enough to spawn, and if the spawning season could be accurately determined all fishing should be prohibited during that time. At other seasons all lobsters with spawn should be returned to the water."

SEABROOK, N. H.—"It should be permitted to catch small lobsters, but egg lobsters should always be thrown back into the water."

GLOUCESTER, MASS.—"All spawn lobsters should be thrown overboard, and a fine of $50 be imposed for non-conformity to the law."

BOSTON, MASS.—Mr. S. M. Johnson gives his opinion as follows: "In regard to laws that exist at the present time, I think they can only be considered a step in the right direction. Their lack of uniformity is their most objectionable aspect. What is needed is a uniform United States law with a limit of 11 inches, and until we have this or one as effective we must suffer a waste, the extent of which we have hardly begun to realize."

PROVINCETOWN, MASS.—Capt. N. E. Atwood states that "the law of this State prohibits the capture and sale of lobsters less than 10½ inches long. This does not in any way affect the fishery of this vicinity, as very few lobsters as small as 10½ inches are found about here. A fisherman will not catch a dozen such during the entire season."

YARMOUTHPORT, MASS.—"It would be much better to throw back all spawning lobsters and permit the capture of all salable sizes."

WOOD'S HOLL, MASS.—Mr. V. N. Edwards says: "The law now forbids the sale of all lobsters under 9½ inches long, but does not prevent any one from destroying all he pleases. All the lobstermen of this place agree in believing that the best law would be one forbidding the sale or destruction of all lobsters with eggs."

WEST TISBURY, MARTHA'S VINEYARD.—Mr. Frank M. Cottle writes as follows: "There is but one law governing the trapping of lobsters and that is what we call the ten-and-a-half law. This law is made to protect young lobsters, but it does not do it, for we catch more from 9½ to 10½ inches in length than any other, and as we cannot tell by eye-measure alone the exact length, they are put into cars until measured for market, and then what are not dead are thrown away, so that the destruction is the same and the benefit minus. For less than 9½ inches we can measure by the eye in nine cases out of ten and throw them, as we do, into the sea from the pots. Therefore if the

law read 9½ instead of 10½ it might do some good, and the lobstermen be better satisfied. In my opinion the law can be of but little protection any way, for the cod destroys more young lobsters and paper-shells or 'shadows' in one day than all the lobstermen on this coast in a week if they marketed all sizes. This I know for a certainty. From careful observation I have caught one hundred cod in one day that I know had the amount of one thousand lobsters and 'shadows' in their entrails."

NEW BEDFORD, MASS.—"All lobsters under 10½ inches in length should be thrown back into the water."

NEWPORT, RHODE ISLAND.—The lobster fishermen of Narragansett Bay set but few pots apiece. They complain that fishermen come from other States and set about 50 pots each, covering very much of the ground and absorbing a large share of the business. A few of the lobstermen of Newport, who have been consulted, suggested that the number of pots to be used by each man might be restricted to ten or twelve, but none of them seemed to have a clear idea of what measures would best protect their interests. They did not consider that legislation could afford them much relief, but would not actively oppose it, should an attempt be made to pass restrictive laws. Since receiving the above information the first lobster law of Rhode Island, given on a following page, has been enacted.

NOANK, CONNECTICUT.—"The lobster law, so far as it prohibits the sale or destruction of lobsters with spawn from the 1st to the 15th of July of each year, has no effect upon the fishery at this place, as not one lobster in a thousand is found with spawn during that period."

ACTION OF THE BOSTON ANGLERS' ASSOCIATION, IN 1874.—The following report, prepared by the Anglers' Association of Boston, in January, 1874, previous to the enactment of the present State laws, is of sufficient interest to be reproduced here:

"The committee appointed to take into consideration the subject of the protection of the lobster, most respectfully submit the following report:

"From the information the committee have been able to obtain, it appears to them that it is time to take some step to stop the wholesale destruction of the lobster that is now going on. From the information obtained from the lobster dealers in this city, it appears that unless something is done, and that very soon, the lobsters in Massachusetts Bay will become, if not entirely extinct, so small that they will not be of any use for food. It appears to be the opinion of the dealers that we have met, that the taking of the lobster could be better regulated by the size rather than by weight, for the reason that it will be much easier for the fishermen to measure than to weigh; also for the reason that the lobster shrinks in boiling; therefore it would be very difficult to tell whether it weighed 2 pounds before boiling or not. A lobster that measures 11 inches from the head to the tail will weigh from 1½ to 2 pounds. On Saturday last the committee paid a visit to Johnson & Young, lobster dealers on Warren Bridge. They met there a number of gentlemen who were engaged in the lobster trade. From them a great deal of information was obtained. We saw there twenty-six lobsters brought into the office, and out of the twenty-six there were but fourteen that would measure 11 inches and upwards, twelve of them being under 11 inches long. We were told that was a fair sample of the size of the lobsters now brought to market. There was also present a gentleman from Portland, Me. (Mr. Marston), who is engaged in the lobster trade, and whose views coincide with the Boston dealers. He said the lobster fishing on the coast of Maine was used up—in fact, it had got to be so poor that the canning had about all been removed to the New Brunswick coast. He said they tried last year to get a law passed to protect the lobster, but all they could do was to get a law to prohibit the taking them with spawn. That for various reasons did not amount to anything. It was his opinion that a law

regulating the size of those offered for sale was what was wanted, and it appears to be the general wish of those whom we have met that some law might be made to prohibit the exposing for sale of any lobster not of a certain length.

"We therefore recommend that a committee be appointed to take charge of the matter, and to appear before the legislature or some committee thereof, to use their best efforts to have such a law passed as may seem best to them to prevent the taking or offering for sale, or being in possession of, any lobsters less than 11 inches in length.

"We also recommend that the president of this association be requested to correspond with the fish commissioners of the State of Maine upon the subject."

VIEWS OF MR. S. M. JOHNSON, OF BOSTON.—A few years later Mr. S. M. Johnson, of Boston, discussed the subject of protection in an address before the American Fish-Cultural Association, from which we abstract the following:

"This, like all questions having for their object the best method for economizing and preserving our supply of sea food, has become not only of great interest, but of great importance; and the discussion of such topics is looked upon with increasing interest from year to year, as the necessity for a law in relation to them becomes more apparent. With these facts in view, I esteem it a privilege to accept the invitation of this association to consider briefly the causes of a very apparent decrease in the size of lobsters offered for sale in our markets.

"The first question seems to be, What relation the supply bears to the demand, and the ability of the former to meet the latter, in the future as well as the present.

"In looking for a reasonable solution of this problem, an inquiry concerning the means taken to provide the supply now, as compared with those taken in former years, might properly be prefaced by a statement of the fact that not as many lobsters are consumed now as formerly. A few years ago fifty or sixty traps per man were considered a good number, while at the present time from seventy-five to ninety are used, and even with this addition it requires twice the number of men to catch the same amount of lobsters. These facts seem to show the danger of depletion in our efforts to keep up the supply, even if size and quality are disregarded.

"It may be fairly estimated that from 28,000,000 to 30,000,000 of lobsters are taken annually off the coast of New England, aggregating in weight not far from 15,000 tons. These figures may be considered only important here when taken in connection with the ability of the source of supply to furnish this amount without endangering its perpetuity. This calamity, however, I think most likely to ensue unless some proper restrictions are enforced, limiting this continual drain. When we compare the lobsters seen in the market to-day with those of former years, the danger becomes still more evident; and if this decrease in size goes on, the industry will, in a short time, become of little or no importance.

"The reply to the oft-repeated question, Why do we not get larger lobsters? must be, We catch them faster than they can grow; the smaller the lobsters we retain, the smaller will they become in the future, and, as a natural consequence, if we continue indiscriminate fishing, practical extermination must follow. This ground I am anxious to maintain, and wish to have some remedy applied to obviate the evil, still, however, permitting a partial supply. * * *

"From actual observation I have found that a lobster measuring 10½ inches in length will, after shedding, have increased to 12 inches; but if we make the comparison in weight, it may be better understood. For instance, a lobster of 10½ inches will weigh 1¼ pounds, while one of 12 inches, on an average, 2½ pounds, or double its former weight, which will add to its market value in the same proportion, or 100 per cent. Now, if a lobster sheds its shell once a year, which is approximately true, I think, it shows that by establishing a reasonable standard of length (which must not

be so high that it would prohibit fishing, neither so low that a sufficient age for reproduction may not have been attained) we may in time get back that which we have so foolishly sacrificed.

"Lobsters of a less length than 10¼ inches have been found bearing eggs, but by careful observation and inquiry I have found the exceptions to be very rare. Therefore this standard could not be safely fixed under that length, but should, on the contrary, be as much above it as possible still not so high at first as to cause hardship to the fishermen, while from time to time an advancement might be made as the supply of the required length increased and more nearly met the demand.

"Having pointed out the necessity of such a law, and indicated the best modes of its application, it only remains to be shown how it may be made effective.

"I think it is an established fact that protective measures can only be carried out in the open market, where the possession of unlawful fish or game is *prima facie* evidence of guilt. Such a law has been in full force in Massachusetts since 1874, but the possibility of finding a market outside the State has been a barrier to the best results; and just so long as there is any place where lobsters may be indiscriminately sold, we cannot justly judge of its efficiency. I am fully aware that in advocating a measure of this kind opposition will arise, which must be met and answered in the most tolerant spirit; for fancied rights of individuals are not always in accordance with the reasonable demands of the public good.

"The first opponents of the law for the protection of lobsters in Massachusetts were the fishermen, whose testimony at the same time was the best evidence given of the necessity of such a law. These, however, after a trial of one year, not only became reconciled to it, but even its strongest advocates, and realize year by year more fully the wisdom of the measure they so bitterly opposed.

"There has been one circumstance noticed which I think quite significant, viz, that the first year the law went into effect one-fourth of the whole number caught were obliged to be thrown back on account of their insufficient size, which proportion has gradually diminished until at present scarcely more than one in ten is discarded. The State of Maine, which possesses the largest lobster-producing grounds on the coast, has from time to time passed laws for the protection of the lobster fishery, but has had a powerful and important interest in opposition to a limit which no other State has, the size being of less importance for canning purposes than for other consumption. This year, however, a law has been enacted by which the canners are obliged to confine their operations to four months of the year, while for the remaining eight months a limit of 10½ inches is required, and, I think, may be looked upon as a great step in advance of any law previously passed. This movement was made by the fishermen in the form of petitions to the legislature, numerously signed, and from one end of the State to the other. Maine, New Hampshire, Massachusetts, and Connecticut each have laws practically corresponding to each other, while New York, without a law which might so much assist in protecting the other States, only helps on an illegal and wasteful practice."

A committee from the Fish-Cultural Association, consisting of the president, Mr. Roosevelt, Mr. E. G. Blackford, and F. Mather, was appointed to draft some additions and amendments to the New York game law. They met, and among other things recommended that the 10½-inch limit on lobsters be added, which is now before the legislature. By this co-operation the market is closed, without which the laws of the lobster-producing States were inoperative.

STATEMENT OF MR. J. WINSLOW JONES, OF PORTLAND, ME.—In a letter dated December 22, 1880, Mr. J. W. Jones, one of the largest canners on the coasts of Maine and the British Provinces, gives the following opinion regarding the protection of the lobster fishery:

"In relation to the duty on lobsters, although I am packing in the provinces, I want the duty

to remain. Were it not for the duty, our fishermen could not live and compete with the provinces. I think we now get as many lobsters as ever, only the size is very small. I think there should be more stringent enforcement of the law, and when we are not allowed to pack, fishermen should not be allowed to take for the market. I think the fisheries should be regulated by the General Government, not by State law. There is too much private interest in the making and enforcement of the law. They do the thing much better in the provinces, where the fisheries are regulated by the General Government. There should also be protection to packers; the fishing ground should be divided up so that one factory would not be competing with another on prices, making competition so close that neither the packers nor the fishermen have an interest in protecting the grounds where they fish, and this cannot be properly done unless there is an interest in protecting the fish. In some places in the British provinces the ground is divided up and apportioned out to the factories that pack lobsters, and no party can put out a salmon net without a lease from government, and they will not grant a permit to interfere with one already placed. I have petitioned the General Government of Canada to have all the fishing ground apportioned to the factories. I have a letter to-day saying they are bringing the matter before Parliament, and I think the law will pass."

STATEMENT OF MR. GEORGE BURNHAM, JR.*—"The packing of lobsters as early as 1845 shows none of the trouble experienced at the present time—viz, small light-meated fish. At that date all lobsters under 3 pounds in weight were doubled and counted as one; all such lobsters as are now packed (then called snappers) were then thrown away; in fact, we never used to catch many, as the large lobsters took possession of the traps, driving out the small ones.

"In the fall of 1854 I went to South Saint George, on the coast of Maine, to pack lobsters, and sent a smack to Deer Isle, where the fishermen used hand nets, and 1,200 lobsters then caught filled the smack's well. It would take of the lobsters we now catch from 7,000 to 8,000 to fill the same well.

"The only remedy in my mind to preserve the lobsters is to have a close time—they should not be caught between the first day of August and the first day of March for market or canning.

"The Massachusetts law is a good law if it could be carried out, but fishermen set their traps for lobsters, and there is only one in five that is large enough to be marketable. Do the fishermen throw the small ones overboard to again crawl into their traps and eat their bait, or do they take them ashore and boil them for the hens and other purposes, or destroy them in some other way? I am quite certain that the small lobsters once caught never again get the chance to eat bait from a trap. Therefore I am convinced that the close time is the only sure way of preserving the lobster fisheries."

THE STATE LAWS RESPECTING THE LOBSTER FISHERY.

Following are the laws of the several New England States and New York, relative to the lobster fisheries, corrected to March 1, 1885. New Jersey has no lobster law, her fishery not being of sufficient importance to demand legislation.

Maine.

Chapter 69 of the public laws, passed in 1879.

"SECTION 1. No person or corporation shall can or preserve any lobsters within the limits of this State, from the first day of August to the first day of April following, under a penalty of five dollars for every lobster so canned or preserved, and a further penalty of three hundred dollars for each and every day on which such canning or preserving is done by said person or corporation from the said first day of August to the said first day of April following.

"SEC. 2. No lobster of less size than ten and one-half inches in length, measuring from one

* Of the canning firm of Burnham & Morrell, of Portland, Me., November 24, 1880.

extreme of the body extended to the other, exclusive of feelers and claws, shall be sold or exposed for sale from the first day of August to the first day of April following, under a penalty of five dollars for each and every lobster so sold or exposed for sale.

"SEC. 3. The penalties under this act may be recovered by indictment or action of debt one-half thereof to go to the person making the complaint or bringing the action, and one-half to the use of the town in which the offense is committed.

"SEC. 4. All acts and parts of acts inconsistent with this act are hereby repealed."

The above law was replaced in 1883 by the following, approved February 21:

Chapter 138 of the public laws, passed in 1883.

"SECTION 1. There shall be a close time for lobsters from the fifteenth day of August to the fifteenth day of November in each year, during which close time no lobsters shall be fished for, taken, caught, killed, bought, sold, exposed for sale, or in possession in cars, pounds, or otherwise, under a penalty of fifty dollars for the offense, and one dollar for each and every lobster so taken, caught, killed, bought, sold, exposed for sale, or in possession as aforesaid.

"SEC. 2. It shall be unlawful to fish for, catch, buy, sell, expose for sale, or possess for canning purposes or otherwise, between the first day of April and the first day of August, of each year, any female lobster in spawn or with eggs attached, or any young lobster less than nine inches in length, measuring from head to tail exclusive of claws or feelers; and when caught they shall be liberated alive, at the risk and cost of the party taking said lobsters, under a penalty of one dollar for each and every lobster so caught, bought, sold, exposed for sale, in possession or not so liberated.

"SEC. 3. The penalties imposed by this act may be recovered in the manner provided by section twenty-six, of chapter seventy-five of the public laws of eighteen hundred and seventy-eight."

In February, 1885, the lobster laws of Maine were again amended, to read as follows:

Chapter 275 of the public laws, passed in 1885.

"SECTION 1. There shall be a close time for lobsters between the fifteenth day of August and the first day of October, during which no lobsters shall be fished for, taken, caught, killed, bought, sold, exposed for sale, or in possession, in cars, pounds, or otherwise, under a penalty of fifty dollars for the offense, and one dollar for every lobster so taken, caught, killed, bought, sold, exposed for sale, or in possession as aforesaid: Provided, however, that the provisions of this section shall not apply to any person taking lobsters not less than ten and one-half inches in length for the sole use and consumption of himself and family.

"SEC. 2. No person or corporation shall can or preserve any lobsters between the fifteenth day of July and the first day of the following April, under a penalty of five dollars for every lobster so canned or preserved, and a further penalty of three hundred dollars for each day on which such unlawful canning or preserving is done.

"SEC. 3. It is unlawful to fish for, catch, buy, sell, expose for sale, or possess, between the first day of October and the fifteenth day of the following August, any female lobster in spawn or with eggs attached, or any young lobster less than ten and one-half inches in length, measuring from head to tail extended, exclusive of claws or feelers, and such lobsters when caught shall be liberated alive, at the risk and cost of the party taking them, under a penalty of one dollar for each lobster so caught, bought, sold, exposed for sale, or in possession not so liberated: Provided, however, that from the first day of April to the fifteenth day of July it shall be lawful to fish for, catch, buy, sell, expose for sale, or possess for canning and all other purposes any lobsters not less than nine inches in length, measured as aforesaid, but not including female lobsters in spawn or with eggs attached."

New Hampshire.

Fish and game laws, chapter 4.

"SECTION 16. No person shall eateh, preserve, sell, or expose for sale within the limits of the State of New Hampshire, any lobster between the fifteenth day of August and the fifteenth day of October of eaeh year; and from the said fifteenth day of October to the fifteenth day of August next following of each year no lobster shall be caught, preserved, sold, or exposed for sale, under ten and one-half inches in length, measuring from one extreme of the body to the other, exclusive of claws or feelers, nor shall any female lobster be killed or destroyed while carrying her spawn or hatching her young; and any person violating any provision of this section shall be punished by a fine of ten dollars for every lobster so caught, used, sold, or exposed for sale, as aforesaid."

Massachusetts.

Chapter 91, public statutes.

"SECTION 81. Whoever, from the twentieth day of June to the twentieth day of September, takes a lobster shall be punished for eaeh offense by fine of not less than ten nor more than one hundred dollars, or by imprisonment in the house of correction for not less than one nor more than three months; but a person catching a lobster when lawfully fishing, and immediately returning it alive to the waters from which it was taken, shall not be subject to such penalty.

"SEC. 82. Whoever, from the twentieth day of June to the twentieth day of September buys, sells, or has in his possession, a lobster taken in this Commonwealth shall forfeit for eaeh offense not less than ten nor more than fifty dollars.

"SEC. 83. The mayor and aldermen of every city, the selectmen of every town, and all police officers and constables, shall cause the provisions of the two preceding sections to be enforced in their respective cities and towns.

"SEC. 84. Whoever sells or offers for sale, or has in his possession with intent to sell, either directly or indirectly, a lobster less than ten and one-half inches in length, measuring from one extreme of the body extended to the other, exclusive of claws or feelers, shall forfeit five dollars for every such lobster; and, in all prosecutions under this section the possession of any lobster not of the required length shall be *prima facie* evidence to convict.

"SEC. 85. All forfeitures under the four preceding sections shall be paid, one-half to the person making the complaint and one-half to the city or town where the offense was committed."

"SEC. 88. If, within the harbors, streams, or waters of any place on the sea-coast which adopts this section, or has adopted the corresponding sections of earlier statutes, any person living without the State takes, for the purpose of carrying thence, any lobsters, tautog, bass, blue fish, or scuppaug, or if any person living within this State takes and carries away from any such place any such fish or lobsters in vessels or smacks of more than fifteen tons' burden, he shall forfeit for each offense a sum not exceeding twenty dollars, and all the fish and lobsters so taken.

"SEC. 89. No person shall take lobsters within the waters and shores of the town of Provincetown for the purpose of carrying them from said waters in a vessel or smack of more than fifteen tons' burden, or for the purpose of putting the same on board of such vessel or smack to be transported to any place unless a permit is first obtained therefor from the selectmen of said town, who may grant the same for such sum to be paid to the use of the town as they shall deem proper.

"SEC. 90. Whoever violates the provisions of the preceding section shall forfeit ten dollars for each offense; and if the number of lobsters so unlawfully taken or found on board of any such vessel or smack exceeds one hundred lobsters, he shall in addition forfeit a further sum of ten

dollars for every hundred lobsters so taken or found over the first hundred, and in that proportion for any smaller number.

"SEC. 91. For the purposes of the two preceding sections, the waters and shores of Provincetown shall be deemed to be as follows, namely, beginning at Race Point, one-half mile from the shore, and thence running by said shore to the end of Long Point, which forms the harbor of Provincetown, and from the end of Long Point one-half mile and including the harbor within the town of Provincetown.

"SEC. 92. Whoever, between the first day of April and the first day of July inclusive, takes more than one hundred pounds per week of lobsters, tautog, bass, or scuppaug in the bays, harbors, ponds, rivers, or creeks of the waters of Buzzard's Bay, within one mile from the shore and within the jurisdiction of the towns of Sandwich and Wareham, shall forfeit a sum not exceeding fifty dollars, to be recovered in an action of tort by the selectmen or any legal voter of Sandwich or Wareham, for the use of the party suing therefor."

Chapter 98, public statutes.

The following amendments to sections 81 and 82 of the above laws went into effect March 21, 1882.

"SECTION 1. Section eighty-one of chapter ninety-one of the public statutes is hereby amended to read as follows:

"SEC. 81. Whoever, during the month of July in any year catches or takes from any of the waters of this Commonwealth any female lobster bearing eggs shall be punished for each offense by a fine of not less than ten nor more than one hundred dollars, or by imprisonment in the house of correction for not less than one nor more than three months; but a person catching or taking any such lobster during said month of July and immediately returning it alive to the waters from which it was taken shall not be subject to such penalty.

"SEC. 2. Section eighty-two of chapter ninety-one of the public statutes is hereby amended to read as follows:

"SEC. 82. Whoever, during the month of July in any year, sells or has in his possession with intent to sell, any female lobster bearing eggs, taken in this Commonwealth, shall forfeit for each offense a sum of not less than ten nor more than fifty dollars.

"SEC. 3. This act shall take effect upon its passage."

Chapter 212, section 1, of the acts of 1884, amends section 84 of the public statutes to read as follows:

"Whoever sells, or offers for sale or has in his possession a lobster less than ten and one-half inches in length measuring from one extreme of the body extended to the other, exclusive of claws or feelers, shall forfeit ten dollars for every such lobster; and the possession of any lobster not of the required length shall be *prima facie* evidence to convict."

Rhode Island.

Chapter 147, article XVIII, public statutes of Rhode Island, revision of 1882.

"SECTION 8. Every person not at the time an inhabitant of this State who shall set or keep or cause to be set or kept, within any of the public waters of the State, any pots or nets for the catching of lobsters, shall forfeit twenty dollars for each offense, one-half thereof to the use of the complainant and one-half thereof to the use of the State.

"SEC. 9. Every person who shall hit or raise any pot or net set for the catching of lobsters, without the permission of the owner thereof, shall forfeit ten dollars.

"SEC. 10. Every person who shall sell or offer for sale or have in his possession with intent to sell any lobsters less than ten inches in length, measuring from one extreme of the body to the other, exclusive of claws and feelers, shall forfeit for every such lobster five dollars, one-half thereof to the use of the complainant and one-half thereof to the use of the town where the offense is committed; and every person who shall take or trap any such lobsters shall immediately return the same to the waters from whence they are taken, and every person failing so to do shall forfeit for every such lobster five dollars, one-half thereof to the use of the complainant and one-half thereof to the use of the town where the offense is committed.

"SEC. 25. Every person living without the State who shall take any lobsters, tautaug, bass, or other fish, within the harbors, rivers, or waters of this State, for the purpose of carrying them thence in vessels or smacks, shall be fined ten dollars for every offense, and shall forfeit all the fish or lobsters so taken."

Connecticut.

Revised statutes of 1875, Title 16, Chap. IV, Article 1, Section 27.

"Every person who shall take, sell, or have in his possession with intent to sell, or destroy, any lobsters less than ten inches long, measuring from the head to the end of the tail, exclusive of claws and feelers, shall be fined not less than seven nor more than fifty dollars, half to be paid to him who shall sue therefor, and half to the town in which the offense is committed, or be imprisoned not exceeding thirty days, or both."

Chapter 11 of the session laws of 1875.

"Every person who shall take, sell, or have in his possession, with intent to sell or destroy, any lobsters less than eight inches long, measuring from the head to the end of the tail, exclusive of claws and feelers, or any female lobster with the ova or spawn attached, shall be fined not less than ten, nor more than fifty dollars, half to be paid to him who shall sue therefor, and half to the town in which the offense is committed, or be imprisoned not exceeding thirty days, or both; and all acts inconsistent with this act are hereby repealed."

Chapter 76 of the session laws of 1878.

"Every person who shall at any time take, sell, or have in his possession, with intent to sell or destroy, any lobsters less than six inches long, measuring from the head to the end of the tail, exclusive of claws and feelers, or any female lobsters with the ova or spawn attached, between the first and fifteenth days of July (inclusive) in each year, shall be fined not less than ten nor more than fifty dollars, half to be paid to him who shall sue therefor, and half to the town in which the offense is committed, or be imprisoned not exceeding thirty days, or both. And all acts or parts of acts inconsistent herewith are hereby repealed."

New York.

Chapter 282. AN ACT for the preservation of lobsters, passed May 13, 1880.

"SECTION 1. Whoever shall sell, or offer for sale, or have in possession with intent to sell, any lobster less than ten and one-half inches in length, measurement to be taken from one extremity of the body to the other, exclusive of claws or feelers, shall, for every such offense, be subject to a fine of five dollars; and in all prosecutions under this act the possession of any lobster not of the length herein prescribed shall be *prima facie* evidence to convict.

"SEC. 2. All forfeitures accruing under this act shall be paid one-half to the person making the complaint and one-half to the city or town where the offense was committed.

"SEC. 3. This act shall take effect on the first of June, eighteen hundred and eighty."

Abstract of the State laws.

MAINE.—Law of 1879: prohibits the canning and preserving of lobsters and the capture and sale of individuals under 10½ inches long, between August 1 and April 1. No restrictions placed upon the fishery between April 1 and August 1.

Revision of 1883: makes a close time from August 15 to November 15, and prohibits the capture and sale of females with spawn and lobsters under 9 inches long, from April 1 to August 1.

Revision of 1885: close time from August 15 to October 1, except for personal use of fishermen. Prohibits canning from July 15 to April 1, the capture of females with spawn from October 1 to August 15, and of lobsters under 10½ inches long from October 1 to April 1. The taking of all lobsters over 9 inches long, excepting females with spawn, is permitted during the canning season.

NEW HAMPSHIRE.—In force since 1881: close time from August 15 to October 15, and a limit of 10½ inches in length remainder of year. Destruction of females with spawn prohibited during entire year.

MASSACHUSETTS.—In force since 1880: close time from June 20 to September 20, and a limit of 10½ inches in length during remainder of year; capture and sale of females with eggs prohibited during July. Also several laws of local application.

Revision of 1882: capture and sale of females with spawn prohibited during July.

RHODE ISLAND.—Law of 1882: no lobsters less than 10 inches long can be caught and sold. The privileges of fishing are restricted to residents of the State.

CONNECTICUT.—Law of 1878: the capture of lobsters less than 6 inches in length is prohibited during the entire year and of females with spawn from July 1 to July 15.

NEW YORK.—Law of 1880: prohibits the sale and capture of lobsters less than 10½ inches in length.

9. THE CULTIVATION AND TRANSPLANTING OF LOBSTERS.

CULTIVATION.—The artificial breeding of lobsters has been rarely attempted either in this country or in Europe, and in no instance are we aware of its having been productive of satisfactory practical results. There are so many difficulties to overcome in an undertaking of this character, and the breeding habits of lobsters are yet so imperfectly understood, that it is not surprising greater progress has not been made in materially aiding the increase in supplies by artificial culture, as in the case of the oyster and of many of our true fishes. That further study and persistent efforts may yet afford us the means of accomplishing so desirable an object is very probable and is sincerely to be hoped for, in view of the apparent great decrease in the abundance of lobsters on many portions of our Atlantic coast.*

NORWAY.—The same problem has taxed the ingenuity of European fish-culturists in those countries where the European lobster is an important article of trade, and especially has this been the case in Norway, where a marked decrease in the supplies of that species has been evident for some time. The most noteworthy of the Norwegian experiments began in 1873, but of their final results we have been unable to obtain any definite information. The following account was published in 1875:

"Several men in the district of Stavanger, viz, Mr. Lorange, a civil engineer, Mr. Olsen, a teacher, and two merchants, Messrs. Andr. Hansen and H. Hansen, in 1873, united with a view to

* For recent experiments in lobster culture by the United States Fish Commission, which have been partially successful, see the following reports: Notes on Lobster Culture (Experiments by the United States Fish Commission in 1885). By Richard Rathbun. Bulletin United States Fish Commission, Vol. VI, p. 17, 1886.

Hatching, rearing, and transplanting lobsters (Experiments at Wood's Holl Station). By John A. Ryder. Science, Vol. VII, No. 175 (June 11, 1886), pp. 517–519.

making experiments whether it would not be possible to protect the tender young of the lobster by hatching them in boxes or small basins, where they could find a place of refuge till they were so far developed as to take care of themselves. As these first experiments seemed to augur well, they received at their request, aid from the Royal Society for the Promotion of the Industries of Norway (Kgl. Selskab for Norges Vel.) to enable them to continue their experiments in 1874.

"For this purpose, they inclosed a sheet of water by building a strong wall at each end of a sound, between two small islands in the Veafjord, not far from Kopervig. This sheet of water was about 300 feet long and 30 feet broad; its bottom consisted partly of rough gravel and partly of rocks stretching along one of the sides, and its average depth was about 5 feet. Five hatching boxes were then procured, of which one was placed in the inclosed water, three at Aakrehavn, and one at Kopervig. These boxes were made of cork, and were 5 feet long and 2 feet deep. Both at the bottom and at the sides there was an opening of one-half inch between the boards, which was covered with strips of fine wire-gauze. The boxes at Aakrehavn were, moreover, furnished with a light roof, which, without excluding the light, prevented the boxes from being filled with fresh water during heavy rains. Only one of these three boxes was used for hatching; the two other ones being used for receiving the young ones as their number became too large for the hatching-boxes, and for making experiments whether the young lobster can be kept outside an inclosed sheet of water, which it might be difficult to procure in some places. Twenty-two female lobsters, having roe, were bought, of which three were placed in the inclosed sheet of water and nineteen in the boxes, not all at the same time, however, but by degrees, just as it was possible to procure spawning lobsters.

"Professor Rasch, president of the section for fisheries in the Royal Society for Furthering the Industries of Norway, made a report to the society on the hatching experiments, accompanied by prepared specimens, showing the development of the young lobster on each day of the first week after the hatching, and during the fourth week. In this report he says that, in his opinion, the experiments have been made carefully and skillfully, and that thereby several facts regarding the natural history of the lobster have been made known, which hitherto were either entirely unknown or not sufficiently proved by experiments. These facts are—

"*a.* That the young lobsters swimming near the surface of the water are killed by violent rain, which was successfully avoided by having the above-mentioned light roofs over the boxes;

"*b.* That the older of the young lobsters, when their claws are developed, in their boxes attack and eat the younger ones which stay near the surface; the possibility of doing this was diminished by having holes in the sides of the boxes large enough to let the larger of the young ones which stay deeper under the water slip out easily;

"*c.* That the female lobsters which have roe under the back part of their body in June will have done hatching in September;

"*d.* That the hatching from beginning to end occupies a period of about three weeks;

"*e.* That the summer-hatching does not begin at the same time every year (in 1873 it began on the 4th of July, and in 1874 between the 17th and 26th of the same month), which undoubtedly depends on the higher and lower temperature of water;

"*f.* That the newly-hatched young of the lobster keep closely together near the surface of the water, and because but little skilled in swimming become an easy prey to their enemies; and,

"*g.* That the young lobsters begin to go toward the bottom when about three to four weeks old, and that there they soon assume their retrograde motion.

"It was also shown that when the young lobsters have so far developed as to seek the bot-

tom, they can escape their enemies with comparative ease, partly on account of their quicker motions and partly by hiding between the stones.

"These experiments have, therefore, not only thrown considerable light on the natural history of the lobster, but they have also given practical hints how it may be possible to further the lobster fisheries by adopting regulations for their protection, and by establishing in suitable localities hatching-places where the young can be protected during the first stages of their development. To keep the young lobsters in inclosed sheets of water till they are large enough to become salable will scarcely pay.

"One of our largest exporters of lobsters on the western coast has tried to keep large quantities of grown lobsters in an inclosed sheet of water, feeding them and waiting for the time when it would be most profitable to ship them; but it soon became evident that the expenses were too great.

"These experiments will be continued during the present year with the aid of the Royal Society for Furthering the Industries of Norway."*

The celebrated Norwegian naturalist, Prof. G. O. Sars, who has devoted much time to the study of the European lobster, visited the above locality in 1875, and reported very favorably upon the experiments being made there. Concerning them he writes as follows:

"There is another point which I must briefly mention, viz, the artificial raising of lobsters. I have in another place expressed my opinion that this is a subject which possibly in the future may prove a very important aid to our lobster fisheries. The exceedingly simple manner in which the artificial raising of lobsters can be carried on seems to encourage people in different places to make experiments in this direction. Mr. Hansen, a merchant of Akrevig, assisted by Mr. Olsen, superintendent of schools at Kobbervig, has already made several experiments, which, on the whole, have proved successful. During my journey of last summer I visited the place and examined the hatching apparatus, which had already produced a large number of young lobsters. Mr. Hansen has determined to make a kind of lobster park, where the young lobsters, after their metamorphosis is completed, may live and develop. I consider these experiments of great importance, and would like to see Mr. Hansen receive sufficient aid from the Government to enable him to carry them on on a larger scale and in a practical manner."†

Parking in the United States.—In the United States, the best results have been obtained in connection with the so-called "parking" of lobsters—that is to say, their protection in large, inclosed natural basins, primarily for the purpose of perfecting them for market, and of retaining conveniently at hand, at all seasons, a large reserve stock for supplying the market demands. In these parks the young lobsters taken by the fishermen are allowed to attain the adult size, the soft-shelled individuals to become hardened, and injuries to be repaired. It is needless to state that under such natural conditions, the breeding habits must continue more or less normal and large quantities of spawn be hatched. That much of the spat thus obtained grows into full-sized lobsters and adds very materially to the population of the park, is a question which has not been satisfactorily settled. If lobsters can be profitably raised from spawn in parks of this character, their usefulness cannot be doubted, and the matter of artificial breeding might become comparatively simple. As elsewhere disenssed, however, the question of profit and loss is one for serious consideration to the lobster breeder, and if every lobster he raises costs him

* Om Forsog med Kunstig Udklaekning af Hummer, Ny Raekke of Tidsskrift for Fiskeri, 2 en Aargang, pp. 184–188, 1875.

† Indbere tninger til Departmentet for det Indre fra Prof. Dr. G. O. Sars, om de af ham i Aarene 1874–1877 anstillede Undersögelser vedkommende Saltvands-fiskerierne. Christiania. 1878.

more than its market value, his experiments must be counted a failure from a practical standpoint.

Lobster parks have been established in Europe as well as this country, but here only a few have been attempted. Two parks on the New England coast have been brought specially to our notice. The first, started in 1872, on the coast of Massachusetts, was described as follows, in the Boston Journal of Commerce for 1873:

"The attempt to cultivate lobsters for the market was begun about a year ago; and though no very great results have yet been obtained, the experiment presents every indication of ultimate success. A space of some 30 acres of flats having been inclosed by an embankment, the proprietor of the place conceived the plan of hiring the use of the inclosed water for a lobster pond. The place was originally an arm of the sea, and had a deep channel in the center, so that sufficient depth of water was secured. On building the dike an arched way was made in it, so that the tide could flow out and in at all times. The opening being small, the tide only rises and falls about 3 feet inside. This keeps the inside water deep at all times, and at the same time prevents it from becoming foul.

"During July and August last summer, 40,000 lobsters, of every age and condition, were let loose in the pond. Many of them were in the soft-shell state, and many were unsalable on account of a lost claw or other mutilation. Food, in the shape of refuse from the fish market, was freely supplied them; and a gate was put up at the entrance to prevent their escape into the sea. Nothing in particular happened for several months; and the enterprising owner arranged nets for eels and other fish, which he caught in the pond in large quantities during the fall and winter.

"When the ice had covered the pond, holes were cut and the lobster traps were put down. Good sizable hard-shell lobsters were at once caught, and two things were proved: first, the water was deep and pure enough to keep the fish alive, and secondly, the fish were healthy, for they had taken their hardened shells, in the usual manner, and new claws had grown in the place of those lost. In the spring, eels, perch, and a great many other kinds of fish were taken from the pond in liberal quantities, and now that the spawning season is well advanced, the farm has reached its final and most critical stage. Some 15,000 good, marketable lobsters have been taken out and sold. Every one was a male fish, as the female fish were all returned to the water for breeding purposes. The spawn is now on its last stage and in a few weeks, if all goes well, some millions of young lobsters will swarm in the pond. The eggs are already so far advanced that the young fry can be seen through the transparent shells, and only one thing will prevent them from coming to maturity. The question is, Can the young lobsters defend themselves from the fish in the pond? It is impossible to keep other fish out, and the lobsters must take their chances. Everything is favorable so far. The bottom is stony and gravelly. There are plenty of hiding places, such as the young fish seek to hide in, and the water is always deep and fresh.

"The proprietor is a keen, far-sighted man, well educated, and thoroughly in love with his business. He has entire confidence in the success of his venture, and will make it succeed if anybody can. From a personal inspection of the lobster farm, we are inclined to think the project destined to prove a financial success. The fish already sold are of excellent quality, and have won a good name in the market. The number of lobsters that can live in the pond is practically countless. If one-eighth of the young fish live, a couple of years will see the place stocked with millions of salable lobsters. The expense is small—the rent, the food (which may be obtained for the asking), and the labor of catching and preparing for market being the whole of it. The experiment is a very important one. If it succeeds it will introduce an entirely new system of lobster fishing, and do much to prevent the destruction of the natural supply. Nor is this all, for

the same pond can be made to yield perch, flounders, eels, smelts, and other fish in great quantities at no additional expense."

About 1879 or 1880, another similar park of about the same size as that above described was established on the coast of Maine, by one of the large wholesale firms dealing in lobsters. The place is a small inclosed bay with a narrow entrance, through which the passage of all objects above a very small size is prevented by a screen of wire netting. A few years ago this bay always contained an abundance of lobsters during the summer, and was much resorted to by fishermen. Overfishing, however, had nearly exhausted the supply and made trapping in the basin unprofitable, although it had not deprived it of its natural advantages, which have been recently recognized by those who are now in possession of its privileges. It contains an abundance of plant and animal food, and toward the center has a sufficient depth of water, with a soft bottom, for the protection of lobsters during cold weather. Into this park large quantities of soft-shelled lobsters, of lobsters minus one or both claws, as well as of young individuals under the legal size of 10 or 10½ inches, have been placed for growth and repair, and it is claimed that the results have been satisfactory. No food has been supplied them beyond what the park naturally contains. At the beginning of cold weather, the lobsters retire to the deeper parts of the park, and at times, when the water has been clear and calm, they have been observed almost completely buried in the mud, with only their feelers, eyes, and a small portion of the front of the body exposed.

While the owners of the park express great satisfaction at the results thus far obtained, they are not content to rest their experiment at this point, but are endeavoring to solve the problem of artificial breeding on a practical scale. They state that many of the lobsters first put into the pond were females with spawn, and claim that the young then hatched have grown and greatly increased its population. Since then, spawning females have been purposely added to the stock from time to time, and at the last accounts young lobsters of various sizes were said to be exceedingly abundant. In an experiment of this kind a considerable lapse of time is required to test its merits, but the present outlook is very encouraging.

THE POSSIBLE SUCCESS OF LOBSTER CULTURE.—There is little reason to doubt the practicability of lobster culture, but whether it can be made a paying business or not can only be determined by experiment. A vital question for consideration in connection with it is that of cost, and especially the first cost in establishing suitable breeding stations with the necessary outfit, and ample basins for conducting the work on a sufficiently extensive scale to make its results noticeable in an increased supply of lobsters. It seems scarcely possible that private enterprise alone could ever successfully carry on such an undertaking which, at the outset, requires the employment of much skilled labor, and must meet with many perplexing and unlooked-for delays. The success which has attended the breeding of so many of our marine and fresh-water products, through the co-operation of the National and State governments, might better determine the proper course to pursue, and we earnestly hope that the attention of the authorities will soon be directed toward this end. Before actual breeding operations are begun, there are many important problems to be solved in respect to the natural history of lobsters, and these must be intrusted to the painstaking skill of expert naturalists especially qualified for the work. The breeding habits, rate of growth, and enemies should be carefully investigated, as also the best means of caring for the young, the age at which they should be liberated from confinement, and the best method of distributing them to different portions of the coast. All of these questions must arise in any systematic attempt at lobster culture, and upon their proper treatment future success will depend.

TRANSPLANTING.—It is an interesting question as to whether lobsters can be made to live

and thrive in other regions than those in which they properly belong. The transportation of live lobsters over long distances has been successfully accomplished, but their acclimatization in strange waters is a more difficult problem still awaiting solution. Several species of true fishes, and also the common soft clam (*Mya arenaria*), belonging to the eastern side of the continent, have been introduced into the Pacific and its tributaries, and Pacific forms are now living on the Atlantic slope, making it appear reasonable to suppose that the lobster is capable of transplantation, providing it is introduced into a region where the water possesses a similar density and temperature to that of its natural habitat. Such conditions possibly exist on certain portions of the western coast, but no investigations have yet been made to determine the fact. The successful introduction of lobsters into that region would prove of great benefit, and it has already been attempted, though without permanent results so far as known.

TRANSPLANTING TO CALIFORNIA.—On page 686 we have referred to the carrying of live lobsters to Europe for the purposes of trade, and will here give a brief account of the experiments of Mr. Livingston Stone in transporting them across the continent. Three trials were made by this gentleman, on behalf of the State of California, with the assistance and co-operation of the United States Fish Commission, in 1873, in 1874, and finally in 1879, the last one only having been successful.

First attempt.—On the 3d of June, 1873, the first shipment was made in an aquarium car specially fitted up for the purpose, and which was to run through to California without change. Several species of fish were also included in the stock. The lobsters numbered one hundred and sixty-two, and were obtained from Massachusetts Bay and Wood's Holl, Massachusetts. They were contained in six large cases, the water in which was retained as nearly as possible at a temperature of between 34° and 36° F. The lobsters began to die early in the journey, but an unfortunate accident near Omaha, which precipitated the car into a river, brought the experiment to an untimely end.

Second attempt.—In June of the following year the second shipment was made. It consisted of one hundred and fifty lobsters, of which a portion were carried in wooden cases and the remainder in a large salt-water tank. The boxes were "without covers, and divided by partitions into twelve apartments. The surface extent of these apartments was just enough to admit one lobster lying within it—smaller than was well for them. The depth of the apartments was about 6 inches, and the bottoms were bored with an auger-hole to allow drainage. A handful of straw was put in each apartment and a lobster laid upon it, then sponges dripping with salt water were placed above and around it until quite concealed from sight and from dry air by this stratum of wet sponges." At the start, all of the lobsters were packed in boxes in this manner, but after two or three days sixty were transferred to the large salt-water tank containing striped bass and other salt-water fish. Air was forced into the tank continuously, but the following day all suddenly died, it was supposed, from the cover of the tank having fallen and interfered with the circulation. The lobsters in the cases were treated in the following manner:

"There were twelve of these boxes, each containing twelve above-described apartments, placed in the aquarium car, one upon another, in two piles of six boxes each, against the side of the car. In going over the lobsters twice a day, the boxes were taken down and the sponges were removed from the lobsters one at a time and squeezed over the animal, which, if alive, will respond to it by blinking its eyes and stretching its claws, perhaps moving its body a little. The sponges were then dipped into a pailful of sea water and wetted again, and were carefully arranged as before about the lobster. Pieces of ice which another person had been breaking up meanwhile were strewn over each box, among the compartments and sponges, to keep cool the water in the

sponges and the moisture in the straw and around the lobster. It was slow work, and the lobsters were too much exposed during the operations. Often, after the boxes were piled up again, pailfuls of salt-water were poured over the whole. During the first two or three days only a few were found dead when they were repacked." After the fourth or fifth day the mortality increased and from one-third to one-half the number were often found dead at each time of repacking. On the fifth day the straw was removed from the boxes, and the lobsters were packed entirely with sponges. Numerous devices were improvised to diminish the death rate, but all were unavailing. Two lobsters were left at Ogden, Utah, to be deposited in Salt Lake, and on leaving there but eight live lobsters remained, of these only four reached San Francisco, and they were put into the sea at Oakland wharf, June 12, nine days after they had been taken from the Atlantic Ocean.*

Third attempt.—The final and successful trip was made in June, 1879, the shipment consisting of lobsters, striped bass, black bass, and eels. They were carried in large salt-water tanks. The following account is extracted from a report by Mr. Livingston Stone:

"The first difficulty to be encountered [in transporting marine animals], viz, the tendency of the ocean water to become foul in the tanks *en route*, was overcome, as above mentioned, by letting the water stand long enough to clear itself of animal life.

"The second difficulty of keeping the water cold in the tanks without introducing ice into it, I resolved to meet by using a variety of coolers formed by the mixture of melting ice and salt. I tried three methods of using the freezing mixtures: (1) Putting the ice and salt in large stone jugs in the tanks; (2) The regular ice-cream-freezer plan of putting the freezing mixture in a vessel surrounding another vessel containing the water to be cooled; (3) Filling a large earthen drain tile with the freezing mixture and keeping it in a reserve tank of water from which the water, when cool enough, could be exchanged with the warmer water in the lobster tanks.

"All three varieties worked very well, and were employed for nearly the whole trip, the ice-cream-freezer method, however, being found to work the best in actual practice.

"After completing my preparatory arrangements for the care of the lobsters in transit, I procured some lobsters of Messrs. Johnson [of Boston], and in order to test the efficacy of my plans, I subjected the lobsters for a fortnight, as nearly as practicable, to the very conditions which they would encounter on the journey, and for this purpose I kept men watching them and dipping the water in the tanks every fifteen minutes, night and day, for fifteen days. The result was very encouraging, and gave strong hopes that the lobsters would reach the Pacific Ocean alive.

"The start from Albany was propitious and encouraging. We had with us three tanks of lobsters, three tanks of striped bass, two tanks of black bass, and two tanks of eels. The lobster tanks contained 22 female lobsters with over a million eggs nearly ready to hatch out. * * * The tanks were very heavy and difficult to lift, weighing about 300 pounds apiece.

"Besides the tanks containing fish, there were two large freezing tanks, in which were kept the reserve of ocean water and a constantly-renewed freezing mixture to maintain the reserve at as low a temperature as possible. These weighed nearly 300 pounds apiece when full. We also had two 5-gallon stone jugs containing the freezing mixture, and a large supply of ice and salt, an assortment of dippers, hatchets, thermometers, and other small articles indispensable to a journey of this kind.

"The main points about the care of the fish were: (1) to keep the temperature of the tanks just right all the time; (2) to keep the water constantly acrated; (3) at every change of cars to make the transfer from one train to another without injury to the fish and in season to take the connecting train. * * * I aimed to keep the lobsters at a temperature of between 46° and 55°.

* M. L. Perrin, in Report United States Commissioner of Fish and Fisheries, Part III, 1876, p. 260.

"It was easy enough to manage the temperatures of all the tanks except those containing the lobsters; but these gave us a good deal of trouble, because they could only be cooled by exchanging the water on the lobsters with the water in the coolers, and by using the stone jugs containing the freezing mixture. On very warm days it was extremely difficult to reduce the temperature in the lobster tanks as fast as the heat of the day raised it. With great pains, however, we succeeded in preventing it from rising high enough to do any mischief."

At Omaha one lobster was found dead. It "proved to be the one that had hatched its brood at Boston, and was undoubtedly not in condition to survive the journey. * * * No further mishap occurred during the journey. We passed the Laramie Plains into the Rocky Mountains in safety, and on the morning of June 17 descended into the valley of Great Salt Lake at Ogden, with lobsters, striped bass, black bass, and the remaining eels in splendid order. We made the transfer to the Central Pacific Railroad at Ogden successfully, and renewed our anxious journey with lighter hearts and more hope of favorable results than we had dared to entertain in all the previous part of the journey. Cheered by the hope of getting the fish through alive, we redoubled our exertions and kept at work with the dippers every minute, aerating the water in the tanks night and day till we reached Sacramento June 20, at 10.30 a. m. (eight days after the start).

"The lobsters were carried to Oakland wharf by the writer, where they were met by a steamer chartered for the purpose, which took them to the Bonito light-house, under the shadow of which, in a sheltered bay a few miles outside the Golden Gate, I had the pleasure of placing them with my own hands—the first lobsters ever introduced into the Pacific Ocean. They were all in splendid condition except one, and had with them over a million eggs nearly ready to hatch.

"Thus terminated one of the most important and difficult expeditions ever attempted with living fishes. The dangers they had to encounter were innumerable. It seemed as if only a miracle could save them, but they escaped all their dangers, and the result was as gratifying as it was unexpected."*

RESULT OF THE EXPERIMENTS.—Despite the numerous favorable reports made from time to time on the appearance of young lobsters in the vicinity of San Francisco, since the first introduction above described, we cannot find that any of them are authentic or based upon the examination of specimens by persons capable of identifying the species. Numerous small lobster-like forms that never attain a greater length than a very few inches at the most, live upon the California coast, and might easily be mistaken for genuine young lobsters by one not well acquainted with the structure of the latter. Such forms are undoubtedly taken at times in the nets of the fishermen and have probably given rise to the reports mentioned.

Mr. W. N. Lockington, of San Francisco, who had been studying the crustacea of California, was applied to, in 1880, for information regarding the matter. In reply he states: "I have been unable to ascertain whether any young lobsters have yet been taken in our waters. Reported examples prove, on inquiry, to be 'something like lobsters,' probably *Gebia* or *Callianassa*, which are very plentiful along sandy shores. An introduction worthy of mention, however, is that of the King Crab (*Limulus Polyphemus*), the young of which are supposed to have been brought over mingled with the spat of the eastern oyster, which has been largely imported for transplantation to the shallow waters of San Francisco Bay."

More recent information is wanting and there is still a possibility that some of the last lot of lobsters introduced may have survived. Before further shipments are made, it would be well to compare the coast temperatures of the two sides of the continent, with the view of ascertaining where on the west coast the conditions most resemble those of New England, whence the supplies are obtained.

* Report United States Commissioner of Fish and Fisheries, Part VII, for 1879 (1882), pp. 637–644.

10. COAST REVIEW OF THE LOBSTER INDUSTRY OF THE UNITED STATES, FOR 1880, STATISTICAL SUMMATIONS, TABLES, ETC.

MAINE.

PASSAMAQUODDY DISTRICT.

This district includes the line of coast from Calais, on the Saint Croix River, to West Quoddy Head, in Lubec. Lobster-fishing is carried on mainly from the lower part of the Saint Croix, from Eastport and from Lubec. The fishing season is practically that during which the canneries are open, beginning, by law, April 1, and ending August 1. Some years, however, as in 1879, the season does not open until the middle or latter part of April, and generally it closes as early as the middle of July, the lobsters becoming scarce, or largely soft-shell, about that time. Many of the lobstermen fish only about two months, which is said to be about the average length of the season for all of the fishermen. June is considered to be one of the best months for fishing. Lobsters are said to be most abundant on rocky bottoms, and in such places the traps are commonly set; but some fishing is also done on smooth bottoms of gravel and sand. In the spring, from April 1 to about the middle of May, the pots are mainly set outside of the island of Campobello, from Head Harbor to Herring Cove. Fishing first begins in depths of 20 to 25 fathoms, but, as the season advances, the pots are gradually shifted shoreward into much shallower water. About the middle of May the fishermen begin upon the so-called inside grounds, which are very extensive, and reach from Lubec to near Saint John, New Brunswick. Eastport is the only market for most of this region. During the summer the pots are usually set in depths of 3 to 10 fathoms. Many lobsters are brought in from about the Wolves, on the New Brunswick coast, and a few also from Grand Manan Both the Saint Croix and Pembroke Rivers furnish a profitable summer lobster fishery, the supplies from those waters containing, it is said, many larger individuals than are obtained elsewhere. The lobsters from Grand Manan are described as being smaller and poorer in quality than those from along the mainland; while those taken in South Bay, Lubec, and the Pembroke River run above the average size.

A curious fact concerning the occurrence of soft lobsters, which influences the market to a certain extent for a limited period in this region, has been described to us by several reliable persons. According to their accounts, although soft lobsters are more or less abundant from the middle of May to August, they are far more plentiful from the 1st to the 10th of May than at any other time during the fishing season. During this period sometimes fully one-half the catch will be soft-shell and unfit for use, and great care has to be exercised in making contracts to furnish large quantities of lobsters at this time. In April soft-shell lobsters are quite rare, especially during the first part of the month. August and September correspond with the first ten days of May in the abundance of soft lobsters, and this is said to account for the fact, that during these two months the lobster fishery has never proved successful about Eastport. There is no fall lobster fishery of any account in the Passamaquoddy district.

The lobster fishermen in this district own their gear, go singly or in pairs, and use from forty to one hundred pots to a boat, the average number being about sixty. On rough bottoms the pots are set on single warps but on smooth bottoms they are worked in trawls. According to a careful estimate by Mr. George R. Ray, of Eastport, the average catch per boat for the season of 1879 (April 20 to August 1) was 3,939 pounds, the lobsters averaging in weight for the entire catch about one pound each. The average catch for 1880 was much less, and the season shorter, lobsters having been less abundant. In 1879, 3,050 barrels of fresh lobsters were shipped from Eastport, and, in

1880, only 2,546 barrels. The prices paid to the fishermen for cullings, or canning lobsters, were 90 cents per 100 pounds, at the traps, or $1, delivered at the canneries. The larger lobsters, intended for shipment to the fresh markets, brought 3 cents each to the fishermen. Sales are generally made by weight for the canning lobsters, and by count for the fresh market. The fishermen live mainly on the islands, and comparatively few lobsters are now caught in this district by Americans. About 94,500 pounds of lobsters were landed in Eastport by the American lobster fishermen in 1880, the balance of the sales recorded for that place having been brought in by provincial fishermen. The lobstermen are mostly farmers, tending weirs being the only other fishery in which many of them engage. Some, however, also go boat fishing. The lobstermen of the Saint Croix River fish only about two months, during May and June, and sometimes a little in the fall. They catch about 500 lobsters weekly to a boat, each boat stocking, on an average, $30 per month, and sell at Calais, Robbinston, Saint Andrews, and Eastport, receiving 3 cents each at the three former places. The fish used as bait in this district are as follows, in the order of their importance: herring, flounders, sculpins. They are usually caught by the lobstermen themselves.

The canning of lobsters began at Eastport in 1842, but at that time these crustaceans were not known to occur in the immediate neighborhood, in sufficient abundance to warrant fishing for them. Hence smacks were sent in quest of supplies as far to the westward as Muscle Ridges, stopping and buying also at intermediate ports. Large quantities were thus obtained from the vicinities of Millbridge and Steuben. It was not until 1855 that lobsters were found to be plentiful near Eastport, and then for the first time was the fishery engaged in extensively in that region. From 1855 to 1865 this fishery continued to develop, reaching its height about the latter year. Since then, however, it has greatly declined in the American waters, although it has proportionally increased among the British islands of the vicinity. Formerly the entire catch was used by the factories, but, later, when the demand for fresh lobsters, in New York and Boston, increased beyond the capacities of the fisheries nearer home, the Eastport fishermen found a profitable market in those places for their largest and best fish.

Lobsters are sent from Eastport to the fresh markets at the west, mainly in flour barrels, which hold from 135 to 140 pounds each, or about fifty-five lobsters by count. In the bottom of each barrel a hole of about an inch diameter is bored to permit of drainage. The lobsters are then packed in them, care being taken to have the tail of each curled up under the body. The barrel is filled about even full, and on top is placed a large piece of ice, weighing from 10 to 15 pounds. Over this is arranged a covering of marline or gunny cloth, which is held in place by the upper hoop of the barrel. The journey from Eastport to Boston occupies about thirty-six hours, but lobsters will live in the barrels fully forty-eight hours or longer, if properly packed. They are transferred to cars, or boiled as soon as they reach Boston. The regular steamer from Eastport for Boston leaves the former place, during the summer, about noon of every other day. It is customary to pack the lobsters in the morning of each steamer day, in order that they may start in good condition.

A portion of the lobster scrap or refuse from the canneries is sold to the Red Beach Plaster Company, by which concern it is dried and ground with plaster for fertilizing purposes. In 1879 2,000 barrels of scrap were thus disposed of, and in 1880, 1,500 barrels. A large quantity of the scrap in its crude state is also used directly upon the farms in the vicinity.

CANNERIES.—There were four canneries located in Eastport in this district, in 1880, as follows: One established in 1870, and owned by the American Sardine Company; one established in 1877,

and owned by Thomas L. Holmes, and two established in 1879, and owned by Pike & Faben, and P. M. Kane, respectively. These canneries put up nothing but lobsters in 1880.

Two canneries are located in the province of New Brunswick, in close proximity to this district, viz., one at Saint Andrews, on the Saint Croix River, owned by Hart & Balkam, and one at Grand Manan, owned by George Underwood & Co.

FRESH-MARKET DEALERS.—In addition to the canneries, two or three of which engaged in shipping fresh lobsters, there were also three exclusively fresh lobster and fish dealers at Eastport, with a small working capital.

SMACKS.—There is but one lobster smack owned in this district, the Swampscott of Eastport. She is schooner-rigged, measures 22.88 tons, is valued at $500, and carries a crew of four men. She carries lobsters in the spring and summer, and herring in the summer and fall, to the Eastport canneries.

THE LOBSTER FISHERY AT EASTPORT, IN 1882.—While at Eastport in July, 1882, the author made many inquiries regarding the condition of the lobster industry at that time, and it may be interesting to note, in this connection, the few changes which have taken place since the official investigation of 1880. Lobsters were much more abundant and averaged larger this year than in 1881 and 1880, both of which were considered off years, and although only about the same quantity of canned lobsters was produced, the number shipped fresh to Boston in ice was much greater. The canning of lobsters is no longer profitable at this place, because of the great competition which has arisen in connection with the fresh trade. The dealers, in purchasing of the fishermen, are obliged to take all sizes that are brought in, and the latter are in consequence able to demand a higher price for the poorer part of their catch. Lobsters intended for the fresh-market trade must measure at least 10½ inches in length; all under this size, designated as cullings, are canned. The former, since 1881, have paid to the fishermen 5 cents each, and the latter $1.30 at their cars, or $1.50 delivered at the canneries. This is an advance, since 1880, of about 50 cents a hundredweight. The dealers claim that they can the cullings simply to prevent a loss, and that the canning of lobsters only about pays its way, without adding to their profits. There are now in Eastport only three lobster canneries, which keep open for lobsters from the first part of April until about the middle of July, or perhaps a week or two longer if supplies remain abundant. After this time, they engage in the sardine business, during the proper seasons. All of these three canning establishments ship fresh lobsters by steamer to Boston, and in addition there are one or two other fresh dealers, who sell their cullings to one or other of the canneries at reduced prices. The fresh lobster trade is said to yield fair profits. Contracts are occasionally made with Boston dealers to supply them with a specified quantity every week, during the season, the latter, on their part, agreeing to receive these quantities, whatever may be the state of the market.

In 1882 only about 1,500 cases of canned lobsters were prepared in Eastport, against 4,500 cases ten years ago. The largest shipper of fresh lobsters states that, in 1879, he canned 1,500 cases of lobsters; in 1880, 500 cases; in 1881, 500 cases; and in 1882, 500 cases. Ten years ago, when he started in the business, he put up 1,400 cases and also shipped about 1,400 barrels of fresh lobsters. This year, in canning 500 cases, he has shipped about 1,600 barrels.

Information was solicited respecting the general decrease of lobster supplies during the past ten years, but the result of the inquiries was quite unsatisfactory, from the contradictory statements of the informants. It seems quite certain, however, that lobsters are much less abundant now than formerly, in very shallow waters near shore, and in the more inclosed areas, such as the mouths of rivers and inner bays. There appears also to have been a decrease in the

average size of lobsters, the run of small individuals being greater than was the case ten years ago. Nearly four times as many fishermen supply the Eastport market now as then, and still the quantity handled is no greater. Formerly a large proportion of the supplies came from the Pembroke River, which was fished to within about 2 miles of Pembroke, and from the Saint Croix River, as far up as Robbinston. Broad Cove, back of Eastport, also furnished at one time valuable lobster fisheries. The lobsters of the Pembroke River averaged larger in size than the ordinary. Of late years the catch in these areas has been much less extensive, and some seasons has amounted to little or nothing, although in 1882 it was far better than for several years back. The extent of the area fished over for lobsters has been gradually increased from year to year.

Summation of the lobster fisheries in Passamaquoddy district in 1880.

Number of fishermen	62
Number of marketmen	4
Number of vessels above 5 tons burden	1
Value of same	$670
Number of boats	37
Value of boats	$1,015
Number of lobster pots	2,775
Value of lobster pots	$2,081
Total amount of capital invested in the fishery	$3,766
Number of barrels of bait used	1,220
Value of bait	$610
Quantity of lobsters sold fresh to the Boston market and local trade, in pounds	351,348
Value of same	$12,883
Quantity of lobsters sold to canneries, in pounds	953,910
Value of same	$9,539
Total quantity of lobsters taken and sold, in pounds	1,305,258
Value of the same to the fishermen	$22,422

Summation of the lobster canneries in Passamaquoddy district in 1880.

Number of canneries	4
Value of buildings and fixtures	$4,000
Additional cash capital required	$7,000
Number of boats	7
Value of boats	$1,500
Total capital invested	$12,500
Average number of men employed	31
Average number of women and children employed	31
Average number of smackmen employed	19
Total number of persons employed	81
Number of pounds of live lobsters used	953,910
Amount paid to the fishermen for the same	$9,539
Number of 1-pound cans of lobsters put up	135,792
Number of 2-pound cans of lobsters put up	4,776
Number of other brands of lobsters put up	12,000
Enhancement in value of lobsters in process of canning	$9,254
Value of the canned lobsters	$18,793

Summation of the entire lobster industry in Passamaquoddy district in 1880.

Total number of persons employed	147
Total amount of capital invested	$16,266
Total value of the products as they entered into consumption	$31,676

MACHIAS DISTRICT.

In this district lobster fishing is carried on principally from Cutler, Machias and Little Machias Bays, Mason's Bay, Jonesboro', Jonesport, Harrington, Addison, and Millbridge.

QUODDY HEAD TO JONESBORO'.—Passing westward from Quoddy Head, the first lobster fishing station met with is Cutler. Here there are a few men who, like the average lobster fishermen of this part of the coast, farm and fish for lobsters at the same time, selling their catch to smacks

running to the factories at Eastport or the Little Kennebec River. Some of these fishermen live on Cross Island and about the shores of Little Machias Bay, both of which places are favorably situated for engaging in the lobster fishery. At Machiasport all of the lobster fishermen live on the west side of Machias Bay, at Larribee Cove, Buck's Harbor, and Howard's Bay. The lobster fishermen of this region are all farmers, and usually do not begin to set their pots until after planting, although a few may commence to fish as early as the middle of April; but a small portion of the day is occupied in hauling the pots, the remainder being spent in procuring bait and in working on the farms. About one-fourth of the bait used is small herring brought from Eastport in the dry smacks. The greater part of the catch (probably three-fourths) is sold to the cannery at the Little Kennebec River, the remainder going to the Jonesport factory. Smacks generally go around to obtain the lobsters, but sometimes the fishermen carry them to the canneries in their own boats. Machias Bay is considered an excellent fishing-ground for lobsters, the statements of several persons warranting the belief that the average daily catch falls but little, if any, short of two lobsters to a pot. Mr. O. S. Church, of Cutler, says that, in 1879, one of the boats fishing from that place was paid for 6 tons of lobsters, which is equivalent to about 11,000 lobsters by count.

To the westward of Machiasport we come upon the Little Kennebec River, on the west side of which, near the mouth, is situated a lobster cannery, owned by Messrs. Burnham & Morrill, of Portland. It is located in the township of Jonesboro', and draws its supplies mainly from the fisheries to the eastward. A few lobsters are also obtained from the Jonesport fishermen, in Mason's Bay, and from fishermen at Chandler's River, Jonesboro'. The catch at the latter places is, however, mostly sold to the Jonesport cannery, situated at the "Reach" in Jonesport.

JONESPORT.—About seventy-one men are engaged in lobstering from Jonesport, including the mainland and Head Harbor, Beals and Great Wass Islands. They fish singly, using boats valued at $30 each, and, on an average, about sixty-five pots apiece. The average catch per man for the season of 1880 (three and one-half months, April 15 to August 1) was about 9,250 lobsters by count, valued at about $125 to the fishermen. The pots are set singly, as lobsters are not considered to be abundant enough for the use of trawls, although there has been no apparent decrease in their numbers during the past ten years. They are, however, said to run smaller now than formerly, the average weight of those taken during the summer being about 1 pound. The average daily catch for a man is about one hundred and twenty-five lobsters. This fishery began in the vicinity of Jonesport about 1860. Formerly only flounders and sculpins were used as bait, but during the past two or three years one-half of the bait employed has consisted of salted herring, brought from the weirs at Millbridge. The average amount of bait used to a boat for the season is about 34 barrels. After the close of the lobster season the men engage in boat and other fisheries. Three or four men, however, trap lobsters in the fall to sell to the fresh markets, but they do a very limited business. Most of the lobsters taken are sold to the factory at Jonesport, being carried there in dry smacks, owned on the islands. Of the average catch of each man for 1880 (9,250 lobsters) about 7,650 were sold to the cannery and 1,700 to well smacks in the spring, at the rate of 3 cents each. The lobsters taken in the fall and winter are mainly sent to Portland and Boston packed alive in barrels.

HARRINGTON.—At this place nine men use on an average sixty pots each, and make an average stock for the summer season of about $75. The catch is sold entirely to Jonesport, Cape Split Harbor, and Millbridge. The men are all farmers, depending more upon that branch of labor than upon fishing.

ADDISON.—Twenty-four men from Addison fish for lobsters from April to August. They set on an average sixty pots each, and make an average season's stock of $100. Herring are prin-

cipally used as bait. The catch is sold both to the canneries and to well smacks, and a few lobsters (about 3,000 annually) are consumed locally.

MILLBRIDGE.—About twelve men from this place engage in lobstering from April to August, setting from fifty to one hundred pots each, or an average of seventy-five pots, and fishing in depths of 3 to 15 fathoms. The men go singly, sometimes having a boy with them to help, and generally use the so-called "reach boats," measuring 15 to 16 feet in length. In 1879 the average daily catch to seventy-five traps was stated to be about 700 pounds of lobsters, and in 1880, 500 pounds. About one-sixth of the catch, weighing on an average 2½ pounds each, was sold to the Boston smacks at 3 cents apiece. After July or August all of the lobstermen engage in hand-line fishing for cod, hake, pollock, &c.

CANNERIES.—Four lobster canneries are located in this district, as follows: Jonesboro', established in 1867, and owned by Burnham & Morrill; Jonesport, established in 1863, and owned by William Underwood & Co.; Cape Split, Addison, established in 1879, and owned by the Portland Packing Company; Millbridge, established in 1861, and owned by J. Winslow Jones & Co. The Jonesport cannery puts up mackerel and clams as well as lobsters, but the other three canneries are entirely limited to lobsters.

SMACKS.—Only one registered smack, the Havelock, of Jonesport, is owned in this district. It is a well sloop, of 32.97 tons measurement, is valued at $1,500, and has a crew of two men. It engages in carrying lobsters from Grand Manan and the coast of Maine to the Jonesport cannery and to Boston.

Summation of the lobster fisheries in Machias district in 1880.

Number of fishermen	232
Number of marketmen	2
Number of vessels above 5 tons burden	1
Value of same	$1,670
Number of boats	200
Value of same	$6,030
Number of lobster pots	8,251
Value of same	$6,188
Total amount of capital invested in the fishery	$13,888
Number of barrels of bait used	4,330
Value of same	$2,165
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	107,950
Value of same	$3,958
Quantity of lobsters sold to the canneries, in pounds	2,474,300
Value of same	$24,743
Total quantity of lobsters taken and sold, in pounds	2,582,250
Value of same to the fishermen	$28,701

Summation of the lobster canneries in Machias district in 1880.

Number of canneries	4
Value of buildings and fixtures	$11,650
Additional cash capital required	$26,748
Number of boats	8
Value of same	$1,200
Total capital invested	$39,598
Average number of men employed	58
Average number of women and children employed	71
Average number of smackmen employed	12
Total number of persons employed	141
Number of pounds of live lobsters used	2,474,300
Amount paid to the fishermen for the same	$24,743
Number of 1-pound cans of lobsters put up	438,624
Number of 2-pound cans of lobsters put up	24,144
Enhancement in value of lobsters in process of canning	$32,986
Value of the canned lobsters	$57,729

Summation of the entire lobster industry in Machias district in 1880.

Total number of persons employed	375
Total amount of capital invested	$53,486
Total value of the products as they entered into consumption	$61,687

FRENCHMAN'S BAY DISTRICT.

In this district the lobster fishery is carried on principally from Stuben, Gouldsboro', Winter Harbor, Sullivan, Lamoine, Mount Desert, and Bartlett's, Gott's, Cranberry, and Tinker's Islands.

At Gouldsboro' some lobster fishing is done during most of the year, but the principal fishing season is from April 1 to August 1. Lobsters are said to be most abundant in May, June, September, and October. The traps are set mainly in depths of 4 to 10 fathoms, but sometimes as deep as 30 fathoms, on both rocky and sandy bottoms. The boats used by the fishermen are the so-called "reach boats" and dories, the former measuring about 15 feet long by 4½ feet broad, and costing about $20 each. There are about seventy-eight lobstermen in this place, a portion of whom go singly in their boats and others in pairs, and they set on an average sixty pots each. The greater part of the catch is sold to the canneries, the remainder being taken by the well smacks or consumed locally. The prices paid for lobsters range from 80 cents to $1.20 per 100 pounds. Sculpins, flounders, herring and fish heads are employed as bait. About one-half of the bait used by the Gouldsboro' lobstermen in 1880 consisted of fish heads, obtained from the boat fishermen, many of whom dress their catch on shore. Two-thirds of the lobster fishermen of Gouldsboro' follow boat fishing after July, and the remainder engage in coasting, farming, mining, &c. About 13,000 lobsters were sold for local consumption in and about Gouldsboro' in 1880. The average stock, with fifty pots, in that year was $80, and the best stock, with one hundred pots, was $200. The largest catch for one day by a single fisherman was 850 pounds, live weight, and the average daily catch about 200 pounds. The lobsters average in weight 1¼ pounds each.

About eleven men at Winter Harbor and vicinity fish for lobsters in the canning season, selling to the South Gouldsboro' cannery. All of these men also fish for cod and hake at the same time, hauling their pots in the morning and going out line fishing the same day. They set about thirty pots each, and make an average daily catch of about 75 lobsters.

At Sullivan seven men engage in lobstering during about three months, from April to August, setting on an average about sixty pots each, and selling principally to the Gouldsboro' cannery. Some lobsters are also sold to the Southwest Harbor cannery, and in 1880 about 1,200 pounds were used locally. One man sets his pots during three months in the fall and winter, selling his catch to the country trade. About an equal quantity each of herring, flounders, and sculpins, was used as bait. The average season's stock per man was about $105. At the close of the lobster season most of the men stop fishing and obtain work on land. There are nine lobstermen fishing from Lamoine.

At Mount Desert and Bartlett's, Gott's, and Cranberry Islands seventy-seven men engage in the lobster fishery from April 1 to August 1, using on an average ninety pots each. Fish heads constitute about one-half of the bait used, the remainder consisting of sculpins, flounders, and herring. In some cases the lobster fishermen assist the boat fishermen to dress their catch, taking the heads as payment. In 1880, 45,500 lobsters by count were sold for local consumption. Three well smacks visit this region during the summer and carry away fully one-half the catch to western markets.

The lobster fishery of Tinker's Island is participated in by five men, who set about one hundred pots each, and make an average season's stock of $125.

CANNERIES.—There are three lobster canneries in this district, as follows: One at Prospect Harbor, Gouldsboro', worked for one season, in 1863, and re-established in 1867, run for the Portland Packing Company; one at Hammond's Cove, South Gouldsboro', established in 1870, and owned by the Portland Packing Company; and one at Southwest Harbor, Mount Desert, established in 1853, and owned by William Underwood & Co. The Prospect Harbor cannery puts up lobsters only, and obtains its supplies mainly from Schoodic Point and Boisbubert. The cannery at Hammond's Cove cans both lobsters and clams, and that at Southwest Harbor puts up lobsters, clams, mackerel, salmon, clam chowder, and fish chowder. The latter cannery obtains its supplies from a radius of about 20 miles, or from the region lying between Naskeag Point, Isle au Haut, and Prospect Harbor. Eighty lobstermen fish regularly for this cannery.

List of lobster smacks owned in Frenchman's Bay district, all of which carry lobsters only.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Citizen	Gouldsboro'	Sloop	Well	18.21	$400	2	Prospect Harbor cannery.
Naiad	do	Schooner	Dry	8.76	200	2	Gouldsboro' cannery.
Total				26.97	600	4	

Summation of the lobster fisheries in Frenchman's Bay district in 1880.

Number of fishermen	176
Number of marketmen	4
Number of vessels above 5 tons burden	2
Value of same	$940
Number of boats	198
Value of same	$4,747
Number of lobster pots	12,990
Value of same	$9,742
Total amount of capital invested in the fishery	$15,429
Number of barrels of bait used	6,600
Value of same	$3,300
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	269,000
Value of same	$9,863
Quantity of lobsters sold to the canneries, in pounds	1,368,726
Value of same	$13,687
Total quantity of lobsters taken and sold, in pounds	1,637,726
Value of same to the fishermen	$23,550

Summation of the lobster canneries in Frenchman's Bay district in 1880.

Number of canneries	3
Value of buildings and fixtures	$11,000
Additional cash capital required	$41,000
Number of boats	6
Value of same	$3,150
Total capital invested	$55,150
Average number of men employed	42
Average number of women and children employed	65
Average number of smackmen employed	12
Total number of persons employed	119
Number of pounds of live lobsters used	1,368,726
Amount paid to the fishermen for the same	$13,687
Number of 1-pound cans of lobsters put up	155,244
Number of 2-pound cans of lobsters put up	33,336
Number of other brands of lobsters put up	127,801
Enhancement in value of lobsters in process of canning	$32,900
Value of the canned lobsters	$46,587

Summation of the entire lobster industry in Frenchman's Bay district in 1880.

Total number of persons employed	299
Total amount of capital invested	$70,579
Total value of the products as they entered into consumption	$56,450

CASTINE DISTRICT.

The lobster fishery is carried on from Blue Hill, Brooklin, Deer Isle, Little Deer Island, Brooksville, Castine, Swan's Island, Long Island, and Isle au Haut, in this district. Fourteen men engage in lobstering at Blue Hill during the canning season, selling their catch principally to the Brooklin and Deer Isle canneries. They set on an average seventy pots each, and make an average season's stock of $100. One-fourth of the bait consists of herring, and three-fourths of flounders and sculpins.

There are twenty-eight lobster fishermen at Brooklin, who begin setting their pots in April. After June the greater number go smack fishing from other places, or coasting, and during the spring and fall all dig clams. The average duration of the fishing season is six to eight weeks only. One-fourth to one-third of the catch by weight, and nearly one-half in value, is sold to the well smacks carrying to Portland, Boston, and New York. More would be sold to these smacks, but early in the spring, when the smacks obtain abundant supplies from the outer islands, they do not go as far up the "Reach." The larger part of the remainder of the catch is sold to the Brooklin factory. Flounders and sculpins form the principal bait. The average number of pots used by each man is one hundred and twenty-five, and the average season's stock per man about $125.

At Deer Isle there are one hundred and forty men who fish for lobsters during the season. The fishery begins at the Thoroughfare the latter part of February or about the 1st of March, but in other sections about the 1st of April. Seven-eighths of the men fish until August, the remainder dropping off from time to time after June to go boat fishing. Three-fourths of the catch is sold to the canneries and one-fourth to Portland and Boston smacks. A fall fishery of two and one-half months, from the middle of September to December 1st, is carried on by some of the men. The average stock per man for the summer season of four months in 1880 was $200, and for the fall season of two and one-half months $150. A few of the fishermen own two boats each. The average number of pots to a man is seventy-five; 11,200 barrels of herring, flounders, and sculpins were used as bait in 1880.

The lobster fishery of Little Deer Island is of limited extent, being engaged in by only eight men, who set their pots during the canning season of four months. The greater part of the catch is sold to the Castine cannery, but the larger lobsters are taken by the Portland, Boston, and New York smacks. Outside of the lobster season the men do little beyond a small amount of farming and fishing. Lobsters are caught all about the island in summer, but remain a short distance farther off during the spring. The average number of pots to a man is forty-five, and the average stock for the season about $60. The boats used are mainly old dories.

There are thirteen lobstermen at Brooksville, fishing from April to August, and again from October to January. They set on an average fifty pots each. The greater part of the spring and summer catch is sold to the Brooklin and Castine canneries. The fall and winter catch is shipped by steamer to Boston or sold to the well smacks, a small amount (about 8,000 by count) being peddled up the river.

At Castine there are four men who fish for lobsters during the canning season. They set two hundred and fifty pots in all, and in 1880 used 215 barrels of flounders, sculpins, and herring as bait; they made a total catch of 12,000 lobsters, equal to 16,000 pounds.

Seventy-four men engage in the lobster fishery at Swan's Island. Of these, fifty-one are vessel fishermen, who set lobster pots only in the spring and early summer. They use on an average one hundred pots each, each man also owning at least two boats, one for lobstering, the other of smaller size for catching bait. Sculpins, flounders, and herring are used as bait, two-thirds of the quantity consisting of sculpins. In 1879 many pots were set close inshore, upon

the eel grass, in such shallow water that they were uncovered at low tide. The average weight of smack-lobsters in that year was 2 pounds each, and of canning lobsters from three-fourths of a pound to 1 pound. The average daily catch to forty pots was about seventy-five lobsters, the larger part being smack lobsters. By fishing in deep water in the spring but few small lobsters are taken. According to Mr. David Smith, the lobster fishery was started at Swan's Island by four parties from Gloucester, Mass., who hired others to assist them at this place. They came in the fall in a smack, which waited until they obtained a load; but they did not return for a second trip. The year in which this occurred was not stated by Mr. Smith, but prior to this time the inhabitants of the islands had no idea of the abundance of lobsters in their neighborhood. They began fishing the next spring, and ten men engaged in the business up to 1855, after which time there followed an interval of three or four years when but little was done. In 1860 eight or ten men were again fishing, using from thirty to forty pots each. In 1855 the daily catch for forty pots varied from two hundred to two hundred and fifty lobsters, very few of which were small. About one-fourth were rejected as soft, or otherwise unsalable, the marketable ones averaging 3 to 3½ pounds each.

Long Island, lying to the southeast of Swan's Island, is the outermost of all the islands in the vicinity of Mount Desert, and is considerably isolated. It is visited in the lobster season by dry smacks running to the Southwest Harbor and Deer Isle canneries, and by well smacks from Boston and Portland. There are eight men on the island, who fish for lobsters, with about fifty pots each, from April to August, and stock on an average about $75. The pots are set singly. At the close of the lobster season these men engage in hand-line fishing to some extent. Flounders, sculpins, and fish heads are used as bait.

The boat fishermen of Isle au Haut and the adjacent islands make almost a specialty of fishing for lobsters. As a rule, however, they all catch enough fish for home use, while a portion also fish for a few weeks in midsummer, curing most of their catch, and peddling it up river in the fall. When mackerel are abundant they fish for them quite generally. There are six fishermen who regularly abandon lobstering about the middle of June to go trawling. They fish for cod, hake, and mackerel until September, when they usually begin to set their lobster pots again. Those who do much other fishing than that for lobsters generally have two boats, a square-stern, center-board, sloop-rigged fishing boat, 15 to 20 feet long, similar in most respects to the "Matinicus boat," and a "double-ender," for lobster fishing. In 1878 one-half of the fishermen fished for lobsters the entire season, or from the 1st of March until December. The others had taken up their pots by the middle of July, in order to fish for cod, hake, and mackerel until the middle of September, when they set them again, completing the lobster season about the first of December. In 1879 all of the fishermen, forty in number, fished for lobsters from the 1st of March to the 1st of August, selling the count lobsters to Portland, Boston, and New York smacks, and the cullings to dry smacks running to Green's Landing, Oceanville, North Haven, and Castine. After the 1st of August most of the men engaged in the mackerel fishery. Only ten of the fishermen set pots in the fall of 1879, beginning in October and continuing until December, and selling all of their catch to Portland, Boston, and New York smacks. No lobster fishing is done in the winter. The fishermen make and repair their gear, and build a boat, if needed; but the greater part of the time is spent in idleness, as no other employment than fishing is to be obtained on the island. A few of the men do a little farming to supply their own needs.

A larger number of pots to the man is used here than in most localities, and the more active fishermen make very fair earnings. One instance is recorded of a man stocking $425, lobstering during the five months from March to August of 1879, and several others, during the same period,

stocked over $350 each. Isle au Haut is favorably situated for boat fishing of all kinds. Lobsters are caught around the entire island, but are most abundant on the eastern side. The bar in the Thoroughfare, which is left dry at low tide, is a favorite locality for digging clams, as well as for procuring lobster bait—flounders and sculpins—which are also to be found in all of the coves and along the shores where there is gravelly, sandy, or muddy bottom. They are caught with hook and lines, spears, and nets. In windy weather, when spears are employed, oil is used to render the surface of the water smooth. The nets used to catch flounders and sculpins measure 20 to 30 fathoms in length, 2½ fathoms in depth, and have a 4-inch mesh. They are set mostly on the edge of the bar, where the water is about 3 or 4 feet deep at low tide. For several years previous to 1879 about 500 barrels of herring were used annually as lobster bait. They were employed principally in the spring, and were kept salted in barrels over winter.

CANNERIES.—There are five canneries in this district, located and owned as follows: Brooklin, established in 1870, and owned by J. Winslow Jones & Co.; Burnt Cove, Deer Isle, established in 1877, and owned by the Portland Packing Company; Green's Landing, Deer Isle, established in 1877, and owned by W. K. Lewis & Bro.; Oceanville, Deer Isle, established in 1858, and run by the Portland Packing Company; and Castine, established in 1871, and owned by Littell and Hunt. The products of the several canneries were as follows: Brooklin, lobsters only; Burnt Cove, lobsters and mackerel; Green's Landing, lobsters, mackerel, and clams; Oceanville, lobsters and mackerel; Castine, lobsters, mackerel, and clams. The Brooklin cannery obtains its supplies from over an area extending east and west about 20 miles; the Burnt Cove cannery depends mainly upon the fishermen at Vinal Haven, Isle au Haut, Deer Isle, and Blue Hill Bay; the Green's Landing cannery mainly upon those at Deer Isle, Isle au Haut, Rockport, and Mount Desert; and the Oceanville cannery upon those at Swan's Island, Isle au Haut, Sluson's Neck, Buck's Harbor, or Eggemoggin Reach, and Hodgkins' Cove Port. The lobsters are mostly brought in by dry smacks, of which there are fifteen, with a combined crew of about twenty-five men, running to the five factories.

List of lobster smacks belonging in the Castine district.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Ethel and Edith	Brooklin	Schooner	Dry	10.12	$500	2	Camden and Deer Isle canneries.
Mountain Fawn	do	do	do	18.18	500	2	Brooklin cannery.
Dry Spring	Deer Isle	do	do	12.73	200	2	Burnt Cove cannery.
Dolphin	do	do	do	11.52	250	2	Castine cannery.
J. C. Jameson	do	do	Well	24.07	800	2	Portland.
Minna	do	do	Dry	17.80	500	2	Green's Landing cannery.
Mozart	do	do	do	17.79	100	5	Fishes with traps, and sells locally.
Mary Elizabeth	Castine	do	do	9.04	200	2	Castine cannery.
Little Eva	Eagle Island	do	do	6.79	200	2	Camden cannery.
Total				128.04	3,250	21	

ENGAGED IN OTHER FISHERIES ALSO.

Favorite	Deer Isle	Schooner	Dry	7.13	$150	3	Oceanville cannery.
Hattie L. Gray	do	do	do	6.71	200	2	Camden cannery.
Helen M. Macomber	do	do	do	14.75	300	4	Green's Landing cannery.
Israel Washburn	do	do	Well	25.16	800	8	Portland.
Three Sisters	do	do	Dry	17.40	300	6	Burnt Cove cannery.
Trifle	do	do	do	8.56	350	2	Brooklin cannery.
William	do	do	do	12.77	200	2	North Haven cannery.
Cadet	Swan's Island	do	do	18.68	400	2	Oceanville cannery.
Total				111.16	2,700	29	

Summation of the lobster fisheries in Castine district in 1880.

Number of fishermen	311
Number of marketmen	50
Number of vessels above 5 tons burden	17
Value of same	$7,630
Number of boats	390
Value of same	$12,785
Number of lobster pots	28,050
Value of same	$21,038
Total amount of capital invested in the fishery	$41,453
Number of barrels of bait used	16,860
Value of same	$8,430
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	868,500
Value of same	$31,845
Quantity of lobsters sold to the canneries, in pounds	2,099,360
Value of same	$20,994
Total quantity of lobsters taken and sold, in pounds	2,967,860
Value of same	$52,839

Summation of the lobster canneries in Castine district in 1880.

Number of canneries	5
Value of buildings and fixtures	$15,550
Additional cash capital required	$38,500
Number of boats	15
Value of same	$7,350
Total amount of capital invested	$61,400
Average number of men employed	79
Average number of women and children employed	86
Average number of smackmen employed	25
Total number of persons employed	190
Number of pounds of live lobsters used	2,099,360
Amount paid to the fishermen for the same	$20,994
Number of 1-pound cans of lobsters put up	411,804
Number of 2-pound cans of lobsters put up	13,416
Enhancement in value of lobsters in process of canning	$31,393
Value of the canned lobsters	$52,387

Summation of the entire lobster industry in Castine district in 1880.

Total number of persons employed	551
Total amount of capital invested	$102,853
Value of the products as they entered into consumption	$84,232

BELFAST DISTRICT.

The principal lobster fishing stations in this district are Searsport, Belfast, Lincolnville, Rockport, Islesboro', North Haven, and Vinal Haven.

BELFAST TO OWL'S HEAD.—Along the mainland of this district the lobster fishery was carried on in 1880 as follows: From Searsport, by two men; from Belfast, by two men; from Lincolnville, by four men; from Rockport, by ten men; from Rockland, by eight men, and from Owl's Head, by ten men. The lobster season in this region is mainly limited to the period when the canneries are open, but some lobstering is also done in the spring and fall. More lobsters are taken in May than in any other month. The pots are set in depths of 1 to 20 fathoms, dependent upon the season. The best lobstermen will earn as much as $40 per month in good seasons. The average price of smack lobsters is 4 cents each, and of the small or canning lobsters $1 per 100 pounds. At retail they sell in the markets at about three times the price of the commoner fish of the same region, and are, therefore, rather beyond the means of the poorer classes. Flounders, sculpins, and herring in small quantities, are used as bait. The men go singly and set, on an average, eighty pots each. The boats are mostly valued at $15 each. After July a majority of the lobstermen

engage in boat-fishing. Two-thirds of the catch in value is sold to the Portland and Boston well smacks, and the remainder to the Camden and Castine canneries and the local trade. Forty-eight thousand pounds of fresh lobsters are sold annually for food in the neighboring regions.

ISLEBORO'.—Thirty-two men engage in lobstering from Islesboro' from April 1 to August 1, setting an average of sixty pots each and stocking on an average $80 for the season. Thirteen of these lobstermen go boat fishing after July, principally in the vicinity of Matinicus Island, at which place they camp out during the fishing season. Most of the bait employed consists of flounders and sculpins, but a few herring are also used. The boats are all small, and are valued at about $10 each. The men go singly, and all farm a little for their own use. One-half of the catch in value is sold to the well smacks and one-half to the canneries and local trade.

NORTH HAVEN, &C.—The lobstermen of the fishing area including North Haven, Eagle, Bear, Spruce Head, and Beach Islands, belong mainly at North Haven and live along the coves, harbors, and inlets which indent its shores; but a few are also located on each of the smaller islands. They fish for lobsters a part of each day only, working on their farms the remainder of the time. Those who have the most to do on shore set but a limited number of pots, which can be hauled in the few hours of early morning; but others, who do less farming, work with a larger number of pots, and devote much more time to tending them, and to collecting bait. The methods of fishing are similar to those employed at Vinal Haven, and the fishing season is about the same, beginning, possibly, a little later or about the first week of April. About the middle of June many stop lobstering in order to fish for hake, and from that time until the middle of July they are constantly dropping off, one or two at a time, to engage in the other fisheries. Before the close of the summer season (August 1) not more than one-third of the original number are still fishing for lobsters.

Prior to 1879 nearly all the lobstermen of this region engaged in the fall lobster fishery, which continued until about November 20, this season being considered the best of the year, as farm labors are then done with and the men can devote themselves more fully to fishing than in the spring. The presence of mackerel in 1879, until well into October, greatly interfered, however, with the fall lobster fishery of that year. There is no winter fishery for lobsters. When herring are abundant it is customary for some of the lobstermen to set several herring nets and take the fish from them before hauling their pots. Likewise in the fall it has generally been the custom, whenever schools of mackerel appear, to haul the lobster pots in the morning and fish for mackerel the latter part of the day.

Lobsters are found in all the waters surrounding these islands, but are somewhat more abundant about the smaller islands and dry ledges to the southwest of Long Island (Islesboro'); consequently very many of the fishermen set their pots in these localities, using sail boats when there is a breeze and row boats when it is calm. In the early spring (March), the pots are usually set in depths of 14 to 20 fathoms, but as the season advances they are gradually shifted in, until, by the first or middle of May, they are placed in from 3 to 6 fathoms. The bait consists principally of flounders and sculpins, but salt herring, fish heads, and ham fats, are sometimes put to the same use. The heads and livers of sheep have also sometimes been employed.

Eighty-nine men engaged in the lobster fishery in this section in 1880, setting on an average about sixty pots each. The monthly stock per man in the spring and summer ranged from $20 to $30, but in the fall it advanced to an average of $45 per month. Mr. Nathaniel D. Wooster, of North Haven, states that the average daily catch to a trap at present is about

one and a half to two lobsters. He considers 400 pounds a large daily catch for one man; but twenty years ago, with the same amount of gear, he could obtain as many as 1,500 pounds a day.

The fall catch of lobsters is sold almost entirely to Portland, Boston, and New York smacks. During the canning season the larger or count lobsters are mostly disposed of in the same way, while the small lobsters are sold to the canneries at North Haven and Castine. A small quantity of lobsters is peddled up the river. About ten well smacks visit this region during the lobster season. They seldom make regular trips, but run whenever they feel certain of obtaining a load. The fishermen generally contract for only one load at a time.

VINAL HAVEN.—Lobsters are very abundant in all the waters surrounding the island of Vinal Haven, and are quite equally distributed. In the early spring they are found somewhat farther from land than in the summer, and in depths of 15 to 25 fathoms. As the season advances they gradually move shoreward, into more shallow water, and enter the coves and creeks. Good fishing is frequently obtained in the summer in water so shallow that the pots are left uncovered at low tide. The fishermen are moreover rarely obliged to go much more than a mile from the shore, at any season.

A large percentage of the professional boat fishermen of Vinal Haven engage exclusively in lobstering for several months of each year. The season usually begins between the middle and the last of March, and continues until the first of August. Some of the men, however, drop off at intervals from the first to the middle of July, to engage in other fisheries, and a few also leave off in June. A very few men keep down their pots, or a portion of them, into the fall, or until about December, catching a few lobsters, and keeping them in their cars until such times as they can find a sale for them. The fall of 1879 afforded so good a mackerel fishery that but little lobstering was done. The fall fishery in previous years began about the middle of September, and continued until about the first of December. But very little lobster fishing has ever been done in the winter.

The homes of the lobster fishermen are scattered along the shores of the island, but are principally located in the coves and harbors and on some of the smaller islands, which lie close to the western side of the main island. The pots are usually set at the nearest fishing grounds, either in trawls or singly, the latter method generally having preference, as they can then be scattered more in case the lobsters are scarce. The fishermen claim that by shifting them a little every time they are hauled, which naturally results from the drifting of the boat, they obtain better results. Row boats are generally used in setting and hauling the pots, and sail boats very rarely. One of the most common kinds of row boats employed in this region is the so-called "double-ender," or "pea-pod," which has already been described in the general account of lobster boats, and which is said to have originated either at this place or at North Haven. Most of the lobster fishermen of Vinal Haven do a little farming in the summer for their own use. In the winter a few may find employment elsewhere, but the larger number do little beyond repairing their boats and gear for the next spring, building a new boat, perhaps, or getting in their year's stock of fuel.

Flounders and sculpins principally are used as bait, and also some fish heads, when they can be conveniently obtained. The flounders and sculpins are caught by the lobstermen themselves, by means of spears, fyke-nets, and hooks and lines. Although not as abundant as formerly, they still occur in considerable numbers in most of the shallow coves and inlets. In windy weather the surface of the water is rendered smooth by the application of oil.

In 1880 eighty-two men from Vinal Haven were engaged in the lobster fishery, setting on an average sixty pots each, a smaller number than in many neighboring sections. The average stock per man for the four months from April 1 to August 1 was $100, and for the two and a half months

from September 15 to December 1, was $85. Some of the men own two boats each. The spring and summer catch was largely sold to the cannery at Vinal Haven, all of the small lobsters having been disposed of in that way. A large percentage of the larger, or count lobsters, taken in the spring and summer, and all of that character caught in the fall, are sold to the Portland, Boston, and New York smacks.

CANNERIES.—Three canneries are contained in this district, being located and owned as follows: One in Camden, established in 1878, and owned by J. Winslow Jones & Co.; one in North Haven, established in 1866, and owned by W. K. Lewis & Brother; and one at Carver's Harbor, Vinal Haven, established in 1868, by E. C. Schenck, of New York, and owned, since 1870, by J. Winslow Jones & Co. Lobsters are carried to these canneries in seven dry smacks, having a combined crew of thirteen men. Mackerel, as well as lobsters, are put up at all of these canneries. The first factory was built at North Haven in 1857, the lobsters being caught at that time with the old style of hoop-net pots.

List of lobster smacks belonging in the Belfast district.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
George M. Hodgdon	Stockton	Schooner	Dry	16.19	$1,000	3	Castine cannery.
William Herbert	Islesboro'	do	do	10.50	1,000	2	Camden cannery.
Caro Piper	Rockport	do	Well	29.64	3,000	3	Boston.
Matilda	do	do	do	23.13	600	2	Do.
Clear the Track	Vinal Haven	do	do	41.03	800	3	Do.
Total				120.49	6,400	13	

ENGAGED IN OTHER FISHERIES ALSO.

Glendale	Vinal Haven	Schooner	Dry	12.77	900	5	

Summation of the lobster fisheries in Belfast district in 1880.

Number of fishermen	258
Number of marketmen	18
Number of vessels above 5 tons burden	6
Value of same	$8,150
Number of boats	312
Value of same	$6,295
Number of lobster pots	15,930
Value of same	$11,948
Total amount of capital invested in the fishery	$26,393
Number of barrels of bait used	6,555
Value of same	$3,277
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	699,000
Value of same	$25,630
Quantity of lobsters sold to the canneries, in pounds	1,177,464
Value of same	$11,775
Total quantity of lobsters taken and sold, in pounds	1,876,464
Value of same	$37,405

Summation of the lobster canneries in Belfast district in 1880.

Number of canneries	3
Value of buildings and fixtures	$11,000
Additional cash capital required	$18,000
Number of boats	7
Value of same	$2,925

Total amount of capital invested	$31,925
Average number of men employed	37
Average number of women and children employed	47
Average number of smackmen employed	13
Total number of persons employed	97
Number of pounds of live lobsters used	1,177,464
Amount paid to the fishermen for the same	$11,775
Number of 1-pound cans of lobsters put up	164,292
Number of 2-pound cans of lobsters put up	43,320
Enhancement in value of lobsters in process of canning	$16,560
Value of the canned lobsters	$28,335

Summation of the entire lobster industry in Belfast district in 1880.

Total number of persons employed	373
Total amount of capital invested	$58,318
Total value of the products as they entered into consumption	$53,965

WALDOBORO' DISTRICT.

This district includes many important fishing stations, among which are Rockland, Owl's Head, South Thomaston, Friendship, Saint George, George's Island, Muscle Ridges, Bristol, Bremen, and Matinicus Island.

The boat fishermen of this district constitute the larger part of those engaged in the lobster fishery; but there are quite a number of men employed on the shore and bank fishing vessels, and on the menhaden steamers, who own lobster boats and pots, and who, in the fall (about October), after they have done with those fisheries, begin to fish for lobsters. A few may continue in this industry all winter, but the majority of all the lobster catchers take up their pots in December. Many begin lobstering again in February and March and continue until April or May; some even fish as late as June. The catch is sold to Boston and Portland smacks, and to the canneries at East Boothbay and Saint George. About one-third of all the lobster fishermen are also vessel fishermen; but as about one-third of the boat fishermen do not engage in lobstering, the number of lobstermen is about equal to the entire number of summer boat fishermen. Many of the boats used by the lobstermen are the same as are employed in the other fisheries, and are known locally as "lobster boats." They are quite large, measuring 18 to 26 feet in length, and have a cuddy forward, where the lobsters can be kept from freezing in cold weather, by means of a stove, until they can be transferred to the floating cars. There are also accommodations for cooking and sleeping on board. These boats are sloop-rigged, and generally furnished with a center-board.

The men go singly, and as their pots are set on single warps, unlike the general method to the westward, they keep their boat under sail while hauling. The pots are set in rows; in winter the inner pots will be near one or other of the outer islands or ledges, the remainder extending off shore.

From the large size of their boats, the lobstermen of this region are enabled to begin fishing by the middle of February, and to venture some distance from land, where lobsters are most abundant in cold weather; but the well smacks do not begin to run regularly until between the 1st and the middle of March. By about the middle of April the lobsters have worked back into shallow water, and soon after this the fishery attains its height. The smack lobsters average about 2 pounds each, while the cullings or canning lobsters run from seventy-five to ninety by count to the hundred weight. Four to 5 cents each is paid for smack lobsters until the middle of April, and after that about three cents each. The smacks cease running about the middle of July, and beginning again about the middle of September, continue into November, and even as late as December.

The lobstermen on the west side of Pemaquid fish in John's Bay and the Damariscotta River in the summer, shifting into deeper water in cold weather. Those on the east side and about Friendship take lobsters well up among the islands and in the coves between Saint George and Pemaquid, in the spring, summer, and fall; but in the winter they have to go some distance out, the best winter fishing-grounds lying beyond the outer islands and headlands. Many of the men live on the little islands, between Bristol and Bremen on the one side and Saint George and Friendship on the other, several of these islands containing the homes of from one to four families, who also do some farming on a small scale.

The fishermen of this district set from twenty-five to sixty pots each, or an average of about forty-five; the season's stock in lobstering ranges from $25 to $200, the average being about $110. In obtaining flounders for bait the "dark water" spear is frequently used when the water is rough, during February and March. At Bremen and Friendship the same kind of bait is generally secured by means of fyke-nets, set in the coves, into which the flounders swim during high water. On some of the islands, where flounders are not abundant, cunners are much used, and are taken in box-shaped lath traps about 2 feet high, 18 inches square, and open above. Fish-heads, sculpins, and catfish are also largely used as bait. About a quarter of a barrel of bait is used daily to each fifty traps. The average daily catch per trap for the entire season is said to be about one count and two small lobsters. The cullings are sold mostly to the Saint George and East Booth-bay canneries.

At the Musele Ridges, during the week ending May 12, 1880, four men on Hunt's Island stocked on cullings $85, and on smack lobsters $115, making a total of $200 for the four men.

According to the Cape Ann Bulletin of April 17, 1878, "there have been over 100,000 lobsters caught and sold by the fishermen of Friendship, Me., since the 1st of February, averaging 4 cents each. Six smacks from this place are constantly employed to carry lobsters to Boston and Portland, from which they receive from 1½ to 2 cents freight on each lobster. One smack made three trips to Boston this spring, carrying in all 23,000."

The Gloucester, Mass., Telegraph, of June 8, 1870, states that "a firm in Rockland, Me., is said to have shipped to Boston and Portland, during the months of March, April, and May, 100 tons of live lobsters."

At Matinicus Island lobster fishing was introduced in 1868. The season extends from April 1 to August 1. The men for the most part go singly, set on an average eighty traps each, and make an average stock of about $150 for the four and one-half months. In the spring the traps are set on trawls, but during the summer on single warps. One-half the bait used consists of fish-heads.

Canning.—There is in this district but one cannery, located at Port Clyde, South Saint George, and owned by Burnham & Morrill, of Portland. Both lobsters and mackerel are put up. This cannery is situated in one of the best lobster sections of the Maine coast, and gathers its supplies from Pemaquid Point, on the west, to Owl's Head, on the east, including Matinicus and George's Islands, Musele Ridges, the east side of Bristol, Bremen, Friendship, Cushing, and Saint George. Two dry smacks, with four smackmen, are employed in gathering the lobsters from the fishermen.

List of lobster smacks belonging in Waldoboro' district.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
(*Unknown*)	Rockland	Schooner	Dry	9.86	$200	2	Burnt Cove cannory, Deer Isle.
Exchange	Saint George	do	Well	30.09	800	3	Boston.
May Queen	do	Sloop	Dry	11.58	300	2	Saint George cannery.
General Worth	Cushing	Schooner	Well	19.00	500	2	Boston.
I. W. Crawford	do	do	do	16.79	400	2	Portland and Boston.
John Dexter	do	Sloop	do	24.78	1,000	2	Boston.
Republican	do	Schooner	do	19.00	600	2	Portland.
Sentinel	do	Sloop	do	15.06	400	2	Boston.
True Republican	do	do	do	16.38	600	2	Do.
Highland Lass	Friendship	do	do	16.80	400	2	Do.
Planter	do	Schooner	do	32.57	600	3	Do.
Total				211.91	5,800	24	

ENGAGED IN OTHER FISHERIES ALSO.

Minnie Davis	Friendship	Schooner	Well	27.51	$2,000	3	Boston.
Pride of the Port	do	do	do	32.39	1,500	3	Do.
Sarah E. Hyde	do	do	do	36.44	1,200	3	Do.
Total				96 34	4,700	9	

Summation of the lobster fisheries in Waldoboro' district in 1880.

Number of fishermen	250
Number of marketmen	33
Number of vessels above 5-tons burden	14
Value of same	$12,370
Number of boats	220
Value of same	$17,600
Number of lobster pots	12,500
Value of same	$9,375
Total amount of capital invested in the fishery	$39,345
Number of barrels of bait used	9,595
Value of same	$4,798
Quantity of lobsters sold to market smacks and local fresh trade, in pounds	947,700
Value of same	$34,749
Quantity of lobsters sold to the canneries, in pounds	748,182
Value of same	$7,482
Total quantity of lobsters taken and sold, in pounds	1,695,882
Value of same to the fishermen	$42,231

The statistics of the South Saint George cannery are given in connection with those of the Wiscasset district.

WISCASSET AND BATH DISTRICTS.

The principal lobster fishing stations in the Wiscasset district are Boothbay Harbor, North and East Boothbay, Southport and Westport; and in the Bath district, Georgetown and Small Point.

When the lobster fishery was first started in Boothbay Harbor, the waters between the numerous islands which dot the entrance to the harbor abounded in lobsters from the early spring until December, and some lobsters remained there even during the winter. So plentiful were they, and so easily obtained from the sheltered waters of the harbor and bay, that those who first engaged in this industry did much better than the other fishermen. This circumstance naturally tended to draw fishermen from the other branches of fishery, and the older men and boys

who could not endure the hardships of the more active kinds of fishing found in this one remunerative employment close at hand.

The summer lobster fishery of this region is of comparatively little importance at present. In some places, as in Boothbay Harbor, a few men continue to catch lobsters through the summer, selling to the canneries until August, and also to the smacks and to the summer residents on the islands. The larger part of the fishermen, however, stop lobstering in May, or perhaps earlier. Some go to the banks, and after making one or more trips, when the vessel hauls up, begin lobstering again. The majority of the lobster men, however, go boat fishing during the summer. As a rule, the lobster-fishing season may be said to fairly begin by November 1. Many of the men set their traps all winter, but some do not. Mr. Steven Seavy states that in Boothbay Harbor and Linnegan's Bay the ice makes around the shores in winter to such an extent that the men cannot get to the cars in their boats, and they therefore do not fish in the coldest weather, but take up their traps and lay by for about two months. This is also the case, to a limited extent, in some other places. This fishery, like all the small-boat fishery of this region, is carried on with great irregularity; and if the fisherman sees a chance of bettering himself for a time, he leaves off lobstering, returning to it again when he feels inclined or when want compels him.

Good lobster-fishing grounds extend off from Small Point to Seguin Island. The next important grounds are those of the Sheepscot River, which furnish as good fishing as can be found anywhere in these two districts. The depth of water in the river prevents its freezing over in the winter, and offers a good retreat for the lobsters in cold weather without their going far from land. Lobsters are caught as far up as Wiscasset bridge, and thence out to Seguin. In the winter the fishermen shift their pots into the deeper water, toward the middle of the river; but Mr. Joseph R. Rodgers, of Georgetown, says he catches lobsters in the winter, in depths of only 5 to 10 fathoms. The Cape Newagen lobstermen fish as far out as Bantam Ledge, frequently setting their pots in depths of 35 to 40 fathoms.

Notwithstanding the large amount of gear used by the fishermen in this region, they now find the business of lobstering far from remunerative; but as most of them already have their gear, and can fit out with but little additional expense, they are still induced to engage in it, as it offers in many places the only means of making a living. A fair average stock for a man fishing from November to April is now about $75. Formerly the traps were set on single warps, but now the method of setting them trawl fashion is almost universally employed, as it enables one man to do approximately the work of two. This method was first adopted at Harmon's Harbor about 1865, and at Small Point in 1867. In the winter, however, two men generally go out in each boat, more as a matter of safety and for the proper handling of the boat in rough weather.

At Small Point two men engage in lobstering during the entire year, and eight men from April to November, inclusive, trawling for hake and other fish at the same time during the latter season. They set on an average thirty-eight traps, the average yearly stock per man being about $125. A small portion of the catch (about 6,000 by count in 1880) is used locally for bait and food, the remainder being sold to Portland smacks.

At Georgetown fifty-two men were engaged in lobstering from November, 1879, to April, 1880. The remainder of the year they were occupied in other kinds of boat fishing, but some kept down a few traps during the same time to obtain lobsters for bait. The local consumption is not great. About one-third of the catch is sold to boats trading up the Kennebec River, and the remainder to Portland smacks. Mr. Rodgers, of Georgetown, fishing from September to May with sixty traps, stocked only $160, which is, however, much better than most fishermen do. On the Kennebec River side of Georgetown lobstering is carried on only about the extreme southern part of the

point, where in 1879 four men from Portland, living on a scow, caught and sold to the Portland smacks and Kennebec River boats.

At Westport five men were fishing for lobsters from November to April, and two men during the entire year. They set an average of thirty-five traps each and made on an average about one dollar each daily. The catch is disposed of as at Georgetown. At Southport there were thirty men fishing from November to April and five men during the entire year, using on an average about fifty traps each. During the canning season the small lobsters are sold to the Boothbay cannery.

There were fifteen lobstermen at North Boothbay fishing from November to April, and to some extent also during the summer, with about twenty-five traps each and stocking about one dollar each daily. Sales were made to the Boothbay cannery, to the Portland smacks, and for local consumption. In Boothbay Harbor and East Boothbay there were seventy lobstermen, with thirty-five boats, fishing from the 1st of February to the middle of March, about thirty-five men from the latter date until June, and ten men from June to November 1. The Boothbay cannery takes the smaller lobsters during the canning season, the remainder being sold to the Portland smacks and the local markets.

CANNING.—There is but one lobster cannery in the Wiscasset district, and none in the Bath district. The Wiscasset cannery is located at Boothbay, on the eastern side of the strip of land known as Spruce Point, adjoining Linnegan's Bay. It is owned by J. Winslow Jones & Co., and was established in 1876. Clams and mackerel, as well as lobsters, are put up. The lobsters for this cannery are procured from the fishermen living between Cape Small Point, on the west, and Pemaquid Point, on the east.

Summation of the lobster fisheries in Wiscasset district in 1880.

Number of fishermen	130
Number of boats	106
Value of same	$6,200
Number of lobster pots	5,895
Value of same	$4,421
Total amount of capital invested in the fishery	$10,621
Number of barrels of bait used	2,700
Value of same	$1,350
Quantity of lobsters sold to the market smacks, and local fresh trade in pounds	428,800
Value of same	$15,723
Quantity of lobsters sold to the canneries, in pounds	367,342
Value of same	$3,673
Total quantity of lobsters taken and sold, in pounds	796,142
Value of same to the fishermen	$19,396

Summation of the lobster canneries in Waldoboro' and Wiscasset districts in 1880.

Number of canneries	2
Value of buildings and fixtures	$8,750
Additional cash capital required	$18,411
Number of boats	5
Value of same	$1,500
Total amount of capital invested	$28,661
Average number of men employed	35
Average number of women and boys employed	33
Average number of smackmen employed	9
Total number of persons employed	77
Number of pounds of live lobsters used	1,115,524
Amount paid to the fishermen for the same	$11,155
Number of 1-pound cans of lobsters put up	185,340
Number of 2-pound cans of lobsters put up	21,912
Enhancement in value of lobsters by process of canning	$15,531
Value of the canned lobsters	$26,686

Summation of the lobster fisheries in Bath district in 1880.

Number of fishermen	88
Number of boats	68
Value of same	$4,100
Number of lobster pots	3,835
Value of same	$2,876
Total amount of capital invested in the fishery	$6,976
Number of barrels of bait used	1,900
Value of same	$950
Quantity of lobsters sold to the market smacks and local fresh trade, in pounds	213,400
Value of same	$7,825

PORTLAND AND FALMOUTH DISTRICT.

PORTLAND.—Lobsters are taken off Portland, in greater or less quantities, during the entire year, but are said to be most abundant and in the best condition from March to July, and again from October to the end of good weather, and during those seasons most of the fishing is done. From July to October a very large proportion are soft, and but few are caught. The fall catch is only about one-half as large as that in the spring, although fully as many lobsters could be taken were there a market for them. The fishermen belonging to Portland who engage exclusively in this industry number about twenty-five, and live mostly on the islands of the vicinity—Hog, House, Peaks, Cushing, and Chebeague Islands, and at Cape Elizabeth. Nearly all of the shore fishermen of this region, however, catch lobsters, to a greater or less extent, during the height of the season, and sell to the Portland fresh markets and to the canneries. The local or warm-weather fishing grounds are situated off the back side of Hog Island, about Peaks and Cushing Islands, and in the vicinity of Portland Light. The winter grounds are mainly off Cape Elizabeth. The depth of water in which the traps are set varies with the season, from 3 to 30 fathoms. The men generally go singly, set from forty to sixty-five pots each, and, during the height of the season, sometimes visit them twice daily. A fair average daily catch per trap is about one marketable and three small lobsters, which is said to be much less than in former years. Mr. Trefethen, of House Island, states that twenty to twenty-five years ago he used to average seven lobsters to a trap each day, the weight of the marketable lobsters ranging from 4 to 6 pounds. Marketable lobsters average at present about 2 pounds each. As a rule, the fishermen carry their catch directly to market, and do not depend upon the smacks, as those living farther away are obliged to do. Lobsters of 10½ inches in length and larger bring to the fishermen in the fresh markets from 4 to 5 cents apiece; the smaller ones sell at 1 cent per pound.

SOUTH HARPSWELL.—At South Harpswell the lobster fishermen go singly, tend forty to fifty pots each, and make an average daily catch per trap of about three lobsters. A fair week's catch per man amounts to about 900 or 1,000 lobsters, of which about one-third are of marketable size and the remainder only suitable for canning purposes. The marketable lobsters weigh, on an average, about 2 pounds each. The smaller lobsters weigh so nearly 1 pound each that the canneries buy them either by count or weight, as the fishermen may desire, at the rate of 1 cent per pound or piece. Smack or count lobsters bring about 5 cents each. The best fishing is said to occur during March and April. From July to October many soft lobsters are taken in the traps. The summer fishery is conducted along the shores and about the inner islands of Casco Bay, but in cold weather the fishermen are obliged to resort to the outer islands and off shore grounds. Most of the lobster fishermen go shore fishing at certain seasons, but a few make a business of lobstering the entire year. Many engage in other kinds of fishing at the same time, keeping their pots set and hauling them every two or three days, or when they cannot fish. During the present closed season (1880) for small lobsters, many of the lobstermen have kept a few pots down, saving the

large lobsters for the smacks, but using all of the small and otherwise unmarketable ones for bait. The above remarks concerning South Harpswell apply to all the lobster fisheries of Casco Bay, excepting Portland.

For many years after 1850, when the first cannery was started at South Harpswell, the fishermen worked in pairs, using about seventy-five traps to a boat. The daily catch per boat averaged 400 to 500 lobsters of salable sizes. All under 2 pounds in weight were thrown away, and the remainder were sold to the canneries at an average price of 3 cents each in the spring, and 2 cents each in the fall. The season extended from March to May and from September to November 15. After the factories had closed the catch was sold to New York and Boston smacks, only a small quantity going to Portland. The prices paid by the smacks were about the same as those given by the canneries, beginning at 3½ to 4 cents in the early spring, and falling as low as 1½ cents when lobsters became more plentiful. Frequently, when the markets were dull, the fishermen, after culling out all under 2 pounds in weight, would bring their catch to the smacks, which, in turn, would throw out about a third more, taking only the very largest lobsters. This happened only late in the fall, or during very dull times. At other times the smacks would take all weighing over 2 pounds at a fair price. The marketable lobsters then averaged about 3½ pounds each.

Small Point.—On the Casco Bay side of Small Point, from Horse Island Harbor to Bald Head, lobsters have grown very scarce during late years, and a large share of those taken are unfit for market. The fishery is carried on by a few men in small boats, who sell their catch to the Portland, Harpswell, and Freeport smacks. The season extends from April 1 to December 1. It often happens that the fishermen leave off lobstering for days or even weeks at a time to fish for mackerel when they are abundant near shore. At such times they leave their pots set, and haul them when an opportunity offers. Flounders, sculpins, fish heads, lumpfish, and catfish are mainly used as bait. The men handle on an average thirty-five pots each, go singly, and make a gross season's stock of about $125. The daily catch per trap averages about one marketable and three small lobsters.

Canneries.—There are two lobster canneries in this district, one located at South Harpswell, the other at South Freeport. The former is owned by Marsh & Dennett, and the latter by William K. Lewis & Brother. At the South Harpswell cannery mackerel, as well as lobsters, were originally preserved, but this branch of the business has been abandoned. This establishment was started in 1876; in 1879 it was opened from April 8 to July 3, only closing at this early date because of the scarcity of lobsters. The South Freeport cannery was established in the fall of 1876, and puts up lobsters, clams, and mackerel. The season of 1879 lasted from April 12 to July 31. Both of these canneries draw almost all of their supplies of lobsters from Casco Bay. The total live weight of the lobsters used by them in 1880 amounted to 305,000 pounds, for which the sum of $3,050 was paid to the fishermen. Mr. George F. Lewis, superintendent of the South Freeport cannery, states that the lobsters used there average larger than at most canneries, as the fishermen supplying them set their pots mainly out of the course of the well smacks, and find about their only market at the cannery. During the two years prior to 1880 the following quantities of one pound cans of lobsters were put up by these two canneries: In 1878, 81,000 cans; in 1879, 64,000 cans. Three-fourths of the products of the South Harpswell cannery are sent to Burnham & Morrill, Portland, and one fourth to Kemp & Day, Boston. All of the products of the South Freeport cannery are sent to William K. Lewis & Brother, Boston.

The canning of lobsters was started in this district, about 1850, by Mr. William Underwood, who opened a factory at South Harpswell, and kept it running for about five years. A year or

two later, Messrs. Burnham & Rumery established another cannery, which continued in operation during only a single season. Nothing further was attempted in this line, however, from that date until 1876, when the present canneries were opened. According to the statements of the fishermen, many more lobsters were canned in those early days than at the present time.

PORTLAND FRESH MARKET.—The Portland fresh-lobster market is largely controlled by two firms, although a third firm buys and sells to a greater or less extent. The supplies are brought to the city by about sixteen well smacks, with an aggregate measurement of 345.55 tons. These smacks run up and down the Maine coast, from Cape Porpoise to Eastport and Grand Manan, buying directly of the fishermen. The greater part of the lobsters carried to Portland, however, come from between Portland and Mount Desert. The smacks are gone from one to two weeks on each trip, dependent upon the weather and the abundance of supplies, and carry each time from 2,000 to 8,000 lobsters by count. As a rule, they buy only the larger lobsters, those measuring above 10½ inches in length, which sell most readily in the fresh markets. In 1880 the fishermen received from the smackmen 3½ to 5 cents each for count lobsters, the latter in turn selling to the Portland dealers at a slight advance. Lobsters must reach Portland alive, no dead ones being accepted by the dealers. They are transferred at once to floating cars, where they await orders Of late years many lobsters have been shipped to Portland, as well as Boston, packed in barrels, with ice in warm weather. This method of shipping is much in vogue at Eastport, but is also practiced at some other places along the Maine coast. The majority of the fishermen of Casco Bay bring their lobsters directly to market in their own boats, not depending upon the smacks. About twenty five small boats are thus employed.

The lobster trade at Portland is most active from March to about the middle of July, this being the principal lobster-fishing season of the coast of Maine, whence all supplies are obtained. From the middle of July until October but little is done in this line, as lobsters are then generally considered to be in poor condition. From October to the end of favorable weather there is, however, a good trade, supplied by the so-called fall fishery.

The demand for fresh lobsters in Portland generally exceeds the supply, and in case of an overstocked market, which but rarely occurs, the surplus is disposed of to the canneries of the vicinity. The fresh-market trade in Portland in 1880 amounted to about 1,900,000 pounds, valued at $70,000, fishermen's price, and $90,000, market prices. About 1,000 men on the Maine coast catch for the Portland market.

Lobsters are shipped from Portland to Boston and New York, and to many smaller places in Maine, New Hampshire, Massachusetts, and Canada. About 10 tons are pickled yearly by the dealers, and put up in barrels or kegs for the trade. In 1880, 213,355 lobsters, received from the smacks buying on the Maine coast, were shipped from Portland to Boston by railroad, without passing through the hands of Portland dealers.

CANNING INTERESTS AT PORTLAND.—Although but few lobsters are now canned at Portland, owing to the great demand for fresh lobsters and the high prices paid for them by the fresh-market dealers, that city has probably more capital invested in this industry than any other city in the world, both as regards the coast of Maine and the coast of the British provinces. Portland interests are centered in three firms, which own or control sixteen canneries in Maine and thirty-one in the provinces. The cans and cases for these Maine canneries are mostly made in Portland, this branch of the industry giving employment to about eighty men for three months, at the rate of about $2 a day. The details and statistics of the canneries are given elsewhere.

List of the lobster smacks owned in Portland and Falmouth district.

Name.	Where owned.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
A. Morse	Portland	Schooner	18.16	$800	2	Portland.
Cornelia	do	Sloop	14.33	500	3	Do.
Georgia	do	do	25.05	600	2	Do.
James Beckwith	do	do	24.54	500	2	Do.
Star of the West	do	Schooner	21.21	800	2	Do.
Young Chief	do	do	21.79	375	2	Do.
Adaline Adams	Harpswell	do	27.27	1,000	2	Portland and Harpswell.
B. F. Brown	do	Sloop	24.15	600	2	Portland.
Mary H. Lewis	do	Schooner	19.07	1,100	3	Do.
Monterey	do	Sloop	32.25	700	2	Do.
Total			227.82	6,975	22	

The above smacks are all well smacks, engaged in carrying lobsters only.

List of the smacks carrying lobsters to the Portland market in 1880.

Israel Washburn, 25.16 tons; J. C. Jameson, 24.07 tons; General Worth, 19 tons; I. W. Crawford, 16.79 tons; Republican, 19 tons; Cornelia, 14.33 tons; Young Chief, 21.79 tons; Alwida Morse, 18.16 tons; James Beekwith, 24.54 tons; Star of the West, 21.21 tons; Georgia, 25.05 tons; Lizzie May, 13.71 tons; Adaline Adams, 27.27 tons; Mary H. Lewis, 19.07 tons; Monterey, 32.25 tons; B. F. Brown, 24.15 tons; total tonnage, 315.55.

Summation of the lobster fisheries in Portland and Falmouth district in 1880.

Number of fishermen	175
Number of marketmen	22
Number of vessels above 5 tons burden	10
Value of same	$8,875
Number of boats	160
Value of same	$7,500
Number of lobster pots	9,015
Value of same	$6,761
Total amount of capital invested in the fishery	$23,136
Number of barrels of bait used	4,000
Value of same	$2,000
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	241,000
Value of same	$8,836
Quantity of lobsters sold to the canneries, in pounds	305,000
Value of same	$3,050
Total quantity of lobsters taken and sold, in pounds	546,000
Value of same to the fishermen	$11,886

Summation for the Portland wholesale market in 1880.

Amount of capital invested (estimate)	$25,000
Quantity of lobsters handled, not including those shipped to Boston without passing through the hands of Portland dealers, in pounds	1,929,967
Amount paid to the fishermen for the same	$70,765
Value of the same at wholesalers' prices	$90,065
Enhancement in value in the Portland market	$19,300

Summation of the lobster canneries in Portland and Falmouth district in 1880.

Number of canneries	2
Value of buildings and fixtures	$3,500
Additional cash capital required, including the capital employed in handling the canned lobsters in Portland	$56,000
Number of boats	4
Value of boats	$1,100
Total capital invested	$60,600
Average number of men employed	55
Average number of women and children employed	16

Average number of smackmen employed	6
Total number of persons employed, including the men engaged in the manufacture of lobster cans in Portland	77
Number of pounds of live lobsters used	305,000
Amount paid to the fishermen for the same	$3,050
Number of 1-pound cans of lobsters put up	51,600
Number of 2-pound cans of lobsters put up	7,800
Enhancement in value of lobsters in process of canning	$4,713
Value of the canned lobsters	$7,763

Summation of the entire lobster industry in Portland and Falmouth district in 1880, not including the Portland wholesale market.

Total number of persons employed, including the men engaged in the manufacture of lobster cans in Portland	274
Total amount of capital invested, including the capital employed in handling the canned lobsters in Portland	$83,736
Total value of the products as they entered into consumption	$16,599

SACO DISTRICT.

This district includes the lobster stations of Biddeford Pool and Pine Point.

Biddeford Pool is the most important lobster-fishing station of Maine west of Portland. Fishing is kept up more or less continuously throughout the year, with a break from August to November. During the warmer months th traps are set about the islands of the vicinity, and outside of them to a distance of abont 2 miles; but in cold weather, when the lobsters move off shore, the traps are shifted farther out, being often set as far off as 7 miles to the east and southeast of Wood Island, in depths of 20 to 40, or even 50, fathoms. In the deeper waters a greater proportion of large lobsters are taken. The bait used consists of several species of small common fish, including hake, brim, and small cod. In 1880 twenty-one men were engaged in this industry, using sixteen small boats, and twelve hundred and sixty pots. The catch for that year amounted to 139,000 lobsters, valued at $6,950. Several of the fishing schooners owned at this place also participated in the lobster fishery, making a total catch of 54,000 lobsters, valued at $2,700. At Goose Rocks, between Biddeford Pool and Cape Porpoise, five men, with three sail boats, took, during the same year, 45,000 lobsters, valued at $2,250. Of the twenty-one boat lobstermen from Biddeford Pool, eleven follow lobster fishing for ten months of the year, and ten for only five months, the latter engaging in other kinds of boat fishing during the summer.

The larger lobsters are mostly shipped to Boston and New York by rail, packed in barrels of 140 pounds each. The principal market for small lobsters is Portland, where they are canned. Soft lobsters, when obtained in quantity, are also sent to the latter place for canning. The prices are about 5 cents apiece for the large lobsters, sent to the fresh markets, and 1 cent each for the small ones, sent to the canneries.

Lobsters are eaten to a certain extent by the poorer people of the neighborhood, during the summer, when the small ones cost about the same price per pound as the commoner food fish of the same region. During other seasons they are too expensive and too much in demand for the larger markets.

The lobster fishermen do some codfishing during a portion of the year, and some of them also belong to the life saving station located near the Pool.

PINE POINT.—About ten men from this place fish for lobsters during six months every year, setting their pots from Cape Elizabeth on the east to Wood Island on the west. They use ten dories, and six hundred pots, and in 1880 made a total catch of 32,400 lobsters, valued at $1,620.

List of lobster smacks belonging to the Saco district, all of which engage both in lobstering and in other fisheries.

Name.	Where owned.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
Florence Pearl	Biddeford Pool	Schooner	10.62	$750	4	Portland.
H. F. Ward	do	do	8.97	500	4	Biddeford Pool.
J. L. Berry	do	do	8.03	400	5	Portland.
Maid of the Mist	do	do	12.12	1,000	4	Biddeford Pool.
Ripple	do	do	10.41	800	4	
Total			50.15	3,450	21	

All of these smacks set pots in the vicinity of Biddeford Pool.

Summation of the lobster fisheries in Saco district in 1880.

Number of fishermen	42
Number of marketmen	21
Total number of persons employed	63
Number of vessels above 5 tons measurement	5
Value of same	$3,450
Number of boats	33
Value of same	$1,250
Number of lobster pots	1,860
Value of same	$1,395
Total amount of capital invested in the fishery	$6,095
Number of barrels of bait used	870
Value of same	$435
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	405,600
Value of same to the fishermen	$14,872

KENNEBUNK DISTRICT.

In this district lobster fishing is carried on principally from Cape Porpoise, Kennebunk Port, and Mousam River.

CAPE PORPOISE.—The winter fishery of Cape Porpoise is mainly limited to the catching of lobsters. About twelve hundred traps are set during that season outside of the harbor, and to a distance of 4 miles from land. In the spring the number of traps is increased to fifteen hundred or two thousand. They are generally set in trawls of fifty pots each. The boats used in this fishery are mostly dories. The catch for the past few years has been poor. In 1880, 34,400 lobsters, by count, valued at $2,064, were taken.

KENNEBUNK PORT.—About four hundred lobster traps are set near the mouth of the river at this place. The fishery is confined to the spring and summer, and is carried on by five men with five boats.

MOUSAM RIVER.—Four men fish for lobsters from this place, using four boats and setting three hundred and fifty traps. The catch for 1880 amounted to 5,000 lobsters by count, valued at $300.

List of lobster smacks belonging to Kennebunk district.

Name.	Where owned.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
Fannie T.	Cape Porpoise.	Schooner	6.84	$450	3	Cape Porpoise
Poor Jim	do	do	7.64	200	5	Portland
Total			14.48	650	8	

Both of these smacks engage in setting lobster pots along the coast of Maine, and also in other fisheries.

Summation of the lobster fisheries in Kennebunk district in 1880.

Number of fishermen	55
Number of marketmen	8
Total number of persons employed	63
Number of vessels, above five tons burden	2

Value of vessels	$650
Number of boats	50
Value of same	$600
Number of lobster pots	2,250
Value of same	$1,688
Total amount of capital invested in the fishery	$2,938
Number of barrels of bait used	1,050
Value of same	$525
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	108,600
Value of same to the fishermen	$3,982

YORK DISTRICT.

Lobster fishing is carried on from Wells, Cape Neddock, York, and Kittery in this district.

WELLS.—Lobsters have not been abundant in this locality for several years past. The fishery is carried on in small wherries, measuring from 13 to 20 feet in length, and either schooner or sloop rigged. The old style of hoop-net pot, with iron ring measuring 2½ feet in diameter, is still employed to a large extent. About thirteen men now engage in the fishery, using seventy-five lath traps and two hundred and fifty hoop-net traps.

CAPE NEDDOCK.—At Cape Neddock three hundred lobster pots are set from April to July, the catch being marketed at Portsmouth and Gloucester. Dories are used for tending the traps.

YORK.—A small fishery for lobsters is carried on about the ledges near York Harbor, the season being limited to the three and one-half months, from April to the middle of July. The catch during late years has greatly fallen off, and the lobsters have also become reduced in size. Two hundred traps were set in 1880.

KITTERY.—Six men from this place engage in lobstering from March to October, using three boats and setting two hundred and eighty traps.

Summation of the lobster fisheries in York district in 1880.

Number of fishermen	30
Number of boats	23
Value of same	$460
Number of lobster pots	1,105
Value of same	$829
Total amount of capital invested in the fishery	$1,289
Number of barrels of bait used	510
Value of same	$255
Quantity of lobsters sold to the market smacks and to the local fresh trade, in pounds	99,000
Value of same to the fishermen	$3,630

STATISTICAL RECAPITULATION OF THE LOBSTER INDUSTRY IN THE STATE OF MAINE IN 1880.

Table of lobster smacks owned on the coast of Maine.

District.	Including all smacks.				Engaged in lobstering only.				Engaged in other fisheries also.			
	Number of smacks.	Tonnage.	Value.	Crew.	Number of smacks.	Tonnage.	Value.	Crew.	Number of smacks.	Tonnage.	Value.	Crew.
Passamaquoddy	1	22.88	$670	4	1	22.88	$670	4				
Machias	1	32.97	1,670	2	1	32.97	1,670	2				
Frenchman's Bay	2	26.97	940	4	2	26.97	940	4				
Castine	17	239.20	7,630	50	9	128.04	4,250	21	8	111.16	$3,380	29
Belfast	6	133.26	8,150	18	5	120.49	7,200	13	1	12.77	950	5
Waldoboro'	14	308.25	12,370	33	11	211.91	6,922	24	3	96.34	5,448	9
Portland and Falmouth	10	227.82	8,875	22	10	227.82	8,875	22				
Saco	5	50.15	3,450	21					5	50.15	3,450	21
Kennebunk	2	14.48	650	8					2	14.48	650	8
Total	58	1,055.98	44,405	162	39	771.08	30,527	90	19	284.90	13,878	72

Of the fifty-eight smacks included in the above list, fifty are carriers merely, while eight engage directly in the fishery, setting pots. Of the fifty carriers twenty-nine are well smacks, carrying to the fresh markets, principally Portland and Boston, and twenty-one are dry smacks, carrying to the canneries. These smacks do their buying and fishing almost exclusively on the Maine coast.

Table of the lobster industry of Maine for 1880, showing the extent of the lobster fishing, canning, and market interests of the State of Maine, including the men employed, capital invested, and the quantity and value of both the fresh and canned products.

District.	Grand total for lobster industry.			Fisheries.								
					Fishing smacks.		Boats.		Lobster pots.			Bait used.
	Persons employed.	Capital invested.	Value of products as they enter into consumption.	Fishermen.	Number.	Value.	Number.	Value.	Number.	Value.	Total capital invested.	Barrels.	Value.
Passamaquoddy	147	$16,266	$31,676	62	...	.....	37	$1,015	2,775	$2,081	$3,096	1,220	$610
Machias	375	53,486	61,687	232	..	.....	200	6,030	8,251	6,188	12,218	4,330	2,165
Frenchman's Bay	299	70,579	56,450	176	..	.....	198	4,747	12,990	9,742	14,489	6,600	3,300
Castine	551	102,853	84,232	316	1	$130	390	12,785	28,050	21,038	33,953	16,860	8,430
Belfast	373	58,318	53,965	258	...	.....	312	6,295	15,930	11,948	18,243	6,555	3,277
Waldoboro'	328	58,356	52,530	250	..	.....	220	17,600	12,500	9,375	26,975	9,595	4,798
Wiscasset	162	20,271	24,619	130	....	.....	106	6,200	5,895	4,421	10,621	2,700	1,350
Bath	88	6,976	7,825	88	...	.....	68	4,100	3,835	2,876	6,976	1,900	950
Portland and Falmouth	294	108,736	35,899	175	...	.....	160	7,500	9,015	6,761	14,261	4,000	2,000
Saco	63	6,095	14,872	63	5	3,450	33	1,250	1,860	1,395	6,095	870	435
Kennebunk	63	2,938	3,982	63	2	650	50	600	2,250	1,688	2,938	1,050	525
York	30	1,289	3,630	30	...	.....	23	460	1,105	829	1,289	510	255
Total	2,773	506,163	431,376	1,843	8	4,230	1,797	68,582	104,456	78,342	151,154	56,190	28,095

District.	Fisheries.						Canneries.					
	Quantities of lobsters taken.											
	Sold to market smacks.		Sold to canneries.		Total.		Number of canneries.	Value of buildings and fixtures.	Additional cash capital required.	Number of boats.	Value of boats.	Total capital invested.
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value to fishermen.						
Passamaquoddy	351,348	$12,883	953,910	$9,539	1,305,258	$22,422	4	$4,000	$7,000	7	$1,500	$12,500
Machias	107,950	3,958	2,474,300	24,743	2,582,250	28,701	4	11,650	26,748	8	1,200	39,598
Frenchman's Bay	269,000	9,863	1,368,726	13,687	1,637,726	23,550	3	11,000	41,000	6	3,150	55,150
Castine	868,500	31,845	2,099,360	20,994	2,967,860	52,839	5	15,550	38,500	15	7,350	61,400
Belfast	699,000	25,630	1,177,464	11,775	1,876,464	37,405	3	11,000	18,000	7	2,925	31,925
Waldoboro'	947,700	34,749	748,182	7,482	1,695,882	42,231	1	5,000	13,411	2	600	19,011
Wiscasset	428,800	15,723	367,342	3,673	796,142	19,396	1	3,750	5,000	3	900	9,650
Bath	213,400	7,825	.....	.....	213,400	7,825	.....	.....	.....	.....	.....	.....
Portland and Falmouth	241,000	8,836	305,000	3,050	546,000	11,886	2	3,500	*56,000	4	1,100	60,600
Saco	405,600	14,872	.....	.....	405,600	14,872	.....	.....	.....	.....	.....	.....
Kennebunk	108,600	3,982	.....	.....	108,600	3,982	.....	.....	.....	.....	.....	.....
York	99,000	3,630	.....	.....	99,000	3,630	.....	.....	.....	.....	.....	.....
Total	4,739,898	173,796	9,494,284	94,943	14,234,182	268,739	23	65,450	205,659	52	18,725	289,834

* Including the capital employed in handling the canned lobsters in Portland.

Table of the lobster industry of Maine for 1880, *&c.*—Continued.

District.	Canneries.										
	Average number of men employed.	Average number of women and children employed.	Average number of smacksmen employed.	Total number of persons employed.	Number of pounds of live lobsters used.	Amount paid to the fishermen for same.	Number of one-pound cans of lobsters put up.	Number of two-pound cans of lobsters put up.	Number of other brands of lobsters put up.	Enhancement in value of lobsters in process of canning.	Value of canned lobsters.
Passamaquoddy	31	31	19	81	953,910	$9,539	135,792	4,776	12,000	$9,254	$18,793
Machias	58	71	12	141	2,474,300	24,743	438,624	24,144	.....	32,986	57,729
Frenchman's Bay	42	65	12	119	1,368,726	13,687	155,244	33,336	127,801	32,900	46,587
Castine	79	86	25	190	2,099,360	20,994	411,804	13,416	.....	31,393	52,387
Belfast	37	47	13	97	1,177,464	11,775	164,292	43,320	.....	16,560	28,335
Waldoboro'	19	22	4	45	748,182	7,482	123,816	14,448	.....	10,308	17,790
Wiscasset	16	11	5	32	367,342	3,673	61,524	7,464	.....	5,223	8,896
Bath	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Portland and Falmouth	*55	16	6	*77	305,000	3,050	51,600	7,800	.....	4,713	7,763
Saco	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kennebunk	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
York	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	337	349	96	782	9,494,284	94,943	1,542,696	148,704	139,801	143,337	238,280

District.	Wholesale markets.								
	Market smacks.			Marketmen.	Capital invested.	Quantity of lobsters handled in the markets in pounds.	Amount paid for the same to the fishermen.	Value of the same at wholesalers' prices.	Enhancement in value in the wholesale markets.
	Smacks.	Smackmen.	Value.						
Passamaquoddy	1	4	$670	....	.....	.....	.....	.....	.....
Machias	1	2	1,670	.....	.....	.....	.....	.....	.....
Frenchman's Bay	2	4	940	.....	.....	.....	.....	.....	.....
Castine	16	45	7,500	.....	.....	.....	.....	.....	.....
Belfast	6	18	8,150	.....	.....	.....	.....	.....	.....
Waldoboro'	14	33	12,370	.....	.....	.....	.....	.....	.....
Wiscasset	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bath	.....	.....	.....	....	.....	.....	.....	.....	.....
Portland and Falmouth	10	22	8,875	20	$25,000	1,929,967	$70,765	$90,065	$19,300
Saco	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kennebunk	.....	.....	.....	.....	.....	.....	.....	.....	.....
York	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	50	128	†40,175	20	25,000	1,929,967	70,765	90,065	19,300

* Including the men engaged in the manufacture of cans.

† The fishing smacks accounted for on the preceding pages also carry their catch to market.

NEW HAMPSHIRE.

The lobster fishery of New Hampshire is of slight importance compared with that of its northern neighbor, and gives employment to but few men, who generally devote most of their time to other kinds of fishing or other occupations. The principal places from which lobstering is carried on are Portsmouth, New Castle, Rye, Seabrook, and the Isles of Shoals. Beyond the few lobsters used locally, the greater part of the catch goes to Portsmouth, which city acts as a small distributing center for the near inland towns. Lobsters are shipped from Portsmouth, both fresh and boiled. A small portion of the catch is also sent to Boston and New York.

The season lasts from two to four months, lobsters being most abundant in May. When men are hired by the day to tend the traps they are paid at the rate of about $25 a month, which is also about the earnings of the men using their own gear. According to the statements of the fishermen, lobsters have decreased in abundance from one-half to one-fourth during the past twenty years. The average season's (four months) catch per trap of marketable lobsters (those above 10½ inches in length) is stated to be about sixty. The prices paid to the fishermen range from 4 to 5 cents each.

Off Portsmouth the traps are set around the ledges at the mouth of the harbor, from Kittery, Me., to Odiornes Point, New Hampshire. The fishery along the remainder of the coast is mainly confined to slight depths of water near shore; some of the fishermen set their pots off the southwestern corner of Maine. No lobster smacks are owned in New Hampshire.

The average number of pots to a man in the different localities ranges from fifty to sixty-five.

Summation of the lobster fisheries in the State of New Hampshire in 1880.

Number of fishermen (two to four months)	44
Number of boats in use	31
Value of same	$460
Number of pots in use	2,350
Value of same	$2,350
Total amount of capital invested	$2,810
Number of barrels of bait used	500
Value of same	$250
Total catch of lobsters, in pounds	250,000
Value of the same to the fishermen	$7,500

MASSACHUSETTS.

GLOUCESTER DISTRICT.

In the Gloucester district, which includes the greater part of Cape Ann, lobster fishing is mainly carried on in the neighborhood of Rockport, Gloucester, Annisquam, and Manchester The fishery is not, however, of great extent in this district. The season begins in March or April and continues principally through the spring and fall, closing about November 1. Lobsters are said to be most abundant during March, April, and May, and many of the lobstermen take up their traps in September. In Gloucester Harbor the traps are set on sandy bottom, in depths of 2 to 3 fathoms in summer, and about 10 fathoms during the colder part of the season.

Captain Webb, of Milk Island, near Rockport, states that he used to set his traps in 14 fathoms in April, changing to 2½ fathoms as the water became calmer in the late spring. He often greatly increased the amount of his catch by watching the storm signals on Thatcher's Island, and shifting his traps into deeper water when a heavy wind that was likely to produce a strong undertow was predicted.

As a rule, the fishery is conducted in depths of 2 to 10 fathoms in the summer, and of 10 to

20 fathoms in the early spring and late fall. The ordinary half-cylinder lath traps, with net-funnels, measuring 4 feet long by 2½ feet wide and high, are universally employed.

Occasionally, even in recent times, the old style of hoop-net pot has been used by a few fishermen with fair success. Flounders and sculpins are most commonly used as bait in the summer, and cod and halibut heads in the spring. The boats in use by the fishermen are mostly dories, valued at about $20 each. The average catch per trap is said to be about three lobsters, but as many as thirteen are sometimes taken at a single haul.

In the height of the season the traps are sometimes visited twice a day, both morning and evening, but, as a rule, they are only hauled in the morning. In former times the fishermen earned as high as $500 in a season, but now their season's earnings seldom exceed $200. A very few men hire out at the rate of $35 to $40 per month. The average earnings per season for the lobstermen of this district are about $110. Many of the men fish during only a few weeks.

Lobsters are sold in Gloucester mainly by count, but recently the method of selling by weight has been coming into favor. The retail prices of fresh lobsters in 1880 were from 4 to 6 cents each, and of boiled lobsters from 6 to 10 cents each.

The greater portion of the lobsters caught about Gloucester and Rockport are sent to Boston, being carried there either by railroad, steamer, or smacks. There are two or three smacks which make regular trips between Gloucester and Boston. Only a small portion of the catch is sold locally. The lobsters are landed by the fishermen, and sold at once to regular buyers, who tend to the shipping. Many of the fishermen contract in the spring to sell their season's catch, whatever may be the amount, to certain parties. The lobsters sent in the steamers and by railroad are first barreled.

At Manchester, the lobster fishery is about the only fishery now carried on. The catch, which in 1880 amounted to 8,250 by count, is sold locally, and mainly to the summer visitors.

Summation of the lobster fisheries in Gloucester district in 1880.

Number of fishermen	95
Number of boats	78
Value of same	$1,560
Number of lobster pots	2,549
Value of same	$2,549
Total amount of capital invested in the fishery	$4,109
Number of barrels of bait used	570
Value of same	$285
Quantity of lobsters taken and disposed of, in pounds	285,510
Value of same to the fishermen	$10,468

SALEM DISTRICT.

The lobster stations in this district are Salem and Beverly. Fishing is carried on more or less continuously throughout the entire year, but the greater part of the catch is made in April, May, September, and October. But few lobsters are taken in warm weather. The men generally go two in a boat, each boat using on an average sixty pots. The pots are set on single warps about the ledges in the harbor and also off the harbor, at distances of 5 to 10 miles. The average daily catch to a boat during good seasons, is about one hundred and fifty lobsters. The winter catch averages about seventy-five lobsters daily to a boat. Most of the catch during the early part of the season is sold in Boston, but later the lobsters caught here are mainly boiled in the old-fashioned kettles, and sold in Salem, Beverly, and the adjacent towns. One fishing schooner, of 16.40 tons measurement, is owned in Salem, and engages in the lobster fishery during a part of

the year, setting pots in Massachusetts Bay and carrying to Salem. It is valued at $500, and has a crew of four men.

Summation of the lobster fisheries in Salem district in 1880.

Number of fishermen	46
Number of smacks above 5 tons measurement	1
Value of same	$500
Number of boats	19
Value of same	$380
Number of lobster pots	1,300
Value of same	$1,300
Total amount of capital invested in the fishery	$2,180
Number of barrels of bait used	840
Value of same	$420
Number of pounds of lobsters taken and disposed of, in pounds	422,250
Value of same to the fishermen	$15,482

MARBLEHEAD DISTRICT.

This district includes the fishing ports of Marblehead, Swampscott, Lynn, and Nahant. The Marblehead lobstermen set their pots during the entire year, the Nahant lobstermen during the fall, winter, and spring, and the Swampscott lobstermen during only a small portion of the year. The half-cylinder lath pots are used by most fishermen. The boats employed are mainly dories, the men going singly. The depths of water fished in range from 1 to 30 fathoms, according to the season. At Nahant each man handles about eighty pots, setting them attached in trawls. Two lobster-fishing schooners of more than 5 tons measurement are owned in this district. The Zeppie, of Marblehead, measuring 11.78 tons, valued at $700, and with a crew of five men, fishes on the coast of Maine and Massachusetts, and carries her catch to Marblehead. The Lizzie Phillips, of Nahant, 14.12 tons measurement, valued at $1,000, and with a crew of four men, fishes in Boston Bay, and sells to Boston.

The catch by Nahant and Marblehead fishermen is sold principally to the Boston markets; that by Lynn and Swampscott fishermen is mostly consumed at home. Very few lobsters are taken at Swampscott. The lobster fishery is the only one now carried on from Nahant. The Barnstable Patriot of February 19, 1861, says: "Nahant fishermen have given up winter codfishing and gone into the lobster fishery, which is a new business for this season of the year. The fleet consists of some six vessels, manned by thirty men, or thereabouts."

Summation of the lobster fisheries in Marblehead district in 1880.

Number of fishermen	62
Number of smacks above 5 tons measurement	2
Value of same	$1,700
Number of boats	24
Value of same	$430
Number of lobster pots	2,260
Value of same	$2,260
Total amount of capital invested in the fishery	$4,390
Number of barrels of bait used	650
Value of same	$325
Quantity of lobsters taken and disposed of, in pounds	325,500
Value of same to the fishermen	$11,935

BOSTON DISTRICT.

In this important district the principal lobster-fishing stations are Winthrop, Long Island, Hull, Cohasset, and Brewster's. During the warmer months of the year this fishery is mainly carried on in Boston Harbor and along shore, but in cold weather the men go farther out in

Massachusetts Bay, even to distances of 15 miles from land. The traps are mostly set in the deep channels of the harbor and among the outer ledges and islands. The summer fishery is conducted in depths of 1 to 8 fathoms, and the winter in depths of 12 to 16 fathoms or more. The season for fishing in Boston Harbor begins about the middle of April and continues until about the 1st of December. The Massachusetts Bay or deep water fishery is kept up the balance of the year. April and May, September and October are the best months for lobstering. During June, July, and August the catch is said to be much lighter, and lobsters are then considered to be in the poorest condition for eating, very many being soft-shell. The winter catch is almost always insufficient to meet the demand. The lobsters caught in the deeper parts of the bay are stated by the fishermen to run larger in size and to be thicker shelled and firmer in flesh than those taken in Boston Harbor, also keeping better when boiled. Only about one-fifth as many men are engaged in the winter fishery as in the spring, summer, and fall.

The ordinary form of lath trap is most commonly employed. The traps are now mostly set in trawls of twenty to forty each, and a fixed pulley attached at or near the bow of the boat, for underrunning the trawl has recently come into general use. Sometimes as many as five trawls of twenty pots each are handled by a single fisherman. At Hull the trawls are made up of twenty-five pots each. The bait consists of sculpins, flounders, cod and halibut heads, and other so-called refuse fish. The boats are mainly schooner-rigged and built lapstreak; they are valued at from $50 to $75 each. Some dories are also employed. The only registered lobster smack of the district is the Joseph; it is schooner-rigged, of 5.77 tons measurement, valued at $50, and is manned by a single fisherman. This schooner fishes for lobsters in Boston and Massachusetts Bays, and carries to Boston.

The average daily catch per trap, reckoning for the entire year, is about one and a half to two lobsters of marketable size. About Point Shirley a fisherman expects to obtain, on an average, about 100 lobsters per day in all his traps, of which about fifty will be of salable sizes. Lobster fishermen are supposed to earn from $2 to $4 per day, or from $300 to $500 during a season of six months. Boston is the only market for the catch of this district excepting the small quantity which may be used locally. At Hull, the only fishery receiving any attention is that for lobsters. The fishermen all report a considerable decrease in the abundance and size of lobsters, which they say has been going on steadily from year to year. The cause assigned is overfishing. They also state that it has been their experience that a greater mortality occurs among the lobsters in a car where their claws have been wedged than when they have been left free, and they have therefore abandoned the practice of wedging.

Boston wholesale market.—Lobsters are brought to this market in three different ways—from the immediate neighborhood, in the small boats of the fishermen, dry, and from a distance in well smacks, and by railroad, packed in barrels. Although the well smacks bring the largest supplies from distant grounds, thousands of barrels are received every year in good condition, from along the coasts of Maine, New Hampshire, and Massachusetts, in warm weather protected with ice, but at other times without it. As soon as they are received they are transferred, at least in the case of the larger dealers, to floating cars, capable of holding from 5,000 to 10,000 lobsters each, and in which they can be kept alive for some time. About fifteen of these cars are owned in Boston, six of the largest belonging to a single firm, who profess to keep constantly on hand, so far as possible, from five to six days' supplies. A car to hold 10,000 lobsters should measure 40 feet long, by 12 feet broad, and 5 feet high. The greatest number of lobsters is received in April and May, the smallest number about February. The sources of supply vary more or less with the season. In summer the most and best lobsters come from the eastward of Deer Isle,

Maine, but in colder weather the greater number come from the westward of Deer Isle and from as far south as Chatham, on Cape Cod. Very large quantities of lobsters are received from Portland, Me., where they are often reshipped by railroad from the smacks which bring them in from the coast of Maine. No lobsters are sent to Boston from the westward of Chatham, the entire catch of Southern New England being consumed at different places along that coast or sent to New York City. Occasional supplies of fresh lobsters are received at Boston in summer from the coast of Nova Scotia. Some of the Boston dealers anticipate that in the future they will have to depend more and more on shipments from the British Provinces in order to supply the ever-increasing demands.

Larger lobsters are demanded by customers in summer than in winter, probably because in the former season larger lobsters, which come mainly from the eastward, are more abundant, and, therefore, nearly always obtainable, while in the latter season the supply is much more limited.

The outside markets for fresh and boiled lobsters from Boston are principally the New England towns and New York City. The Middle and Western States also receive a certain amount, but Chicago is about the western limit of fresh distribution.

There are in Boston about six permanent establishments for receiving and distributing lobsters, both fresh and boiled, and also several small occasional boilers. The lobsters, in either condition, are generally shipped away in barrels, with or without ice, according to the season.

According to the estimates of Mr. W. A. Wilcox, of Boston, that city was supplied with lobsters in 1880 as follows, the figures being by count:

From Maine*	793,099
From Boston Harbor, including Winthrop and Lynn	596,400
From Hull	319,200
From Nahant	50,000
From north shore of Massachusetts Bay, including Cape Ann	300,000
From south shore of Massachusetts Bay, including Cape Cod	360,954
Total number	2,419,653
Value of same at wholesale prices	$169,758

The well smacks carrying from Maine to Boston, in 1880, were about seventeen in number, and belonged entirely to Western Maine. They ranged in size from 18 to 40 tons, and in value from $500 to $4,000 each; their combined measurement was 487 tons; total value, $28,800, and combined crew fifty men.

One Boston firm is largely interested in the canning of lobsters on the Maine and provincial coasts, controlling the products of many canneries. Statistics of these canneries have been given in the coast review of the State of Maine.

Summation of the lobster fisheries and markets in Boston district in 1880.

Number of fishermen	86
Number of marketmen	50
Number of smacks	1
Value of same	$50
Number of boats	92
Value of same	$5,275
Number of lobster pots	8,290
Value of same	$8,290
Total amount of capital invested in the fishery	$13,615
Number of barrels of bait used	2,780
Value of same	$1,390
Quantity of lobsters taken and disposed of by the fishermen, in pounds	1,390,800

* 507,554 being brought directly from the fishing grounds; 213,355, forwarded from Portland by railroad; and 72,190, sent by railroad from between Portland and Wells.

Value of the catch to the fishermen	$50,996
Value of the buildings, teams, and fixtures of the Boston wholesale markets	$10,000
Active capital invested in the Boston wholesale markets	$20,000
Quantity of lobsters handled by the Boston wholesale dealers from all sources, in pounds	3,637,687
Value of same at fishermen's prices	$133,381
Value of same at wholesalers' prices	$169,758
Enhancement in value of the lobsters handled in Boston, being the difference between the fishermen's and wholesalers' prices	$36,377

PLYMOUTH DISTRICT.

Plymouth district contains the lobster-fishing ports of Scituate, Duxbury, and Plymouth. The principal season is from April to September, the pots being set near shore, in depths of a few to 15 fathoms. Off Plymouth the fishing grounds are all within 1½ miles of the shore, and extend from Cut River on the north to Sandwich on the south. One-half of the catch is marketed at home, being sold in part to the neighboring towns, and one-half is disposed of to smacks from Boston, New York, and New Haven. Lobsters are said to have been very large and abundant in this region at one time, but to have decreased greatly both in size and numbers, within the past few years. The season's catch for 1880 was, however, quite large. The average number of marketable lobsters taken to a trap is said to be about one per day. Sixty pots on an average are used by each man. The fishery is carried on in small open boats or dories, the men going singly. The average earnings per man for 1880 were about $300. The business is said to have declined one-half during the past five years.

Summation of the lobster fisheries in Plymouth district in 1880.

Number of fishermen	74
Number of boats	74
Value of same	$1,020
Number of lobster pots	4,500
Value of same	$4,500
Total amount of capital invested	$5,520
Number of barrels of bait used	1,440
Value of same	$720
Quantity of lobsters taken and disposed of, in pounds	721,050
Value of same to the fishermen	$26,438

BARNSTABLE DISTRICT.

This once exceedingly important district, which furnished at one time a very large proportion of all the lobsters marketed in New York City, has so fallen off in its production that it now stands among the poorest on the Massachusetts coast. It includes all of Cape Cod as far south as Falmouth and Wood's Holl, which places also belong to it. Lobster fishing is now carried on from Provincetown, the Truros, Orleans, Chatham, Harwich (Monomoy), Barnstable, Cotuit, Yarmouth Port, and Wood's Holl.

Provincetown was formerly the center of one of the most extensive lobster fisheries of our coast, but now comparatively few men engage in this industry there, because of the great depletion of the grounds in that vicinity, from long-continued overfishing. The history of the lobster fishery of Cape Cod has been given elsewhere.

The lobster grounds of the vicinity of Provincetown cover most of the sandy bottoms along the shore, out to a depth of 18 to 20 fathoms, where the area of mud, characterizing the deeper waters, begins. The fishery is entirely confined to the sandy belt, the traps being mostly set in depths of 4 to 15 fathoms. The season continues about five months, or from May to October, lobsters being generally most abundant during July and August. Hoop-net pots were discarded

several years ago, and the ordinary lath trap is now universally employed. A man setting fifty traps would, at present, do well to catch twenty marketable lobsters per day, making the average daily catch per trap less than one-half. Twenty-five lobsters a day to the same number of traps would be considered a large catch. The average monthly earnings of a man while fishing is about $25. Twelve to fourteen men now engage in lobstering from Provincetown, many of them fishing only a portion of the season. They are mostly old fishermen, who are unable to engage in the more active branches of fishing, and who do little work of any kind after the lobster season has ended; they fish singly. The entire catch, excepting about 500 lobsters consumed annually in Provincetown, is sent to Boston in the sloop smack Pennsylvania, of 29 tons measurement. This smack also bought lobsters at Chatham in 1880, and on some of her trips touched also at Plymouth, even then often arriving in Boston with small fares. The same year she made thirteen trips from Provincetown to Boston during the lobster season, carrying in all 11,956 lobsters, for which she paid 7 cents each, making a gross stock of $836.92. The first trip was made on May 27, when she carried 1,096 lobsters from Provincetown, and the best trip was made July 27, when she obtained 1,644 lobsters at the same place.

Capt. N. E. Atwood states that the Massachusetts lobster law does not affect the fishery at that place, as a fisherman will not catch a dozen lobsters less than 10½ inches long during the entire season.

Two men at North Truro set about one hundred traps in all. One fishes from April to September, the other from May to the middle of July. Captain Hopkins, who uses fifty-eight traps, states that his daily catch ranges from ten to twenty-five lobsters. Captain Collins sets forty five traps and often obtains only fifteen lobsters a day, though occasionally his daily catch amounts to forty lobsters. All of the lobsters from this place are sent to Boston and New York, generally by rail, but sometimes by the same smack that visits Provincetown. In 1880 the price was seven cents each, by count, and in 1878, eight cents. At Truro two men also engage in lobstering, setting their traps both on the bay and ocean side of the cape. They handle only ten traps together, and in 1879 stocked $75 on the ocean side and $25 on the bay side. The number of lobsters taken was between 1,400 and 1,500. Most of the catch is used locally, and a portion sold to the Provincetown smack, which makes occasional visits. From 1,000 to 2,000 lobsters are caught annually by fishermen from South Truro, who also engage in other kinds of fishing at the same time. The catch is mostly sent to Boston by rail.

At Orleans only one man engages in lobstering, making an average daily catch of about forty-five lobsters from May to October. Four or five years ago there were eleven lobstermen at this place, but as the business became unprofitable they left it.

There are twenty lobstermen at Chatham and about the same number make their summer headquarters at Monomoy. They fish from about the 1st of June to the 1st of November, and set from forty to eighty traps each. At Chatham the traps are set both inside and just without the harbor. The average daily catch per man was about thirty lobsters, but in 1879 one man, with sixty-six traps, averaged sixty lobsters daily, his catch for the entire season amounting to about 7,000 lobsters. The other fishermen obtained an average of 3,000 lobsters each for the same season. The entire catch is carried to Boston in smacks. The price in 1879 was 6 cents each, by count, which was lower than for the preceding four or five years. About nine years ago the price was as high as 9 cents each.

For the past three or four years a single fisherman from Barnstable, in company with one from Yarmouth, has set a few traps in Barnstable Harbor during a small part of each year. In July, 1879, they used eight traps, and in July, 1880, twelve to fourteen traps. Their catch for each of

those years was only about 300 lobsters. At Cotuit, near Barnstable, twenty-five traps were set in 1880, taking in all only about 500 lobsters. One lobster smack, the Pontiac, is owned at Barnstable. She is a schooner of 9.93 tons, is valued at $400, and carries a crew of four men. She sets traps on the coasts of Maine and Massachusetts and also engages in other branches of fishery.

Capt. Benjamin Lovell, of Yarmouth Port, fished with seventeen traps during the season of 1880, making a total catch of about 2,500 lobsters. A portion of this catch was shipped to Boston and the remainder was used locally. Lobsters are generally sold by weight, at the rate of 5 to 10 cents a pound. Since 1876 the lobster fishery of this region has scarcely sufficed to supply the local demand until this year. Captain Lovell, in speaking of the decrease in the abundance of lobsters, states that twenty years ago, with half the number of pots, he could catch 5,000 lobsters in one week.

Five men engage in lobstering at Wood's Holl, and when not so occupied follow other kinds of fishing. The traps are set in depths of 4 to 15 fathoms, the season extending from April to October. Each man will stock from $100 to $200 per season. The average daily catch per trap is said to be four or five lobsters of all sizes. About one-half the catch is sold locally, the balance being shipped away, mainly to New York and New Bedford. The wholesale price of lobsters is 3 cents per pound; the retail, 6 cents per pound.

Summation of the lobster fisheries in Barnstable district in 1880.

Number of fishermen	66
Number of smacks	1
Value of same	$400
Number of boats	50
Value of same	$1,000
Number of lobster pots	3,000
Value of same	$3,000
Total capital invested in the fishery	$4,400
Number of barrels of bait used	420
Value of same	$210
Quantity of lobsters taken and disposed of, in pounds	211,230
Value of same to the fishermen	$7,745

NANTUCKET DISTRICT.

This district includes the islands of Nantucket and Tuckernuck. Four men engage regularly in lobstering from Nantucket, and eleven others fish at odd times. At Tuckernuck there are six regular lobstermen, who set from thirty to sixty or seventy traps each. Most of the catch, which is very small, is sold to a New York smack, which makes a trip about once every ten days.

Summation of the lobster fisheries in Nantucket district in 1880.

Number of fishermen	21
Number of boats	21
Value of same	$420
Number of lobster pots	1,500
Value of same	$1,500
Total amount of capital invested in the fishery	$1,920
Number of barrels of bait used	22
Value of same	$11
Quantity of lobsters taken and disposed of, in pounds	11,250
Value of same to the fishermen	$412

EDGARTOWN DISTRICT.

Edgartown district includes Martha's Vineyard, No Man's Land, and the Elizabeth Islands. Lobster fishing is carried on mainly from Cuttyhunk, No Man's Land, Lobsterville (Menemsha Bight), and Edgartown, Martha's Vineyard. This fishery was begun at the Elizabeth Islands

as early as 1807. "The fishes are the same as those of the vicinity, but lobsters, which are scarce at Martha's Vineyard, are caught in great abundance at all the Elizabeth Islands."* At present the lobster fishery of the Elizabeth Islands is confined almost exclusively to Cuttyhunk, where it is engaged in by the majority of all the fishermen, about thirty in number. The season lasts about four months. The thirty fishermen run six small smacks and twelve open boats, setting from forty to one hundred and twenty traps each, or a total of 2,000 traps. The Cuttyhunk Club, a New York association of sportsmen, also handles about one hundred and twenty pots, selling the larger lobsters obtained and using the smaller ones for bait. During the season of 1880 the lobster traps at Cuttyhunk averaged about one marketable lobster each per day, or a total of about 230,000 lobsters, by count, for the season. The regular tautog fishermen of Cuttyhunk use about 1,000 pounds of lobsters each for bait during the season.

At No Man's Land, in 1880, the lobster fishery was conducted by fifteen men who make that island their headquarters during the fishing season. The catch in that year was small, averaging about 1,000 pounds to each man, and amounting altogether to about 15,000 pounds. From the town of Edgartown only about two hundred traps were set in 1880, yielding a total catch for the season of about 16,600 lobsters. The greater part of the lobster fishery of this district is carried on in the vicinity of Menemsha Bight and Gay Head, at the southwestern extremity of Martha's Vineyard, and off No Man's Land, by fishermen hailing from Chilmark and Tisbury. Lobsterville consists of about fourteen temporary shanties, situated near the western end of Menemsha Bight. Along Menemsha Bight, including this settlement, about sixty lobster fishermen were located in 1880, using forty boats, of which one-half carried two men each and the remainder one man each. An average of forty traps was set by each boat in 1880, making a total of sixteen hundred traps for the region. They were worked in trawls of ten to fifteen traps each. The common form of lath trap is universally employed. The catch for 1880 amounted to about 200,000 lobsters. In 1879 this fishery was carried on from this locality by a much smaller number of men, with fourteen boats and 560 traps.

The fishing grounds range from the shallow water near shore, in depths of 1 fathom, to depths of 15 to 20 fathoms. The season usually continues four or five months, from May to October, but a few men sometimes begin fishing as early as the middle of March. Flounders, menhaden, dogfish, and other common fish are used as bait. The average number of marketable lobsters caught to a trap per day varies from one to two. Fifteen lobsters of all sizes to a trap is considered a large catch. Nearly all the lobsters taken in this region are sold to smacks running principally to New York, but also, to some extent, to other smaller markets. About twelve well-smacks of different sizes making weekly trips visit this region during the season, and pay on an average about six cents each for all lobsters above 10½ inches long.

After the smacks stop running, which sometimes happens about the 1st of August, the catch is sold mainly at Wood's Holl at 3½ cents per pound. During good seasons the monthly earnings for each man are said to range as high as $50 to $100. In 1880 the average earnings per man for the entire district were about $250 for the season. The following note from Mr. Frank M. Cottle, of West Tisbury, is of interest, as illustrating the rapid growth of the lobster industry in this region: "Twenty years ago there was but one vessel in the lobster fishery on this coast, or rather in this vicinity; now there are a dozen. Then the business was not considered to be of any value, and but few men entered it at all. Within the past fifteen years, however, it has improved rapidly, and now there are some 60 men or more in this vicinity who depend upon it

*Coll. Mass. Hist. Soc., 2d ser., vol. iii, p. 79.

almost wholly during the season." That the destruction of lobsters by fish in this district is very great is indicated by the observations of Mr. V. N. Edwards, of Wood's Holl, who, during October and November, 1877, examined the stomachs of hundreds of cod caught about No Man's Land. Nearly all the fish he examined contained one or more young lobsters, and in many cases the stomachs were almost entirely filled with them.

THE FISHERY IN 1882.—During the summer of 1882, the author made many inquiries of the fishermen regarding the lobster fishery of the Martha's Vineyard region, including No Man's Land and the Elizabeth Islands, with the following results:

Lobsters have, from year to year, steadily decreased in size and abundance, in the upper part of Vineyard Sound, while at the same time there has been a proportionate increase in numbers, and the size has remained constant, about Gay Head, No Man's Land, and Cuttyhunk. About one-third of the catch only is under size or less than 10½ inches in length. According to some of the older fishermen of No Man's Land, 1882 was one of the best lobster years ever experienced there. From fifteen to twenty men lobstered during the summer season, setting, on an average, sixty traps each, the greater part of which were arranged in trawls of eight to twenty traps. The catch during this season, from the middle of May to the latter part of September, amounted to about 100,000 marketable lobsters, weighing, on an average, 2½ pounds each. The price paid by the smacks was 8 cents each, making a total season's stock for the twenty men of $8,000.

In addition to the twenty fishermen living on the island, there were six smacks, owned in New London County, Connecticut, with a combined crew of twenty-four men, which fished in the same region. Their catch, though large, was proportionately less than for the regular fishermen. As fast as they obtained fares, they proceeded to market, generally New York. One market smack, called the Boston Smack, made weekly trips to the island, and carried the catch of the fishermen to New York, at the rate of about 6,000 lobsters each trip. Another smack, the Daboll of New York, made occasional trips, carrying about the same amount of lobsters each time.

In the above reckoning no account has been taken of the fisheries of Menemsha Bight, near Gay Head, and of Cuttyhunk, at both of which places the catch for 1882 was much larger than for 1880. In the upper part of Vineyard Sound, on both the Martha's Vineyard and Naushon sides, the fishery for 1882 was poor. The Wood's Holl lobstermen set their traps during only a very short part of the summer, and the greater portion of their catch was under size.

The lobster season at No Man's Land generally begins about the middle of May and continues until about the 20th of September. About October 1, the fishermen begin to turn their attention to the cod fishery, which lasts until bad weather sets in, and is again taken up in the spring, from April 1 to the middle of May. The lobster pots are set on all sides of the island, but mainly off the north and west sides, where there are numerous rocky patches, at distances of 1½ to 2 miles from land, and with depths of 10 to 13 fathoms. Each of the fishermen owns one or two floating cars for the storage of his catch, awaiting shipment. Thirty such cars were in use during 1882, the larger ones having a capacity of 500 to 1,000 lobsters each, but there are others of smaller size. They are tied to stakes just off the shore, in front of the fishing village, and swing with the tide. They are made of two shapes; the smaller ones are generally rectangular, but the larger ones taper at one or both ends, but from the bottom and top, so as to present a rather narrow edge to the tidal currents, or to the waves, in stormy weather. This construction is rendered necessary from the fact that the area in which they are moored is exposed to a heavy sea, during strong easterly winds, and a plain rectangular car would soon be torn to pieces.

The bait used consists of menhaden, bluefish, flounders, and cod heads. Menhaden are preferred, and, in 1882, cost $8 per thousand.

The fishermen of this region recognize the two varieties of lobsters, called "school" lobsters and "ledge" or "rock" lobsters. The latter, apparently, remain about the island during the entire year, and live only upon the rocks or rocky grounds. The school lobsters appear about July 1, and are gone by the last of September. They are most abundant on smooth bottoms, but also occur among the rocks. Lobsters can, therefore, be caught upon smooth bottoms only during the season for school lobsters.

The boats used are the so-called "Vineyard fishing boats," having one or two masts. These are moored just off the town, and are reached by means of dories. In case of an approaching storm, or when it is desirable to clean them, these small smacks are hauled upon the beach, which consists of large gravel stones, by means of a team of oxen, kept on the island for that purpose. Ladder-like frames, made in sections, and with the cross-pieces broad and flat, are placed under the boats, or, rather, the latter are hauled over the frames, to keep them from being worn by grinding against the gravel. The boat being brought in as near the shore as possible, one section of the frame, with the cross-pieces downward, is set in front of it, leading up the beach. The boat is then hauled upon it, and another section added, this operation being repeated until the boat has reached the proper height upon the beach, when it is braced from both sides.

The No Man's Land fishermen all belong to Martha's Vineyard, and live on the former island only during the fishing seasons. There are only two permanent residents on the island.

Summation of the lobster fisheries in Edgartown district in 1880.

Number of fishermen	110
Number of boats	58
Value of same	$13,800
Number of lobster pots	4,520
Value of same	$4,520
Total amount of capital invested in the fishery	$18,320
Number of barrels of bait used	1,540
Value of same	$770
Total quantity of lobsters caught and sold, in pounds	773,100
Value of same to the fishermen	$28,347

NEW BEDFORD DISTRICT.

In the New Bedford district lobster fishing is carried on mainly from New Bedford, Fairhaven, Dartmouth, and Westport. The traps are set in different parts of Buzzard's Bay to within a short distance of Cuttyhunk Island, in depths of 2 to 25 fathoms, according to the season. The fishery is continued through about five months of each year, or from May to October, lobsters being most abundant during June, July, August, and September. Two kinds of traps are in use, one being rectangular and the other semi-cylindrical in shape; some of these are furnished with one, and others with two funnel openings. Hoop-net pots are also still occasionally employed. From New Bedford three small smacks engage in lobstering, but at the other localities small open boats, valued at $20 to $25 each, are mainly used. Each man uses on an average about thirty traps. Lobsters are sold by weight in New Bedford at the rate of 4 to 8 cents a pound, but elsewhere generally by count, at 5 to 7 cents each. The average season's earnings per man, in 1880, were about $200. The small-boat fishermen generally go singly, sometimes, however, hiring a man to help. Nearly all the lobsters taken by the New Bedford smacks are sold to smacks carrying to New York, New Haven, or New London. The Fairhaven catch is mostly used as bait for tautog,

scup, and squeteague, and that of Mattapoisett, Dartmouth, and Westport Point is consumed locally, or sent to New Bedford, New York, or Fall River.

The catch for the several places in this district in 1880 was as follows: New Bedford, 50,526 pounds; Fairhaven, 45,000 pounds; Mattapoisett, 3,000 pounds; Dartmouth, 75,000 pounds; Westport Point, 12,000 pounds. About fifteen well smacks, ranging in measurement from 12 to 50 tons each, visit the New Bedford district, and make about fifteen trips each, during the season, to the several markets, principally New York. Four lobster-fishing smacks are owned in this district. They are as follows:

List of the lobster smacks owned in New Bedford district.

Name.	Where owned.	Rig.	Tonnage.	Value.	Crew.
D. B. Mayhew	New Bedford	Schooner.	23.51	$2,000	4
Emma Clifton	do	do	26.67	1,000	4
Rhoda G	do	do	10.47	500	3
Spray	Fairhaven	Sloop	7.30	100	2
Total			67.95	3,600	13

Summation of the lobster fishery in New Bedford district in 1880.

Number of fishermen	35
Number of smacks	4
Value of same	$3,600
Number of boats	21
Value of same	$430
Number of lobster pots	1,088
Value of same	$1,088
Total amount of capital invested in the fishery	$5,118
Number of barrels of bait used	370
Value of same	$185
Quantity of lobsters caught and disposed of, in pounds	174,726
Value of same to the fishermen	$6,406

STATISTICAL RECAPITULATION OF THE LOBSTER INDUSTRY OF MASSACHUSETTS IN 1880.

Table of the lobster industry of Massachusetts in 1880.

Districts.	Fishery.													Wholesale markets.		
		Smacks.			Boats.		Lobster pots.		Capital invested.	Bait used.		Quantity of lobsters taken.				
	Fishermen.	Number.	Tonnage.	Value.	Number.	Value.	Number.	Value.		Barrels.	Value.	Pounds.	Value.	Marketmen.	Capital invested.	Enhancement in value.
Gloucester	95	--	.....	.....	78	$1,560	2,549	$2,549	$4,109	570	$285	285,510	$10,468	....	.....	-- ....
Salem	46	1	16.40	$500	19	380	1,300	1,300	2,180	840	420	422,250	15,482	--	.....	.....
Marblehead	62	2	25.90	1,700	24	430	2,260	2,260	4,390	650	325	325,500	11,935	....	.....	-- ....
Boston	86	1	5.77	50	92	5,275	8,290	8,290	13,615	2,780	1,390	1,390,800	50,996	50	$30,000	$36,377
Plymouth	74	....	.....	.....	74	1,020	4,500	4,500	5,520	1,440	720	721,050	26,438	- -	.....	.....
Barnstable	66	1	9.93	400	50	1,000	3,000	3,000	4,400	420	210	211,230	7,745	....	.....	.....
Edgartown	110	....	.....	.....	58	13,800	4,520	4,520	18,320	1,540	770	773,100	28,347	....	.....	.....
Nantucket	21	....	.....	.....	21	420	1,500	1,500	1,920	22	11	11,250	412	....	.....	-- ....
New Bedford	35	4	67.95	3,600	21	430	1,088	1,088	5,118	370	185	174,726	6,406	....	.....	.....
Totals	595	9	125.95	6,250	437	24,315	29,067	29,067	59,572	8,632	4,316	4,315,416	158,229	50	30,000	36,377

Table of lobster industry of Massachusetts—Continued.

GRAND TOTALS.

Districts.	Persons employed.	Capital invested.	Value of products as they enter into consumption.
Gloucester	95	$4,109	$10,468
Salem	46	2,180	15,482
Marblehead	62	4,390	11,935
Boston	136	3,615	87,373
Plymouth	74	45,520	26,438
Barnstable	66	4,400	7,745
Edgartown	110	8,320	28,347
Nantucket	21	11,920	412
New Bedford	35	5,118	6,406
Totals	645	89,572	194,606

NOTE.—In the above table no account is made of any markets outside of Boston. The Massachusetts lobster smacks all engage in fishing, and their crews have, therefore, been included among the fishermen instead of the marketmen. Boston capital invested in the Maine canneries has been included in the statistics of that State.

RHODE ISLAND.

Rhode Island ranks fourth among the States in the value and extent of its lobster fisheries. This industry is carried on to a greater or less extent from nearly all the fishing ports or stations of the State, the principal ones being Wickford, Newport, Dutch Island, Sanderstown, Narragansett Pier, Sakonnet Point, Bristol, and Block Island.

GROUNDS.—The lobster grounds in Narragansett Bay include the numerous inlets on both sides of the bay as far north as Hope Island, the ledges lying out in the bay, and the moderate depths of water surrounding the islands. Off Sakonnet Point and Brenton's Reef Light Ship lobsters are taken on both sandy and rocky bottoms, from 2 to 10 miles from shore, and in depths of 5 to 18 fathoms. In these localities the traps are generally set on rocky bottoms in the spring and fall, and on smooth bottoms during the summer. Brown's Ledge, situated about 20 miles off shore, used to be a good lobster ground, but of late years it has not yielded much. Various good fishing grounds for lobsters exist in many places off the coast and about Block Island. The Block Island region is, however, fished more by boats from Connecticut than by native ones. The Rhode Island fishery also extends to the Connecticut coast, which is visited to some extent by boats from Newport, and nearly or quite to Cuttyhunk.

The Rhode Island grounds, like those of many other sections of the coast, have been gradually extended outward with the increase of trade and the demand for lobsters, in order to accommodate the greater number now fishing, but the inner grounds, those of Narragansett Bay, still furnish many lobsters. The depth of water in which the traps are set varies from a few fathoms to 15 or 20 fathoms.

SEASON.—The lobster season usually extends from May 1 to October 1, after which the main part of the fishery generally ceases. In 1879 a few men began lobstering as early as March, obtaining good fares and high prices. As a rule, some lobsters are taken during every month from February until November. The so-called school lobsters are noticed in the waters off Rhode Island. The presence of a school, or its passage over the fishing grounds, is indicated by much better fishing for a few days at a time, after which the catch falls off to the ordinary run. In 1879 the best schools came as early as July 4; in 1880 they began about a week later. The best months for fishing are said to be July and August.

TRAPS.—The ordinary semi-cylindrical lath traps are commonly used, but there is a smaller rectangular or "square pot," as it is called, which is extensively employed by many fishermen, who claim that they can work to better advantage with it on account of its being more easily handled. These traps are furnished with the same kind of funnel openings as the lath traps to the north. Other more complicated forms of the round-top trap, said to possess several improvements, and costing about $5 each, are sometimes constructed by the fishermen. The old-fashioned hoop net pot, made of an iron barrel hoop, is also occasionally used. Although it is customary to haul the traps every morning, it sometimes happens, because of stormy weather, that those offshore cannot be visited for several days or a week at a time. The average number of pots set by each man in this State is comparatively small, ranging from ten to thirty, but sometimes reaches fifty.

SMACKS AND BOATS.—The registered Rhode Island lobster smacks are five in number. All engage directly in the fishery, setting traps in Narragansett Bay, about Block Island, and on Brown's Ledge, and carrying their catch to Newport and Providence. These smacks also engage in other fisheries. Their total catch for 1880 was 116,250 pounds, making a gross stock of $4,068.

The ordinary Newport lobster boats used for visiting the traps are cat-rigged, and average in value about $100 each. They are also employed, to a certain extent, in other fisheries, principally for tautog, blue-fish, squeteague, and bass. Fifty of these boats are owned in Newport.

BAIT.—The bait usually consists of refuse fish, called shuck fish, which is obtained from the home markets and the fishermen, and is also shipped back from the New York markets at half price. Fish heads are also employed.

It is customary with some of the Newport fishermen to retain their lobsters in the cars three to five days before selling, or until it is thought that they have become "cleansed" of the food or bait last eaten. They are then considered more wholesome, and often bring a higher price.

MARKETS.—The catch by Newport fishermen is sold mainly at Newport, Providence, and Fall River, from which places many neighboring towns are supplied. A portion of this catch also goes to Boston and New York, by railroad. The Bristol catch is entirely consumed at that place, and that of the west side of the bay, including Wickford, Dutch Island Harbor, and Narragansett Pier, is sold mostly to the numerous summer hotels and the local trade. Prior to 1881, when no law existed for the protection of the lobster fishery, lobsters of all salable sizes were brought to market by the fishermen. Those smaller than 10 inches long could not be shipped out of the State, and were, therefore, considered inferior in value. This gave rise to two grades of lobsters in the markets, those above 10 inches being rated in 1879 at 3 to 3½ cents a pound, and those under 10 inches at half price. Few were regarded as salable under 9 inches in length. In 1880 the prices ranged from 3½ to 4 cents a pound. Lobsters are generally shipped to distant places by railroad, packed in barrels. The retail price of lobsters in Newport is about 5 cents a pound.

List of the Rhode Island lobster smacks.

Name.	How rigged.	Tonnage.	Value.	Crew.	Markets supplied.
Almeida	Schooner	9.70	$500	5	Newport and Providence.
Arabella	do	19.62	2,000	3	Do.
J. S. Whittier	Sloop	9.45	1,000	4	Do.
Pathfinder	Schooner	8.06	650	4	Do.
Stella	Sloop	7.53	500	3	Do.
Total		54.36	4,650	19	

Summation of the lobster fisheries of Rhode Island in 1880.

Number of fishermen	110
Number of smackmen who are also fishermen	19
Number of smacks above 5 tons burden	5
Value of same	$4,650
Number of boats	85
Value of same	$6,400
Number of lobster pots	2,170
Value of same	$1,627
Total amount of capital invested	$12,677
Number of barrels of bait used	840
Value of same	$420
Quantity of lobsters taken and sold, in pounds	423,250
Value of same to the fishermen	$15,871

CONNECTICUT.

The lobster fisheries of Connecticut are of considerable importance, especially in New London County. The principal places from which the fishery is carried on are as follows, beginning at the east: Stonington, Noank, New London, Saybrook, the vicinity of South Norwalk, including Black Rock and Five Mile River, and New Haven. The catch for New London County, including Stonington, Noank, and New London, is five or six times greater than that of the remainder of the State. The little town of Noank, situated at the mouth of the Mystic River, about midway between Stonington and New London, is the most important lobster station in the State, the catch for that port in 1880 having been equal to about one-half the total catch for the entire State.

SEASON.—The extreme limits of the Connecticut lobster season are from March to December, but a few lobsters are sometimes taken in the winter when the weather is not too severe. The Stonington lobstermen generally fish from April to November; the New London from April to September; the South Norwalk from April to November; the New Haven from April to October. The Noank lobstermen fish more or less the entire season, as indicated above, but state that lobsters are most abundant during the latter part of the summer and the fall, or from August to November.

GROUNDS.—The traps are set in all depths of water, from a few feet to 60 fathoms, and on all kinds of bottom, rocky, sandy, and muddy. Some of the best fishing grounds are situated in Block Island Sound off Fisher's Island, where lobsters are caught abundantly, even in deep holes sounding 50 to 60 fathoms. This region is mostly visited by the Noank fishermen. In Western Connecticut, from the mouth of the Connecticut River westward, the fishery, being of slight extent, is generally carried on near shore and in depths of 1 to 20 fathoms. The New London County fishermen are, however, more venturesome, being to a greater extent dependent upon this industry for a living. They have, therefore, extended their field of operations over a much broader area. The smaller boats set their pots everywhere and in all depths in Fisher's Island Sound and Block Island Sound, about Montauk Point, and from there towards No Man's Land, and along the Rhode Island shore to near the mouth of Buzzard's Bay. The larger smacks fish over the same area and also in Buzzard's Bay and Vineyard Sound, and off Martha's Vineyard and Nantucket.

TRAPS.—The ordinary round-top lath trap, with wooden or twine funnel openings, is most commonly used. Occasionally, however, a galvanized iron funnel is employed. Another style of trap is made from basket splints. The hoop-net pot, called in this State the "drop net" trap, is sometimes, but only rarely, employed.

BAIT.—Menhaden are generally used as bait, as they are usually more easily and cheaply

obtained than other species of fish. When they are scarce other common species, and especially flounders, are employed.

MARKETS.—Outside of New London County the catch for the several localities is generally sold near home. Most of the lobsters taken by the Stonington fishermen are likewise disposed of in that place. The New London catch is partly sold at home and partly shipped to New York and to interior towns in small quantities. Noank supplies three principal markets, New York, New London, and Norwich, sending to the first by smacks and steamer, to the second by railroad, and to the last by wagon. The Noank catch is mostly sent to New York early in the season, but later New London takes two-thirds of the catch.

Lobsters are sold in Connecticut both by weight and count, but generally by weight, the average price to the fishermen in New London County being about 4 cents per pound.

EARNINGS.—The earnings of lobstermen in New London County range all the way from $100 to $1,000 per season, the average earnings for 1880 having been about $350 per man. In good seasons the Stonington lobstermen are said to earn about $1.50 per day; the New London, $25 to $30 per month; the South Norwalk, $2 to $5 a day; and those in the vicinity of New Haven, $8 to $14 per week. The Noank small boats, fishing for lobsters only, made, in 1879, profits of $110 to $570 each.

SMACKS AND BOATS.—The lobster fishery is conducted by means of small boats and smacks. The small boats used for tending the pots in Eastern Connecticut are mainly of the pattern called the Connecticut lobster boats, already described. A few of these boats engage only in the lobster fishery, but the majority also fish for cod, mackerel, blackfish, and other species in their season. They range in value from $150 to $300 each. In addition to the regular sloop boats, there are others, generally of smaller size and of less value, employed in lobstering in this region and elsewhere. The fishermen go in their small boats either singly or in pairs, and usually fish for themselves, selling their catch.

Twenty-four lobster smacks of more than 5 tons measurement each are owned in Connecticut, all belonging to New London County; nine hail from New London, thirteen from Noank, one from Stonington, and one from Mystic. Two are well-smacks, used as carriers only, while all the remainder engage in the fishery; six are employed solely in lobstering, and eighteen engage also in other fisheries. The majority carry their catch to New York City, but many sell at New London.

List of the Connecticut lobster smacks.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	Rig.	Tonnage.	Value.	Crew.	Carrier or fishing smack.	Fishing grounds.	Markets supplied.
C. M. Harris	New London	Schooner	24.72	$3,000	3	Fishing	Martha's Vineyard	New York.
Conquest	do	do	14	1,500	2	do	Long Island Sound	New London.
Laurel	do	do	19.06	1,500	3	do	Buzzard's Bay	New York.
Phebe	Noank	do	25.74	2,400	5	do	Vineyard Sound	Do.
Tina B	do	Sloop	8.36	800	3	do	Buzzard's Bay	Do.
Victor	Mystic	do	5.82	300	2	do	Block Island	Do.
Total			97.70	9,500	18			

List of the Connecticut lobster smacks—Continued.

ENGAGED IN OTHER FISHERIES ALSO.

Name.	Where owned.	Rig.	Tonnage.	Value.	Crew.	Carrier or fishing smack.	Fishing grounds.	Market supplied.
Alnoma	New London.	Schooner	23.22	$1,500	6	Carrier		New York.
Anna Elizabeth	do	do	17.03	800	4	Fishing	Block Island and Buzzard's Bay	Do.
Isabella	do	Sloop	14.43	500	3	do	Long Island Sound	New London.
Joseph Wooley	do	Schooner	32.19	1,800	6	do	Coast of New Jersey	New London and New York.
Mary and Carrie	do	do	33.90	2,500	6	do	Nantucket Shoals and Sandy Hook	New York.
Robert A Gray	do	do	12.51	800	3	do	Block Island and Vineyard Sounds.	New London.
Annie D	Noank	Sloop	23.74	1,400	5	do	Vineyard Sound and Nantucket Shoals.	New London and New York.
Ella May	do	do	14.91	1,200	4	do	Block Island and Vineyard Sounds	New York.
Ira and Abby	do	Schooner	11.77	2,000	3	do	Off Block Island and Montauk Point.	Do.
Manhattan	do	Sloop	22.59	1,000	4	do	No Man's Land, Block Island and Montauk Point.	Do.
Martha	do	do	27.80	1,000	4	do	Vineyard Sound	Do.
Sharon	do	do	15.03	600	3	do	Off Block Island	New London.
S. R. Packer	do	do	10.66	600	3	do	Vineyard Sound	New York.
Whistler	do	do	8.62	700	3	do	Vineyard Sound and Montauk Pt.	Do.
Wildwood	do	do	11.19	950	3	do	Vineyard Sound and Block Island.	Do.
William Henry	do	do	8.53	800	3	do	Block Island Sound	Norwich.
Willie	do	Schooner	13.91	1,800	3	do	Block Island Sound	New York.
Lizzie	Stonington	Sloop	7.60	500	3	Carrier		Do.
Total			309.63	20,450	69			
Grand total			407.33	29,950	87			

Summation of the lobster fisheries of the State of Connecticut in 1880.

Number of fishermen	148
Number of marketmen	9
Number of smacks above 5 tons burden	24
Value of same	$29,950
Number of boats	42
Value of same	$5,700
Number of lobster pots	2,100
Value of same	$2,100
Total amount of capital invested in the fishery	$37,750
Number of barrels of bait used	1,226
Value of same	$613
Quantity of lobsters taken, in pounds	613,385
Value of same to the fishermen	$23,002

NEW YORK.

Although New York City is next to the largest receiving market for lobsters in the country, the lobster fisheries belonging to the State are inconsiderable and at present almost entirely, if not wholly, confined to Eastern Long Island. According to Mr. Eugene G. Blackford, lobsters used to be exceedingly abundant in New York Bay and Hell Gate. On the New Jersey side of the bay they were especially numerous, but now they are nearly extinct in this section of the State. This present scarcity is probably due in part to overfishing, but also very largely to the establishment, on the shores, of obnoxious manufactories, such as oil refineries, which have so befouled the waters as to kill off the lobsters as well as other marine animals. As late as 1879, a few lobsters were received at Fulton Market from Robbins Reef, in New York Bay, but they were very small and unfit for sale.

On the north side of Long Island, at Mount Sinai, a few lobsters are taken annually, but the quantity is small. The fishery is, however, conducted to a greater, though moderate, extent from the following ports of Eastern Long Island, arranged in the order of their catch for the season of

1880, beginning with the most important: Sag Harbor, East Marion, Orient, Greenport, Springs, Southold, Water Mills, and Amagansett.

In addition to the boat fisheries from these places, there is a sloop smack of 30.87 tons, owned at Greenport, which fishes for lobsters, setting pots on the Massachusetts coast about Martha's Vineyard and elsewhere, and carrying the catch fresh to New York City. The total catch of the above places, including that of the smack, for 1880 amounted to only 135,000 pounds, worth to the fishermen, at the rate of 3¾ cents per pound, $5,062.

Six lobster smacks are owned in New York State—two at New York City, and four at Greenport, Long Island. One of the Greenport smacks engages directly in the lobster fishery, as stated above, but all of the remainder are well smacks, acting merely as carriers of fresh lobsters to New York City, mainly from Northern New England. Both of the New York smacks and one from Greenport also carry other kinds of fresh fish, but the remaining three limit themselves exclusively to the lobster trade.

The following account of the operations of the lobster smack Laura Thompson, Captain Rackett, will serve to indicate the methods of buying and carrying practiced by all the New York well smacks. This smack engages in carrying lobsters from the Deer Isle, Maine, region, and Cuttyhunk, Mass., to New York City, from April 1 to December 1. At Deer Isle, Captain Rackett buys of ten men, each handling eighty pots, and from that place can average a trip every two weeks in April and May, and one trip every week the remainder of the season, from Cuttyhunk. In 1880 he had full loads in the spring from Maine, but later only partial loads from Cuttyhunk. In cold weather, this smack can carry 20,000 pounds of lobsters in its well, but during the summer not more than half that quantity. The Maine lobsters die more quickly in warm weather than those from Cuttyhunk. The seasons of 1879 and 1880 were fair ones, but on account of the law recently passed he was obliged to stop buying small lobsters.

New York City lobster trade.—There are twenty-seven wholesale lobster dealers in New York City, the more prominent ones being located at Fulton market, and most of the others in the same vicinity. Lobsters are brought to New York both by well smacks and by railroad, during the warmer months packed in barrels with ice. From one-half to three-fourths of the quantity received comes in barrels, and the remainder in smacks. About six smacks engage regularly in carrying lobsters to New York during the spring, summer, and fall, afterwards entering into other branches of the fishery. A few other well smacks, which make a business of carrying fresh fish to New York, sometimes also include a few lobsters in their cargo. From six to ten of the wholesale dealers, with headquarters at Fulton market, own part interest in the smacks, and thereby control their shipments, selling for the smacks on commission. The remainder of the wholesale dealers receive their supplies of lobsters entirely by railroad, as do also some of the retailers. The smack lobster dealers also receive barreled lobsters. The smacks begin to run about March 1, carrying from the coast of Maine from that time until the middle of May or 1st of June, when they commence to take supplies from the Vineyard Sound region, including Menemsha Bight, No Man's Land, Cuttyhunk, and Block Island. Lobsters continue abundant over this latter area until into September or October, after which the smacks return to the coast of Maine, and run until about the middle of November. Occasional fares are obtained from the vicinity of Block Island during the fall. Each trip consumes from one to two weeks or more, dependent upon the distance, weather, and abundance of supplies. During the spring and fall, while the weather is cool, the smacks can carry from 6,000 to 8,000 lobsters each trip, but during the summer months they carry only 4,000 to 5,000 at a time.

Lobsters are received in barrels during the entire year, and, after the smacks stop running,

can only be obtained in that way. They are brought from as far east as Southwest Harbor, and South Harpswell, on the coast of Maine. The fishing ports from which lobsters are sent in barrels to New York are very numerous, and include, in addition to those above-mentioned, Portland, Me.; Portsmouth, N. H.; Boston, Wood's Holl, and New Bedford, Mass.; Newport, R. I.; Stonington, Noank, New London, and New Haven, Conn., and many small places at the eastern end of Long Island, N. Y. About fifty barrels of lobsters are received annually from the vicinity of Long Branch, N. J. As in the case of the smacks, barreled lobsters are obtained mainly from Southern New England, Long Island, and Boston during June, July, August, and September, and from Boston and more northern ports during the remainder of the year. By far the larger portion of the barreled lobsters come from Boston, from 5 to 10 per cent. of the supplies from that place being boiled and the remainder fresh. Boston boiled lobsters have obtained a good reputation in New York, being more favorably regarded there than those boiled elsewhere. However, nearly all the lobsters retailed in New York are sold fresh, the sales of boiled lobsters being almost exclusively limited to those received in that state from Boston. But at times there is a small demand for boiled lobsters above the Boston supply, and as there are no regular boilers in New York, the cooking is accomplished by forcing steam from a boiler into a wooden tank containing the lobsters and water.

The floating cars employed for holding the fresh lobsters are the same as are used for other kinds of fish. About forty-eight such cars, with a capacity of about 600 lobsters each, are in use for lobsters in the slips at Fulton market during a longer or shorter period of each year.

Lobsters are sold in New York during the entire year, but the greatest demand is during the months of July, August, and September, when five times as many are disposed of as during any other three months of the year. The demand is least during February and March, when lobsters are comparatively scarce. The fall trade is good. The great summer demand results from the enormous consumption of lobsters at the summer hotels and restaurants of the vicinity. The hotels on Coney Island, for instance, often use as much as 3,500 pounds a day. This trade is of comparatively recent origin, having commenced about 1876 and increased to date. The demand for lobsters in New York City has greatly increased within the past two or three years, but the supply has remained very much the same from year to year. In consequence, the prices have advanced to such an extent that at certain seasons lobsters have come to be regarded as a luxury beyond the means of any but the richer classes.

In 1880 the wholesale prices of lobsters averaged about as follows: From May 1 to November 30, 6 cents per pound; December and January, 8 cents per pound; February, March, and April, 12½ cents per pound. The retail prices for the same periods were 10, 12½, and 15 cents, respectively. During the summer season of 1882 the wholesale prices ranged from 6 to 25 cents per pound, the average price being about 10 cents. The higher prices obtained when the demand was greatest.

About 2,500,000 pounds of lobsters, valued at $175,000 wholesale, were brought to New York City during 1880.

List of New York lobster smacks.

ENGAGED IN LOBSTERING ONLY.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Cal Wells	Greenport	Sloop	Well	29.36	$1,200	5	New York City.
Laura Thompson	...do	...do	...do	42.31	1,500	5	Do.
Wild Pigeon	...do	..do	..do	30.87	350	5	Do.
Total				112.54	3,050	15	

List of New York lobster smacks—Continued.

ENGAGED IN OTHER FISHERIES ALSO.

Name.	Where owned.	How rigged.	Well or dry.	Tonnage.	Value.	Crew.	Markets supplied.
Cornelia M. Kingsland	Greenport	Schooner	Well	39	$3,000	5	New York City.
Caroline Augusta	New York	do	do	21.92	1,800	7	Do.
Josie Reeves	do	do	do	45.35	3,800	6	Do.
Total				106.27	8,600	18	
Total of all smacks				218.81	11,650	33	

Summation of the lobster fisheries of New York State in 1880.

Number of fishermen	32
Number of boats	32
Value of same	$640
Number of lobster pots	960
Value of same	$720
Total amount of capital invested in the fishery	$1,360
Number of barrels of bait used	270
Value of same	$135
Quantity of lobsters taken, in pounds	135,000
Value of same to the fishermen	$5,062

Summation for the New York wholesale market in 1880.

Number of marketmen	81
Number of smacks above 5 tons burden	6
Value of same	$11,650
Number of smackmen	33
Amount of capital invested in the city markets (estimate)	$50,000
Quantity of lobsters handled, in pounds	2,500,000
Amount paid for same to the fishermen and eastern dealers	$125,000
Value of same, at wholesale prices	$175,000
Enhancement in value in the New York markets	$50,000

NEW JERSEY.

Although lobsters occur along the entire outer coast of New Jersey, they are sufficiently abundant to give rise to a regular fishery only upon that section of the coast lying between Sandy Hook and Atlantic City.

The fishing season proper begins about May 1 and continues until the last of September; but some of the fishermen set their pots as early as the middle of March, and others again fish late in the fall.

The net traps described elsewhere are the principal appliances used for taking lobsters along this coast. Two men generally go together in a boat and set from thirty to forty traps on small rocky spots in from 5 to 11 fathoms of water. They then engage in hand-line fishing for the day; after which the pots are hauled. One man rows the boat while the other tends to the pots. Two men tending thirty to forty pots will average about one barrel, equal to 140 pounds of lobsters, daily.

In 1875 lobsters are said to have run much larger in size than at present, the catch in weight having been greater, although the average number procured to the trap was about the same. Thirty pounds to a trap was not an uncommon catch in former years, but during 1880 the average to a trap was less than 5 pounds. The average weight of the lobsters taken at the present time is about $1\frac{1}{4}$ to $1\frac{3}{4}$ pounds each.

According to the statements of the fishermen of Long Branch and Seabright, the lobster fisheries were extensively prosecuted as early as 1860, the catch being sold to carters for their local trade. The business gradually declined, however, until in 1870 it was almost wholly abandoned. About 1872 it again began to pick up, and it has gradually increased until in 1880 there were four-

teen boats with twenty-eight men engaged regularly in lobstering in connection with other fishing. The catch is sold partly to the local trade and partly to the New York and Philadelphia markets, at an average price of 4 cents a pound, netting the fishermen about 3½ cents a pound. The total catch for the season of 1880 was about 156,800 pounds, worth to the fishermen $5,488.

Summation of the lobster fisheries of New Jersey in 1880.

Number of fishermen	28	Average gross stock to a boat for the season	$450
Number of boats	14	Number of barrels of bait used	314
Value of same	$280	Value of same	$157
Number of lobster pots	500	Total catch for 1880, in pounds	156,800
Value of same	$750	Value of same to the fishermen	$5,488
Total amount of capital invested	$1,030		

DELAWARE.

There is no lobster fishery within the limits of this State, although lobsters occur sparingly about the Delaware Breakwater, and are occasionally captured by those who desire them for their own use. One or more are sometimes hauled ashore in drag-seines or gill-nets, or are caught on the hooks of the fishermen. The areas in which lobsters are said to be most abundant are those resorted to by vessels for anchorage, and this would interfere with the setting of pots were there any inclination to engage in fishing. At the most but a few hundred pounds of lobsters are taken annually. Mr. A. T. Burbage, of Ocean View, Del., states that he has occasionally seen lobsters along the beach, in the surf, near Indian River Inlet, Delaware. But rare instances of the presence of lobsters south of Delaware have been noted. Two or three have, however, been recorded from the northeastern corner of Virginia, and in October, 1884, the U. S. Fish Commission steamer Albatross, obtained a single specimen of good size off Cape Hatteras, North Carolina, from a depth of about 30 fathoms, by means of the beam trawl.

STATISTICAL RECAPITULATION OF THE LOBSTER INDUSTRY OF THE UNITED STATES IN 1880.

Table of the lobster industry of the United States in 1880.*

States.	Fishery.											
	Fishermen.	Fishing smacks.		Boats.		Lobster pots		Total amount of capital invested in the fishery.	Bait used.		Quantity of lobsters taken.	
		No.	Value.	No.	Value.	No.	Value.		No. of barrels.	Value.	Pounds.	Value.
Maine	1,843	8	$4,230	1,797	$68,582	104,456	$78,342	$151,154	56,190	$28,095	14,234,182	$268,739
New Hampshire	44	.....	.....	31	460	2,350	2,350	2,810	500	250	250,000	7,500
Massachusetts	595	9	6,250	437	24,315	29,007	29,007	59,572	8,632	4,316	4,315,416	158,229
Rhode Island	129	5	4,650	85	6,400	2,170	1,627	12,677	840	420	423,250	15,871
Connecticut	148	24	29,950	42	5,700	2,100	2,100	37,750	1,226	613	613,385	23,002
New York	32	.....	.....	32	640	960	720	1,360	270	135	135,000	5,062
New Jersey	28	.....	.....	14	280	500	750	1,030	314	157	156,800	5,488
Total	2,819	46	45,080	2,438	106,377	141,543	144,896	266,353	67,972	33,986	20,128,033	483,891

* The total value of the products as they enter into consumption is intended to represent the value of all the lobsters sold in 1880, as they pass from the hands of the wholesale dealers, in the three largest markets of the country, Portland, Boston, and New York; from the fishermen who do not supply these markets, and from the canneries. The figures of this column and of the column of "Total amount of capital invested," so far as they are made up from the "Amount of capital invested in the wholesale markets," and the "Enhancement in value in wholesale markets" are largely the result of estimates. Most of the lobster markets deal even more extensively in other kinds of fish, and it has, therefore, been impossible to properly separate the lobster capital from the fish capital. As to enhancement in value, prices fluctuate so much that an exact average could not be determined upon. For instance, in New York, wholesale prices range from 6 to 25 cents per pound, the latter price being demanded even during the height of the season, when the demand and sales are greatest. No account has been taken of the lesser wholesale markets, as no returns of their sales were made by the field agents. Of the 20,128,033 pounds of lobsters taken and sold by the fishermen, we have, therefore, figured an enhancement in value only on the following: 9,494,284 pounds used by the canneries; 8,067,654 pounds handled in Portland, Boston, and New York—a total of 17,561,938 pounds; leaving a balance of over 2,500,000 pounds, which remain at the fishermen's prices. It can be safely asserted, with reference to the balance of the table, that it is founded on as exact data as it was possible to collect of so scattered an industry. The cannery statistics were taken from the books of the canneries.

Table of the lobster industry of the United States in 1880—Continued.

States.	Wholesale markets.						Canneries.		
	Market smacks.*								
	No.	Value.	No. of smack-men.	No. of market-men.	Amount of capital invested in the markets.	Enhancement in value of lobsters in wholesale market.	No. of persons employed.	Amount of capital invested.	Enhancement in value of lobsters by process of canning.
Maine	50	$40,175	128	20	$25,000	$19,300	782	$289,834	$143,337
New Hampshire									
Massachusetts				50	30,000	36,577			
Rhode Island									
Connecticut									
New York	6	11,650	33	81	50,000	50,000			
New Jersey									
Total	56	51,825	161	151	105,000	105,677	782	289,834	143,337

States.	Grand totals.		
	Total number persons employed.	Total amount of capital invested.	Total value of products as they enter into consumption.
Maine	2,773	$506,163	$431,376
New Hampshire	44	2,810	7,500
Massachusetts	645	89,572	194,606
Rhode Island	129	12,677	15,871
Connecticut	157	37,750	23,002
New York	146	63,010	55,062
New Jersey	28	1,030	5,488
Total	3,922	713,012	732,905

*The fishing smacks also carry their catch to market, and are, therefore, partly of the nature of market smacks.

3.—THE CRAYFISH FISHERY.

1. THE CRAYFISH FISHERY OF NORTH AMERICA.

GENERAL REVIEW.—Although fresh-water crayfish are very abundant in many portions of the United States, they are seldom used as food, and, in fact, there appear to be only two regular markets for their sale—New York and New Orleans. One of the principal uses to which they are put is for garnishing fish dishes in hotels and restaurants. Through much of the region where one or more of the many species of crayfish occur, it is probable that they are taken in small quantities for home consumption; but of so slight and scattered an industry it is impossible to collect statistics.

NEW YORK CITY.—Comparatively large quantities of crayfish are brought to the New York markets during the spring and summer, the sources of supply being the Potomac River, at Washington; Milwaukee, Wis.; and Montreal, Canada. The first supplies come from Washington, where the season opens soon after the ice has disappeared from the river, and just before the shad commence to run. About June 1 they begin to be received from Milwaukee, and about July 1 from Montreal. Originally all the crayfish sent to New York, at least in large quantities, came from Washington; later Milwaukee began to ship them east, and a year ago (1880) the first shipments

were sent from Montreal on trial. Crayfish are sent alive, packed in boxes, containing about five hundred each. In these boxes they are arranged in layers, alternating with moist water-plants.

After crayfish begin to arrive from Milwaukee, the demand for those from Washington ceases, partly because the warm weather prevailing in Washington after May renders their shipment alive quite difficult, and also because the Milwaukee crayfish are considered superior to the others. The quantities received at New York from the three places above mentioned for the past year (1880) were about as follows: From Washington (the season lasting from the middle of March to near June), about 50,000 by count; from Milwaukee (the season lasting about twenty-one weeks from June 1), 84,000 by count, or at the rate of about 4,000 a week; from Montreal the single shipment of 1880 amounted to 2,000 by count, but this year (1881) the receipts will probably be much greater. The shipments from Washington for the spring of 1881 were also larger than usual.

The crayfish sent from Washington are larger than those from Milwaukee, and the latter in turn are larger than those from Montreal. The Milwaukee crayfish are, however, preferred by epicures to those from Washington, as they are considered to be less coarse in flesh and flavor. The Milwaukee and Montreal crayfish are also said to become a deeper red in boiling than the Potomac, which is to their advantage when intended for garnishing.

In previous years the Potomac crayfish have brought, in the New York market, as high prices as $4 to $6 per hundred, but this year, on account of the large number received, the price has fallen, at times to $2 per hundred. The Milwaukee crayfish, coming in greater abundance later in the season, have been sold at lower prices—from $2 to $3 per hundred. Crayfish are used in New York principally by hotels and restaurants for making soups and bisque of crayfish, and for garnishing fish dishes and lobster salads.

Mr. Blackford, of Fulton market, to whom we are indebted for the above information and figures, often keeps large quantities of crayfish on hand for a considerable period during the season. In order to do this, he has arranged a large and deep wooden tank in the front part of his ice-house, in the bottom of which there is room for a great many crayfish to move about. Over the bottom of the tank, a thin layer of water, not deep enough to entirely cover the animals, is allowed to pass continuously. The air in the tank is also retained at a moderately low temperature. Although many die, yet the mortality is greatly lessened by this method of storing them.

The sales of crayfish in the New York markets for the year 1880, according to the figures given above, amounted to 136,000 by count, valued at $2,720 wholesale prices.

Washington.—Notwithstanding the great abundance of crayfish along the banks of the Potomac River, in front of, and below, the city of Washington, very few are taken to supply the retail markets of that city, as they find no ready sale there. The business is entirely in the hands of a few parties who fish during a short period only in the spring, and send nearly all their catch directly to New York.

New Orleans.—Crayfish are probably more commonly eaten in New Orleans than in any other American city, outside of New York, and yet they are seldom seen in the markets there in large quantities. The supplies come mainly from the shores of the lakes and canal and from the levees of the Mississippi River, in all of which localities they are said to be very abundant and easily procured. Some of the species live in the mud in which they excavate their holes, and others build chimney-like mounds for their protection. The levees of the Lower Mississippi are often much damaged by the numerous excavations of the burrowing species. The crayfish are shipped in baskets for which the gatherers receive 40 cents each. The sales for 1880 amounted to only about 2,000 baskets valued at $800.

San Francisco.—According to Mr. W. N. Lockington, crayfish are occasionally brought

to the San Francisco markets. The only species which has yet been recognized there is the *Astacus nigrescens*, collected both in Coyote Creek, Santa Clara County, and in the sloughs of the San Joaquin.

2. METHODS OF CAPTURE, PRESERVATION, AND TRANSPORTATION OF CRAYFISH IN GERMANY.

The following account of the methods of collecting, transporting, and protecting crayfish in Germany, extracted from a report by H Rubelins, in the Industrie-Blätter, Berlin, July 29, 1880, will be of value to Americans interested in this fishery:

"The most common and profitable way of catching crayfish is with the so-called 'Bolljacken,' which consists of two hoops with a tube-shaped net attached. On the outside these two hoops are covered with a net-work, and the whole apparatus has the appearance of a cylinder. The hoops are kept open by wooden pegs. A piece of fresh fish or a frog is put inside as bait, a stone is tied to it, and thus the 'Bolljacken' is let down to the bottom.

"Another apparatus for catching crayfish is the so-called 'Tellerhamen,' a sort of purse-net, or hoop covered with a net, in the middle of which there is a long stick which serves to keep the hoop, which resembles a plate, at the bottom of the water. In that portion of the net through which the stick passes, the bait is fixed, so that the crayfish must go on the 'plate' if it wishes to seize the bait. The stick must be long enough so that its other end may protrude above the water. The stick is then pulled out with the net and the crayfish sticking to it, baited anew, and let down again.

"Another method of catching crayfish is much used by private individuals. During the summer months the crayfish seeks shallow places with a clear bottom. The fishermen use a torch of resinous pine-wood, by means of which they throw a strong light on the bottom. The crayfish are dazzled by the light and can easily be taken out of the water with the hands; and it has happened more than once that a single person has in this manner caught 900 to 1,200 crayfish in one night.

"After the crayfish have been caught, the main object of the cultivator is to preserve them, to give them a pure flavor, and to fatten them. For a number of years I have succeeded very well in this. Pure running water is the first requisite; the boxes must be made according to the plan given below, and must not be overcrowded. The best food is fresh meat, but not too much at a time. Immediately after having cast its old shell, the crayfish is very voracious, and consequently needs the largest quantity of food, while in December it needs the least. In January it becomes lively again, its voracity increases, and during its imprisonment the eggs begin to appear at that time. Great care should be taken not to leave old and spoilt fragments of meat in the boxes for any length of time, as they will very soon prove fatal to the crayfish. I have by way of experiment thrown spoilt meat in boxes where there were only a few crayfish, and the consequence was that most of them died. I would also draw attention to a very important matter, viz, to clean the boxes (at least during summer when it is very warm) twice a day and throw out all the dead crayfish, for in summer a crayfish commences to putrefy in ten to twelve hours after death, and the exhalation invariably kills the healthy. One of the greatest dangers to crayfish culture and transportation is a thunderstorm. As soon as a thunderstorm has passed over, the boxes should be opened and cleaned, and care should be taken to admit fresh air and water.

"I have transported crayfish in various ways and have finally arrived at a method which in most cases has proved successful. I have very frequently sent live crayfish by mail from Frankfort-on-the-Oder to Alsace-Lorraine, and they have invariably arrived in good and healthy condition, unless a thunderstorm came up during the journey, which, however, did not happen very

often. During the shedding period no crayfish should be shipped, as then they cannot stand any pressure, and die easily. Care should also be taken not to pack a dead crayfish among the live ones. The main point in shipping crayfish is to select good, healthy ones, well fed and properly dried. I generally employ small wicker baskets each holding sixty to one hundred and twenty crayfish, so that they are not piled too high on top of each other. First put a layer of straw in the basket, then put in the crayfish, one at a time, laying them on their feet, and if the basket should not be quite full, it should be packed with straw till full. The packing is to prevent the crayfish from turning when the baskets, as will frequently happen during a long journey, are thrown about a good deal. If the crayfish falls on its back during the journey, it will die, as it works with its feet till it becomes exhausted. On their arrival at the place of destination the crayfish are taken out of the baskets and placed (again on their feet), in a large vessel, which should be kept in a cool place, best in a cellar, but not be covered up.

"It is an old belief that crayfish are not good in those months the names of which contain the letter *r*; but I have found that when properly cared for and well fed they are good at all times, for I have sold and shipped them during every month in the year, and have never had any complaints.

"An important question remains to be answered, viz, whether artificial crayfish culture in basins is remunerative. Experience has taught me that crayfish increase and develop better when in a free state than in boxes or basins. To start a somewhat remunerative crayfish establishment involves considerable expense, and does not yield the expected result. In such establishments the cold of winter kills most of the crayfish, as they cannot find holes and other places of refuge as when in a free condition. If strong ice forms, as was the case this year, the crayfish are suffocated in the basins; the boxes are soon frozen over on the sides and top, and as soon as the admission of fresh air is stopped, the crayfish die from suffocation.

"I would therefore recommend the following method: From rivers and lakes containing but few crayfish the females should not be removed; the eels and pike should if possible all be caught, and the young crayfish, large numbers of which will make their appearance in a year or two, must be well and regularly fed with meat and turnips; during the fourth year all crayfish which have reached the length of 10 centimeters should be caught and placed in large tanks or boxes prepared in the following manner: The bottom and sides are best made of thin boards, which should not be close together, but have narrow interspaces between them, too small to let a small crayfish escape. The object of having such interspaces on the bottom is to give free egress to the slime, mud, sand, &c., which will get in the box, and thus to keep it clean at all times. The interspaces on the sides will have this advantage that fresh water is constantly passing through the boxes, which of course is an essential condition of keeping the crayfish alive and in good condition. In these boxes, through which fresh water must be kept running all the time, the crayfish are fattened. When ice forms in winter the boxes must be let down into the water so that the openings on the sides do not freeze over."

3. STATISTICS OF THE CRAYFISH FISHERY FOR 1880.

Table showing the quantity and value of the crayfishes taken for market in 1880.

Locality.	Estimated weight.	Value to the fishermen.
	Pounds.	
Washington, D. C	5,000	$500
Milwaukee, Wis	8,400	840
New Orleans, La	10,000	800
Total	**23,400**	**2,140**

4.—THE ROCK-LOBSTER FISHERY.

THE ROCK-LOBSTER FISHERY OF CALIFORNIA.

General review.—The rock-lobster, spiny-lobster, or salt-water crayfish (*Panulirus interruptus*) of the Pacific coast of the United States ranges from Santa Barbara, Cal., southward and is taken for food at Santa Barbara, San Diego, Los Angeles, Wilmington, and other smaller places. The San Francisco market is entirely supplied from Santa Barbara, whence large quantities are shipped annually. Very few, if any, are exported from the State. As there are no regular markets in the smaller places where it is sold, it is hawked through the streets with fish. It is captured in dip-nets or in traps with a funnel-shaped entrance, similar to the lobster pots of the New England coast. Fish is used as bait. This species is in season at San Francisco the entire year. The following account of the fishery is from a report by Prof. D. S. Jordan.

Santa Barbara.—During the summer the salt-water crayfish live in shallow water, where they are taken in a sort of dip-net anchored near the shore, with a piece of bait suspended above the middle. In October they retire to deeper water and remain in the kelp during the winter, when they are captured in lobster-pots. Fresh fish, especially bonito, makes the best bait, but any flesh, fresh or salt, will answer. During the spawning season, which is in the early summer, the flesh of the crayfish is less fat and less esteemed as food, but, nevertheless, it is eaten all through the year. At this period it is also very abundant near shore, and a single person has been able to secure 500 pounds in the space of two hours by means of dip-nets. They are sometimes taken in fish-seines. There is great danger of overfishing, especially in the spawning season. The average weight of those now taken is 3½ to 4 pounds, or about twenty lobsters to a sack of 75 pounds. Formerly, 11-pound individuals were taken about Santa Barbara, but such are very scarce there now.

Some of the crayfish caught at Santa Barbara are peddled through the streets at 10 cents each, but the greater part are sent to San Francisco, where they are sold by commission merchants, the net results being from 75 cents to $1 per sack. In summer great numbers spoil before they can be disposed of. Five or six years ago crayfish were shipped from Santa Barbara to San Francisco by only a single party, who was accustomed to send thirty or forty sacks by each steamer sailing every five days. Now he sends only twenty to twenty-five sacks by each steamer in summer, and a smaller quantity in winter, but three others have gone into the fishery and together they do an increased business. About 180,000 pounds are taken annually at Santa Barbara, the greater part of which, as stated above, are sent to San Francisco. The first shipments to that place were made in 1872.

In 1877 a cannery for crayfish was started in Santa Barbara, but it failed after the first season, as the managers were ignorant of the business. It is intended to make another start soon under better management.

The Chinese fishermen on Santa Cruz Island catch the crayfish, use the bodies for bait, and dry the tails in the sun without salting or cooking. These dried tails are sent to San Francisco and sold to the Chinese at about 15 cents a pound.

Captain Larco, the principal crayfish dealer of Santa Barbara, states that he is positive some law should be passed to protect the crayfish, at least during the spawning season, when large quantities are destroyed every year. His views on this subject are very reasonable, and no doubt

some attention should be paid at once to fostering an industry which avaricious fishing may soon destroy.

SAN DIEGO.—The fishery about San Diego is at present of very slight extent compared with that of Santa Barbara, but it would undoubtedly admit of greater development, did the demand warrant it. The Chinese alone supply crayfish to this locality from their fishery at Roseville. They catch large numbers, a part of which are used as bait, the remainder being sold to parties who peddle them through the streets after boiling them. Crayfish occur abundantly wherever there is kelp, both inside and outside of the bay and near its mouth. Lobster-pots and dip-nets with bait are used in their capture.

The quantity of crayfish sold in San Diego is very small. Three years ago the average sales per week amounted to only three or four dozens, and now still less are disposed of. The Chinese are paid from 50 cents to $1 per dozen for them, and by retail on the street they bring from 10 to 15 cents each.

WILMINGTON.—But one man engages regularly in the fishery at this place, although this crustacean is very common all along the shore. The pots are visited only two or three times a week, but these few trips are sufficient to collect all that can be sold. There is no regular market and no regular price, but after boiling they are peddled through the streets and retailed at from 5 cents to 10 cents per pound. About 20,000 pounds are sold annually.

Table showing quantity and value of rock lobsters (Panulirus interruptus) taken and sold on the California coast in 1880.

Locality.	Quantity.	Value.
	Pounds.	
Santa Barbara	180,000	$5,600
San Diego	30,000	
Wilmington		
Totals	210,000	5,600

5.—THE SHRIMP AND PRAWN FISHERIES.

(*a*) THE SHRIMP AND PRAWN FISHERIES OF THE ATLANTIC AND GULF COASTS.

1. INTRODUCTION.

THE DIFFERENT VARIETIES OF SHRIMP AND PRAWNS AND THEIR DISTRIBUTION.—Shrimp and prawns occur along the entire Atlantic and Gulf coasts of the United States, but the species are of much smaller size at the North than at the South, and shrimp fishing as an industry has thus far been developed, to any extent, at only a few points on the coast of the Southern States. The common shrimp (*Crangon vulgaris*) and prawn (*Palæmonetes vulgaris*) of the New England coast are too small and too rarely found in sufficient abundance to offer many inducements toward a regular fishery. So far as we are aware, the New England prawn is never taken for food, and the shrimp are caught for that purpose only about New Bedford, Newport, and New York. The latter species is, however, occasionally used as bait at many points along the New England coast, but mainly by amateur fishermen.

On the South Atlantic and Gulf coasts at least two species of shrimp or prawns occur, the names shrimp and prawns, throughout that district, according to several authorities, having reference merely to different sizes of the same species, the smaller ones being called shrimp and the larger prawns. They are but different stages in the growth of *Penæus setiferus* and *Penæus*

brasiliensis described in the section on natural history. They are not generally found close to the shore at the same time, the prawn coming first and staying into the summer, the shrimp following and remaining until fall or even through the winter. At least this is the case on the Atlantic coast, but we have received no information tending to confirm these statements with reference to the Gulf coast. The so-called shrimp are said to range in length from 2 to 3 inches and the prawns from 3 to 6 inches. Capt. T. E. Fisher, of Fernandina, Fla., says he has seen prawns taken at that place that measured about 9 inches, but that size was very rare. On the coast of Louisiana and Texas, the same species of shrimp and prawns occur in great abundance, the average length of those taken ranging from 5 to 8 inches. In that region they appear to go entirely under the name of shrimp.

At New Orleans one or more additional species of shrimp are utilized; one of these is the river shrimp (*Palæmon ohionis*), caught in the Mississippi River. The so-called lake shrimp, found in the bays and lakes inside of the Louisiana coast may possibly be the young of the true Gulf shrimp, but we have never had the opportunity of examining specimens. The river shrimp measure in length from 2 to 3 inches, and the lake shrimp from 3 to 4 inches.

During the shrimping season, shrimp are generally found in shallow water close along the shore. *Crangon vulgaris* is abundant in shallow water nearly everywhere along the New England coast, being easily taken with a dip-net. It also occurs in considerable depths of water off shore. At the South, in the various regions where they are taken for food, the two species of *Penæus* likewise abound in shallow water during the shrimping season, which, on the Atlantic coast, generally begins early in the spring and ends in the fall or at the commencement of cold weather. About Norfolk, Va., they are taken in seines, 16 to 18 feet deep; at Wilmington, N. C., they are caught in slight depths, in both salt and slightly brackish water; at Fernandina, Fla., they occur along the shores, in from 6 inches to 4 feet of water, principally on muddy but also, to some extent, on sandy bottoms; on the west side of Florida, they are described as inhabiting the grassy and sandy bottoms along shore, in depths ranging from a few inches to 10 or 12 feet; on the Louisiana and Texas coasts they are found everywhere to the west of the Mississippi River, in from 2 to 18 feet of water. Barataria Bay, on the Louisiana coast, and Galveston and Matagorda Bays, on the Texas coast, are especially noted for their shrimp fisheries.

2. COAST REVIEW OF THE SHRIMP AND PRAWN FISHERIES.

THE NEW ENGLAND COAST.—Shrimp are seldom taken for food on the New England coast. About New Bedford, Mass., they are caught from May to October, in dip-nets, but only at irregular intervals and in small quantities, an occasional daily catch amounting to from 1 quart to 4 gallons. The greater part of the shrimp taken are retained in New Bedford for use as bait, small quantities being sometimes shipped to Providence and New York, packed in boxes with rockweed, moss, or sawdust. Some shrimp are also used at Wareham, Mass., and along the eastern shores of Buzzard's Bay, as bait for the sea bass and squeteague. In Narragansett Bay, Rhode Island, shrimp are only taken for personal use in and about Newport. They are not generally abundant, the largest recorded daily catch by one man amounting to only 1 peck. This was considered, however, as an unusual occurrence. They are caught in fine-mesh dip-nets. At many places along the New England coast, outside of those above mentioned, small quantities of shrimp are used occasionally by amateur fishermen, but the entire amount consumed every year in this manner would not be worth more than a few dollars. Specimens of *Pandalus* are frequently taken in lobster-pots set in deep water, but they are not caught in sufficient quantities for

market. The lobster fishermen of Biddeford Pool, Me., and Noank, Conn., report their capture from time to time.

NEW YORK.—At the eastern end of Long Island a few shrimp (*Crangon vulgaris*) are taken every season for home consumption and for shipment to New York City, but the industry is of slight importance. The vicinity of Bay Ridge is the principal locality in which they are taken for shipment to New York markets, the season lasting from the middle of March until the middle of May. The amount shipped each season is about 3,000 gallons. These shrimp are cooked in brine as soon as caught, and then dried. During July and August of each year about 1,000 gallons of fresh shrimp are sold about Bay Ridge as bait for general hook-and-line fishing. The average price is about $2 per gallon.

NEW YORK CITY MARKET.—The New England shrimp (*Crangon vulgaris*) is brought to the New York markets during about sixty days in the spring, from the middle of March to the middle of May. The average sales per day are about 50 gallons, or 3,000 gallons for the season, which, at the average market price of $1.50 per gallon, are valued at $4,500. They come mostly from the vicinity of Bay Ridge, L. I., below New York City, where the nets are hauled every morning. They are cooked in brine before being sent to market.

The season in New York for the larger southern shrimp or prawn (*Penæus*) is from the 1st of February to the 1st of May, after which time the weather becomes too warm to permit their being shipped safely. During this season each year about 200 bushels are brought to New York, mainly from Charleston, S. C., and Savannah, Ga., in boxes holding about 1 bushel each. They sell in the New York market for about $1.50 per gallon. These shrimp, like the others, are dried, after being cooked in brine.

In 1879 about 200 gallons of *Penæus* were sold in the Boston market, and in 1880 about 75 gallons; they were received through New York.

NEW JERSEY.—Shrimp are reported as abundant along most of the New Jersey coast, but as yet they have given rise to no considerable industry. From a few places, however, they are shipped to New York City in small quantities. The shrimping season extends more or less continuously from May to November. Shrimp are much used on this coast as bait for hook-and-line fishing, and by many are regarded as superior to any other kinds of bait.

DELAWARE.—A small quantity of shrimp are used in this State every year, as bait for hook-and-line fishing, but there appears to be no regular source of supply, and we have not learned of their being taken there for food.

VIRGINIA.—About the same can be said of the Virginia coast as of the New Jersey. Shrimp are more or less abundant, but are only taken for use as bait in small quantities, or incidentally in seines, while hauling for fish. The season begins in the spring and lasts until cold weather, but is best in the fall. At both Norfolk and Hampton, shrimp are only rarely used as food. They are reported as having been very abundant at one time in Lynnhaven Bay, but to have nearly disappeared from that region now. They are but rarely seen in the waters about Hampton. Prawns are the favorite bait for "rock" about Norfolk, where they vary greatly in price, according to their abundance. When very abundant they are sold to fishermen at as low a price as 10 cents a quart, but, when scarce, the price sometimes advances to 25 cents a dozen.

NORTH CAROLINA.—After passing the Virginia coast shrimp appear to increase in size and abundance, and also to meet with much greater favor from the inhabitants. Wilmington, N. C., is the most northern city of our Atlantic coast where the shrimp fishery assumes the importance of an actual industry, and where shrimp are caught in sufficient quantities to merit special attention.

Pamlico Sound, some distance north of Wilmington, abounds in shrimp and prawns, which are taken in immense quantities in ordinary fish-seines, but they find no market at home, and no one in the region has yet been successful in shipping them away to where they might be better appreciated. Here, therefore, in a central location, is an undeveloped industry, awaiting the investment of a small amount of capital, backed by a spirit of enterprise. Concerning this and neighboring regions, Mr. R. E. Earll reports as follows:

"There is no shrimp trade anywhere within the district comprising Pamlico, Albemarle, Roanoke, and Croatan Sounds, although shrimp are very abundant in many localities, and enterprise alone is required to develop an important industry. The fishermen often catch the shrimp in their ordinary nets, along with fish, but find no sale for them at home, and their means of shipping them fresh to outside markets are imperfect. The fishermen of New Berne catch them in considerable numbers in their fish nets along the banks of the Neuse River, and they are also abundant at Stumpy Point, and probably not uncommon in other parts of Pamlico Sound. They are taken only occasionally and in small quantities in Croatan and Roanoke Sounds, and do not occur in Albemarle Sound except in season of unusual drought. The New Berne fishermen often secure from 30 to 40 bushels at a haul of their fish-nets, and have frequently offered them for sale to the market dealers at the low price of 50 cents per bushel, which has almost always been refused. The fishermen eat very few themselves and throw the bulk of their catch away. No shrimp are boiled and dried at this locality, as the inhabitants are entirely ignorant of the methods of preparing them as practiced elsewhere. There is no apparent reason, however, why an important shrimp industry might not be inaugurated at or in the vicinity of New Berne, by the starting of an establishment where this crustacean could be boiled and dried for market, or put up in hermetically sealed cans for more permanent preservation."

The vicinity of Beaufort and Morehead City also abounds in shrimp and prawns, but there the same difficulty exists as in Pamlico sound. There is no local demand for the shrimp, and enterprise is lacking to start a trade with outside cities. According to Mr. Earll, the Beaufort fishermen have never fished for shrimp and prawns and have never tried apparatus suited to their capture. They employ nets of large mesh for fish and frequent only the sand-banks and shores, while the shrimp are known to prefer in this locality a muddy bottom. Even with this style of net, however, it is not uncommon for from five to twenty barrels of shrimp to be taken at a single haul of the seine, indicating that they are quite abundant in the region, and might be secured in great quantities by the use of proper nets. The dealers have never given any attention to this trade, and refuse to buy the shrimp accidentally taken in the fish-seines. The fishermen, therefore, being unable to sell their catch, find no encouragement in this line of fishing. In 1879 a few shrimp were bought by one of the dealers, who tried to ship them to New York in ice, but they spoilt on the way. The result would have been much more satisfactory had the shrimp been boiled and dried, instead of being sent fresh. Those taken in this region are of large size, and it only remains for some one familiar with the methods of curing them to engage in the business, which might soon be made to develop into a very profitable trade.

The principal localities where the shrimp industry has already been started and is carried on more or less extensively are Wilmington, N. C.; Charleston, S. C.; Savannah, Ga.; Fernandina, Fla.; New Orleans, La.; and Galveston, Tex.

Shrimp and prawns are very abundant in both salt and slightly brackish water in the sounds and bays about Wilmington, N. C., from the last of May until November, but the industry is, as yet, only imperfectly developed, though it promises to become in the future of considerable importance. Prior to 1872, shrimp were taken in this locality only with skim-nets; they were not

much thought of by the people, and not over 100 bushels were marketed yearly, at the rate of about 25 cents per quart. In the year 1872, the first shrimp-seine was introduced, and from that time business increased until eight seines were in use. None of the shrimp were sent away, and the home market therefore soon became overstocked, the result being that some of the shrimpers were obliged to give up the business. At the present time only four shrimp-seines supply the Wilmington markets, all of which are owned in Wrightsville or Middle Sound. These seines range in length from 30 to 40 yards, and in depth from 6 to 10 feet; the size of the mesh is one-half inch, and they cost about $35 apiece. Two men are required for each seine, the season's catch for each being about 500 bushels, or 2,000 bushels for the four seines in use.

In addition to the seiners there are about fifty men engaged in taking shrimp with cast-nets and skim-nets, their season's catch amounting in all to nearly 3,000 bushels, though not more than one-half of their catch is marketed. The total catch of shrimp for 1880 amounted therefore to about 5,000 bushels, of which only 2,200 bushels were sold for food at a cost of $5,500. The remainder of the shrimp taken were used for fertilizing purposes or thrown away, only the best and largest specimens being marketed. Fishing is carried on only in the daytime, and then not with any precise regularity, as the markets cannot take all that could be caught. Before sending the shrimp to market, they are boiled by the fishermen for about ten minutes in kettles holding from 10 to 50 quarts each, and then spread out to cool. They are shipped in baskets.

No shrimp were sent away from the city until 1878, but since that time a trade has sprung up with the neighboring towns and northern cities, which promises to increase and become of considerable value.

The principal cities and towns supplied with shrimp from Wilmington are New York, Philadelphia, Charlotte, N. C., Florence, Sumter, Columbia, S. C., and Augusta, Ga.

South Carolina.—The shrimp and prawn industry of Charleston is one of the most important branches of the fisheries at that point, both as regards the number of men engaged and the value of the catch. The fishery begins the last of March or first of April, and continues until the middle of November. During the first of the season (March to July) the so-called prawns alone are taken, but after that the smaller shrimp take the place of the prawns. At the first of the season, six to eight seine-boats, with crews of about six men each, go nightly to the various fishing shores, all of which are within 15 miles of the city, and draw their seines during the two or three hours of low tide; they return before day to supply the boat fishermen with bait, after which they dispose of the remainder of their catch to the men, women, and children, who vend the prawns through the street. The catch varies greatly at this time of year, as the prawns seem to be more abundant in some localities than in others; and the successful boats may return with 10 to 20 bushels, while the less fortunate ones obtain only 4 or 5 bushels. This is also the time when whiting are most plentiful in this region, and for this species prawns are said to constitute the best bait. The whiting fishermen, are, therefore, very anxious to obtain them, even at a high figure, the ordinary price being about 50 cents per plate, containing from a quart to a quart and a half each. Sometimes, however, as high as 2 cents apiece, or about $1 a plate, is paid for them. Each hook-and-line fisherman requires one or two plates for a day's fishing, according to the abundance of fish, and this gives rise to a constant demand for them, at excellent prices. During the first few weeks of the season this fishery is one of the most profitable of any on this part of the coast.

When the prawns become more abundant, cast-nets come into use; early in May the seiners lay aside their seines, and in common with others, engage in cast-net fishing solely. The fishery soon reaches its height, and at this time not less than one hundred and twenty men with sixty

boats and seventy-five cast-nets are constantly employed. The daily catch during June and July often exceeds 100 plates to the boat, while the average catch for the season is from 60 to 75 plates daily per boat. The boats make on an average about four and a half trips per week.

Early in July the prawns disappear and their place is filled by the smaller shrimp, which continue in great abundance until the middle of November. The difference in size between the prawns and shrimp may be measured roughly as follows: Of the former only about forty are required to fill a plate, while a plate full of the latter numbers fifty to sixty. The shrimp fishery continues to the close of the season, with about the same number of men and boats as were engaged in the later prawn fishery, and the average catch also remains about the same, but the price which started at 50 cents for prawns in April soon falls to 25 cents, then to 15, and later to 10 cents per plate, the retail price being about 15 cents, and that to dealers from 8 to 10 cents. The city authorities exact a monthly license of $1 from each fish vender in the city, which tends to limit the number of that class, but the shrimp venders are placed under no such restraint, and many men, women, and children embrace the opportunity of making a few pennies in this line of business, which requires only a tray and plate in addition to the small daily stock in trade. At early dawn the entire city is aroused from its slumbers by the incessant cries of "Shrimp" and "Prawn," as more than a hundred venders, all blacks, and each with a well balanced tray upon his head, wander through the streets and alleys, trying to dispose of their goods. Shrimp have come to be considered a standard article of food by the Charleston residents, who eat them during the entire season. The greater part of the entire catch is sold in the city, either for bait or food, and the quantity sent to outside markets reaches only a few hundred bushels yearly. The shrimp catch for April equals about 10,000 plates, valued at $4,000, and the same from May to November 15 equals about 40,000 plates, valued at $34,667. This is the price as sold from the boat, but the retail value must exceed $60,000.

Georgia.—Shrimp abound along the entire sea-coast of Georgia, from Savannah to the Florida line. They are taken for food, the prawns from March to June, and the shrimp from July to November, in nets of one-half inch mesh. They are caught in large quantities to supply the Savannah and other Georgia markets, and are also shipped to New York and other northern cities. This industry has not, however, attained the proportions in this State which it has in South Carolina. The sales for 1879 amounted to 1,600 bushels, valued at $3,500.

Eastern Florida.—On the sea-coast about Fernandina, shrimp and prawns are very common, and furnish abundant material for a profitable industry; but at present from the want of sufficient capital this fishery is not as flourishing as it has been or as it gives promise of becoming in the future. We are indebted to Capt. T. E. Fisher, of Fernandina, for very full notes on the fishery at that place, from which the following account has been prepared:

According to Captain Fisher, the so-called prawns approach the coast about the full moon in March or thereabouts, and enter the bays, rivers, and creeks in large quantities—as he thinks, to spawn. About May or June they return again to the sea, and are replaced by very small shrimp, which from May until August are used mainly as fish-bait. From August to December they increase rapidly in size, the best shrimping season being during the months of September and October. If the winter is warm the shrimp and prawns remain on the coast during the entire year, but ordinarily prawns are found from March until May, and shrimp from May to December. The fishing is usually conducted on muddy, but sometimes on sandy bottoms in from 6 inches to 4 feet of water and deeper. Cast-nets from 10 to 15 feet in diameter are generally employed, as seines when they have been used have given less satisfaction. The shrimp and prawns do not approach the shore as thickly in the daytime as at night, so that the fishing is mostly carried on after dark.

Two men go out in each boat, one to paddle, the other to manage the net. Captain Fisher records one unusual catch of 7 bushels made by two men in three hours' time.

The shrimp after they are taken are washed very clean, so as to rid them of any mud or sand that may have remained upon them, and are then put into a kettle of strong boiling brine, which is made thick enough to hold up a common potato. About 1 bushel of shrimp is allowed to 3 gallons of brine, and the shrimp are not put into it until the froth and dirt, which usually rises to the surface during boiling, has been skimmed off. After the shrimp have been boiled about ten minutes they are taken from the pot, put into a covered basket or barrel, and allowed to steam for ten minutes more. They are then spread out in a thin layer upon a platform of boards to dry. It is very essential that they should be thoroughly dried before being collected together for shipment, but once in this condition they can be kept for weeks, if always retained in a dry place.

As to the shrimp industry at Fernandina, Captain Fisher states that shrimp and prawns are exceedingly abundant there year after year, and a few years ago he entered into the business of preparing them for market. He had no trouble in obtaining materials, and worked hard to build up a trade. Meeting with some losses and with bad returns from dealers, to whom he had been shipping, he was finally obliged to abandon the project, but, as he says, "from no want of shrimp." He continues: "I have never found any trouble in getting as many as I wanted along the entire coast from North Carolina to Florida, except during severe stormy weather. I have found them just as abundant one year as another, and they furnish a much greater supply of food along the coasts of the States mentioned than is generally supposed." With a east-net 15 feet in diameter two men can catch on an average 2 bushels per day during the entire fishing season. In 1879 quite a business was carried on, some 300 bushels of the dried shrimps having been sent to New York, Philadelphia, Savannah, Atlanta, and Macon, Ga., and Charleston, S. C., in crates or baskets. Since then only enough fishing has been done to supply the home trade, with a very few sent away.

According to the statements of the fishermen shrimp and prawns are very abundant in the vicinity of Saint Augustine, Fla., during the months of July, August, September, and October. They are most commonly taken on the mud flats, being seen less often on sandy bottoms. Sometimes they school at the surface, but generally they remain at or near the bottom. The shrimp season is during July and August, and the prawn from the middle of August to November. Fishing is carried on mostly in the night-time, the men going out either at early twilight or at low tide, and remaining until about half-flood. Each trip realizes on an average about 4 bushels. Three trips are usually made a week. The nets used in this fishery are the so-called shrimp-nets, being the same as the English cast-nets, and measuring from 4 to 5 feet long, with a one-half inch mesh. They are valued at from $12 to $15 apiece.

The quantity of shrimp and prawns taken during a season is about 600 bushels, valued at not more than $700. None are shipped away, and not over 15 or 20 bushels are dried. At the beginning of the season they sell readily at 10 cents a quart, but the price soon falls to 5 cents a quart, and then to 10 cents for 3 quarts. After the season is well advanced or during times when the catch is unusually large, 10 to 15 cents per peck becomes a fair price.

THE GULF COAST.—The shrimp fisheries of the Gulf coast of the United States are carried on mainly to the west of the Mississippi River, and especially in Barataria Bay, Louisiana, and Matagorda and Galveston Bays, Texas. The season lasts about six months, from October to April, and during this time the shrimping crews establish temporary stations at different points along the shrimping region. Some shrimp may be taken, however, during the entire year. Both seines and east-nets are employed, and the work goes on as in the same fisheries on the Atlantic

coast. The shrimp caught in Barataria Bay are mostly sent to New Orleans, where they are marketed fresh, or canned for shipment. These shrimp are described as being of large size and fine flavor; they are mostly caught on the grassy bottoms of the bay, and are shipped to New Orleans in steamboats or luggers, without ice. They are carried in baskets and sell at prices which vary according to their abundance. The average price to the fishermen is about 3 cents per pound.

Galveston takes most of the shrimp caught in that vicinity, both for the fresh market and for canning. The fishermen sell at an average price of about 25 cents per bucketful.

Shrimp and prawns are very abundant in Apalachicola Bay and near Cedar Keys, Fla. At the former place they are sometimes taken in small quantities for shipment to New Orleans, but they have given rise to no regularly established trade. For shipping they are first cooked and then packed dry in salt. At Cedar Keys the best months for shrimp fishing are said to be October and March. At both places they are much esteemed as bait for many kinds of fish.

Three kinds of shrimp are recognized in the New Orleans market—the river shrimp, caught on the shores of the Mississippi River; the lake shrimp, found in the lakes and bays inside of the Gulf coast; and the Gulf shrimp from the outer shores of the Gulf of Mexico, mostly to the west of the mouth of the Mississippi River. The first species is not abundant, and is taken from the beginning of spring to the fall, in small quantities only; the lake shrimp is obtained only during the equinoctial season; but the Gulf shrimp is more or less abundant the year round. In the rivers the shrimp are taken by means of cane baskets, sunk to the bottom near the banks, but in the lakes and Gulf they are captured in seines as already explained. Fresh shrimp are very extensively sold in the markets of New Orleans and large quantities are put up in hermetically sealed cans for shipment to all parts of the United States as well as to England and France. About five hundred and sixty men are engaged in this industry in connection with the New Orleans markets and canneries.

3. SHRIMP CANNING.

New Orleans.—In New Orleans, La., there is an establishment owned by the Messrs. G. W. Dunbar's Sons, where shrimp are put up in hermetically sealed cans, by a process similar to that practiced farther north with crabs and lobsters. This factory is not limited to the canning of shrimp alone, but preserves many kinds of fruit in their season, falling back upon the shrimp when they are most abundant. The shrimp season extends over about five months of the fall and winter, during which time as many shrimp are put up as can be procured. Sometimes a week or two passes when none are to be had, but as a rule the work goes steadily on through the five months.

The working arrangements of the Messrs. Dunbar are of the latest and most approved pattern, and the entire business is conducted under a single roof, even to the making of the tin boxes and the solder. In the shrimp season twenty-five men and one hundred and forty girls are employed. The former make cans and superintend the packing, while the latter prepare the meats by removing the shells and appendages after the shrimp have been boiled. Then the meats are weighed and placed in the cans, which are sealed and put through a similar process to that already described for lobsters and crabs. Messrs. Dunbar's Sons put up on an average 1,500 one and-one-half pound cans of shrimp per day, or a total of about 234,000 cans per season. Their invested capital is about $30,000.

Galveston.—This industry was first started in Galveston, Tex. in 1879, by the Messrs. Peacon Brothers, but at the time their establishment was visited by Mr. Silas Stearns, who supplies the data for this report, they had been running only about a year and were, therefore, not fully underway. There was, however, every indication of success, and the firm was anticipating the

building up of a large and important business. So far they had not been able to supply the demands made upon them. They have all the most improved machinery and appliances for doing an extensive business, but during the first year had not worked up to their full capacity. Their methods of preparing and canning the shrimp are the same as those practiced at New Orleans. They calculate to work about one hundred and seventy-five days out of the year, and to put up about 1,000 cans per day; but last year they had worked only about one hundred and fifty days, preparing only 450 cans a day, or a total of 76,500 cans for the season. These at the rate of 17 cents per can were valued at $13,005. The cans are flat, cylindrical in shape, and contain one pound of shrimp meat each. During the shrimping season very little other fishing is done in this locality, and this firm engage some sixty seiners to obtain shrimp for them. In the factory about forty persons in all are employed, of whom the majority are women and girls, whose duty it is to prepare the shrimp for packing. The men superintend the work, seal the cans, &c. The amount of capital invested is estimated at $5,000.

(*b*) THE SHRIMP AND PRAWN FISHERIES OF THE PACIFIC COAST.

4. THE SHRIMP FISHERY.

EXTENT AND CHARACTER OF THE FISHERY.—The shrimp fishery of the Pacific coast of the United States is by far the most important of any there in the line of marine invertebrates, the exports alone of shrimps from San Francisco in 1880 having been valued at about $100,000. Both species of California shrimp (*Crangon franciscorum* and *Crangon vulgaris*) are taken together, sold fresh in the markets of San Francisco and elsewhere, and boiled and dried for exportation to China and the Sandwich Islands. *Crangon franciscorum* being the larger and also generally the more abundant species, is the one that figures most conspicuously in the shrimp fishery; but *Crangon vulgaris* also forms a large percentage of the quantity taken and disposed of. This industry is controlled almost entirely by the Chinese, who prepare the larger part of their catch for shipment to their native country.

Although both species of shrimp range along the entire Pacific coast of the United States, as far south as Point Conception, they are taken for food in large quantities at only a few localities, principally in San Francisco Bay and Tomales Bay. In both of these bays there are numerous small scattered colonies of Chinese who devote their entire time and energy to the capture and preparation of shrimps, mainly for exportation to China, only a small quantity being sent to the Sandwich Islands, for the consumption of the Chinese living there. In San Francisco Bay, there is a Chinese settlement at Bay View, numbering about twenty-four men, with an outfit of 100 seines and ten boats, who fish mainly for shrimps. Another similar settlement of ten Chinese exists about 2 miles farther south, and still others are located farther up the bay, in San Mateo and Santa Clara Counties, and others also in Marin and Contra Costa Counties. In Marin County, along the coast south of San Rafael, there are two colonies of Chinese, numbering perhaps one hundred men in all, whose principal occupation is shrimp-catching. At each of these stations both *C. franciscorum* and *C. vulgaris* are taken and prepared. The process of capture and drying, which is more or less the same at all the places, is described as follows for the colony at Bay View:

METHODS OF CATCHING SHRIMP.—The seine or drag-net used by the Chinese for catching shrimp is a conical bag-like net, 20 to 25 feet long, and about 10 feet across at the larger end, which is the mouth. It tapers toward the other end, which is about 1 foot broad and open to permit of emptying the contents of the net. The mouth is furnished with a line of weights on one side, and with floats on the other, to hold it open while in use; and the lower end is closed at the

same time by a "sphincter" or "puckering string." The size of the mesh of this net at the mouth is from 1 to 1¼ inches, but it gradually diminishes to one-quarter of an inch at the lower end. The boats employed in seining are from 12 to 25 feet long, rather narrow and sharp at the ends, flat bottomed, and with thick heavy sides; they are built by the Chinese themselves of redwood lumber.

The fishing is usually carried on in rather deep water near the shore (12 to 20 fathoms) on the flood tide, and 3,000 pounds is said to be an average daily catch.

MARKETING.—After the day's fishing is over it is the usual custom to carry the fresh shrimp to the Vallejo street market, in San Francisco, in live baskets covered with a netting, which has a hole in the center closed by means of a puckering string. At the market the live shrimps are sold at 10 cents a pound, and those remaining unsold are carried back to the Chinese settlement and put at once into boiling brine.

METHODS OF PREPARING SHRIMP FOR EXPORT.—The kettle for boiling the shrimp is a rectangular iron tank, 6 feet long by 4 feet wide and 2 feet deep, with a fire-place underneath. After sufficient boiling, care being taken to prevent over cooking, the shrimps are taken out and spread to dry upon level plats of hard ground, which have been previously stripped of grass and rendered perfectly smooth. They are spread out and turned occasionally by means of a hoe-like broom. After four or five days' time or when perfectly dry, they are crushed under large wooden pestles, or trod upon by the Chinese in wooden shoes, for the purpose of loosening the meats from the outer chitinous covering; after which the entire mixture is put through a fanning mill, for the actual separation of the meats and shells. This fanning-mill, which is rather a crude affair, is constructed of wood by the Chinese, on precisely the same principle as the one used for winnowing grain. It measures about 8 feet long by 5 feet high, and consists of a square box, divided on the inside for the passage of the separated shells and meats, with a hopper above, and a large fan-wheel worked by a crank at one end.

WHERE SOLD; USES; SHIPPING.—The meats are partly used at home or at the various inland Chinese settlements, but are mostly shipped to China. The shells are also utilized as manure to some extent about San Francisco, but like the meats, are mostly sent to China, where they serve as a fertilizer for rice, the tea-plant, &c. In San Francisco they sell at about 25 cents per hundred weight. Both the meats and shells are shipped to China in sacks. The trade is entirely in the hands of Chinese merchants, who ship by way of Hong Kong. The meats are eaten by all classes in China, but are cheaper and less esteemed than the native shrimps, which are comparatively scarce.

Shrimp are said to be an excellent producer when used as food for fowls. For this purpose they are broken up, soaked, and mixed with a meal of wheat, oats, or corn. The shells are also sometimes fed to poultry.

VALUE OF THE SHRIMP SOLD FRESH IN SAN FRANCISCO.—The amount of shrimp sold in the San Francisco market during twelve months of 1879–'80, is estimated by Mr. Garibaldi of that city at about 200,000 pounds, which at the rate of 10 cents per pound at the Clay street market were valued at $20,000.

Many crabs, clams, &c., are also taken in the nets of the Chinese and sent to the Vallejo street market, San Francisco.

EXPORTATION.—It is impossible to give more than an approximate estimate of the value of the yearly export of shrimp and shrimp-shells from San Francisco, on account of the practice of lumping together the shrimp, abalones, other invertebrates and even some of the fish products in the cus-

tom-house records, under the heading of "Fish, other." The total value of the "Fish, other" exported from San Francisco to Hong Kong during the entire year 1880, was $229,858. The custom-house records give nothing more definite on the subject, but Mr. Lockington, who investigated this fishery, by reference to the manifests of the vessels in which the shrimp were shipped to China, Japan, and the Sandwich Islands, estimates that the exports for 1880 could not have fallen below $100,000 in value, and probably exceeded that amount. At this valuation the weight of the shrimp exported, including both the meats and shells, must have exceeded 1,000,000 pounds.

DANGERS OF OVERFISHING.—There is little doubt but that the consumption of shrimp in and about San Francisco Bay exceeds their rate of increase, and that they must eventually and at no distant day become much less abundant than they are at present. This is to be regretted not only because of their great value as an article of food and profit to mankind directly, but also for the reason that they form a very important part of the food of fishes, the supply of which has already become very nearly exhausted in the Bay of San Francisco. It seems imperative that some restrictions should be placed at once upon the catching of shrimp in the vicinity of San Francisco, if it is desired to keep up this important industry. At present there are no regulations concerning it, and shrimp catching is carried on continuously throughout the year, without a single interval for the peaceful spawning of the old and the maturing of the young.

5. THE PRAWN FISHERY.

VARIETIES OF PRAWNS.—Two species of prawns are now brought to the San Francisco market. One of these, *Pandalus Danæ*, averages about 7 inches in length, is variegated in color, and very abundant; the other, which is still undetermined as to its name, is smaller, less abundant, and plainly colored.

LOCATION OF THE FISHERY.—The two species are found and caught together, principally in moderately deep water off San Francisco Bay, between Point Reyes and the Farallone Islands. During the past two years prawns have been much more commonly seen in the San Francisco markets than formerly, the reason being that the fishermen driven out of the bay by the great decrease in the fish supply, once so abundant there, have been forced to resort to the deeper fisheries of the open ocean, where prawns abound. Another species of crustacean quite different from *Pandalus*, though resembling it somewhat in shape, the *Penæus brasiliensis* (?), occasionally visits the bay of San Francisco, and is taken and sold in the markets as a prawn. It is considerably larger than *Pandalus Danæ* and commands a higher price. In 1879 it was caught from time to time in the bay, but we have no notice of its occurrence there in 1880.

AMOUNT OF SALES IN 1879.—The sales of prawns in the San Francisco markets in 1879 were estimated to amount to about 20,000 pounds, valued at about $4,000.

PREPARATION OF LARGE PRAWNS.—Some large prawns (the species not determined) are prepared in Chinatown, San Francisco, by removing the carapax and stringing them on two slender pieces of cane, which pass through the flesh, giving rise to a ladder-like structure; they sell at 30 cents a pound.*

* The account of the shrimp and prawn fisheries of California was prepared from materials furnished by Mr. W. N. Lockington and Prof. D. S. Jordan.

(c) STATISTICS OF THE SHRIMP AND PRAWN FISHERIES OF THE UNITED STATES.

6. STATISTICAL RECAPITULATION FOR THE UNITED STATES.

Table showing the quantity and value of the shrimp and prawns taken and sold on the coasts of the United States in 1880.

State.	Quantity.	Value.
	Pounds.	
New York	1,750	$650
North Carolina	63,000	4,500
South Carolina	630,000	37,500
Georgia	56,000	4,000
Florida	71,750	3,500
Louisiana	534,000	16,020
Texas	637,500	19,125
California	1,220,000	124,000
Totals	3,214,000	209,295
Enhancement in value of shrimp by the process of canning in Louisiana and Texas		17,640
Total value of the shrimp as they entered into consumption		226,935

PART XXII.

THE LEECH INDUSTRY AND TREPANG FISHERY.

By RICHARD RATHBUN.

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THE LEECH INDUSTRY AND TREPANG FISHERY.

By Richard Rathbun.

1.—THE LEECH INDUSTRY.

HISTORY AND PRESENT CONDITION OF THE LEECH TRADE OF THE UNITED STATES.

Introduction.—Prior to 1839 there was no regular import trade of European leeches into this country, but sea-captains were accustomed to bring them in occasionally in small quantities, on private speculation. Leechers were, therefore, obliged to depend largely on the native leech for drawing blood, and during the early part of the century the American species was in considerable demand. Although this species (*Macrobdella decora*) is quite widely distributed, the principal source of supply appears to have been, as it is now, Eastern Pennsylvania, and especially Berks and Bucks Counties.

Comparative merits and uses of European and American leeches.—As already stated, in discussing the natural history of leeches, the European species is much superior to the American for most purposes, but during the earlier periods of importation of the former, the prices charged for it were so high that the American leech held its ground for a time. Gradually, however, prices have fallen, until now, although the European leech is still more expensive than the native, its cost is so slight comparatively that it is almost universally employed, excepting in special cases, and in a few localities where the American leech is preferred. No American leeches, we believe, are now used either in or about New York City or Boston, but in Philadelphia they are still in slight demand. In fact, the latter city appears to have held to the old custom of leeching more than any other American city of which we have information.

History of the American import trade.—In 1839 the first regular leech importing house of the country, that of Mr. Herman Witte, was established in New York City, and from that time until about 1856 the import trade in leeches rapidly increased. The number of leeches received from Europe by Mr. Witte in the latter year was about 500,000, and his sales per month amounted at times to 50,000 leeches. At the same time the importing house of Paturel & Co., in New York, was receiving 300,000 a year, making the total annual receipts during the few years of that period 800,000. The wholesale prices then and in the few preceding years ranged from $80 to $100 per one thousand. Assuming the average price to have been $90 per thousand, the value of leeches imported in 1856 and thereabouts was $72,000 annually.

Since 1856 the use of leeches has gradually diminished, and the import trade is now only about one-seventh in value what it was then; the wholesale prices have also fallen off to from $25 to $50 per thousand.

EUROPEAN COUNTRIES SUPPLYING LEECHES TO THE UNITED STATES.—Originally the leeches imported into this country came from Northern Europe, but since the failure of supplies in that region and the successful cultivation of leeches in France and Hungary, they have been received almost entirely from the latter countries, Paris being the center of the export trade.

SEASON AND METHODS OF TRANSPORTATION.—Leeches are imported during most of the year, but only to a slight extent in summer, as they are easily killed by an excess of heat. June, July, and August are the months when the smallest quantities are received, and when the greatest mortality occurs, reaching sometimes 25 per cent. They are imported packed in swamp earth, in air- and water-tight wooden cases, holding 1,500 leeches each. These cases are made rather light, and are about 21 inches long, 15 inches wide, and 13 inches high. In shipping leeches to customers in this country, the same cases are used for sending large quantities, and tight wooden pails for the smaller quantities, the packing of swamp earth being also employed. American leeches, on the contrary, are kept best in water, in earthen or glass jars, in a cool place. Although considerable quantities of leeches are kept constantly on hand in the importing houses, Mr. Witte is obliged to draw on his storage-ponds on Long Island, between Winfield and Newton, for supplying large amounts, and especially for the export trade.

EXPORT TRADE FROM THE UNITED STATES.—The value of the American import trade in leeches is increased by the fact that a large share, if not nearly all, of the European leeches used in South America, pass through the New York market. Mr. Witte claims to dispose of 100,000 leeches a year in this way; he sends to ports on both the Atlantic and Pacific sides of the South American continent.

EXTENT OF IMPORTATIONS, SALES, PRICES, &C.—The import trade in leeches, including the quantity sent to South America, amounts to from 300,000 to 350,000 a year. The regular leech importing houses in this country are only two in number, both being located in New York City. They sell in quantities of 25 to 1,000 and upwards, at prices ranging from $25 to $50 a thousand, though the smaller quantities, say from 100 downward, generally bring a higher price. The retail prices for single leeches varies from 18 to 25 cents. The average wholesale price of leeches sold by the two New York houses is about $35 per thousand, which for an annual sale of 300,000 leeches would amount to $10,500.

It is stated that about one-half of the leeches regularly disposed of by the dealers of Paris are sent to this country, or sold to England for her colonial trade, but the latter trade is not extensive. It is likewise affirmed that the greater part of the leeches sold in this country are used by emigrants from Europe, and that were it not for that large element in our population the leech trade would become of comparatively slight importance.

THE TRADE IN AMERICAN LEECHES.—A Philadelphia leecher of long practice informs us that thirty or forty years ago very many more American leeches were used in that city than foreign ones, but as the importation of the latter increased and the prices declined, they gradually took the place of the natives. The market price of the American leeches in New York at that time was about $10 per thousand. Now, perhaps, scarcely more than 1,000 are actually used a year, though more than that quantity are brought to the city and sold. About ten years ago the practice of leeching declined greatly in Philadelphia, and about that period fewer leeches were used than in any previous year for a long time. Since then some physicians have again strongly advocated the use of leeches, and the practice is once more increasing. Philadelphia is supplied with native leeches by a single person, who collects them in Bucks and Berks Counties, Pennsylvania, and about Trenton, N. J. The value of the native leeches used in Philadelphia annually is very small.

The comparative merits of the European and American leeches have been discussed in connection with their natural history.

Table showing the extent and value of the import and export trade in leeches of New York City, for 1880 *(estimated).**

No. imported.	Value.	No. exported.	Value.
300,000	$10,500	100,000	$3,500

Table showing the value of foreign leeches imported into the United States from July 1, 1871, *to July* 1, 1880, *according to the custom-house records.*†

Year ending—	New Orleans.	New York.	All other ports.	Annual totals.
June 30, 1872			$5,375	$5,375
June 30, 1873			5,775	5,775
June 30, 1874			6,675	6,675
June 30, 1875			6,049	6,049
June 30, 1876			5,712	5,712
June 30, 1877			4,288	4,288
June 30, 1878	$128	$5,251	4,351	9,730
June 30, 1879	19	4,315		4,334
June 30, 1880	46	4,651		4,697
Totals	193	14,217	38,225	52,635

Table showing the value of foreign leeches exported from the United States to other countries, from July 1, 1877, *to July* 1 1880, *according to the custom-house records.*

Year ending—	Lake ports of New York State.	New York City.	Annual totals.
June 30, 1878	$83	$675	$758
June 30, 1879		1,243	1,243
June 30, 1880		1,170	1,170
Totals	83	3,088	3,171

2.—THE TREPANG FISHERY.

THE TREPANG FISHERY AT KEY WEST.

THE TREPANG AS AN ARTICLE OF FOOD.—The preparation for market of this soft echinoderm, variously designated as holothurian, sea-cucumber, sea-slug, beche de mer, and trepang, was, as the following account will show, once attempted on the Florida coast; but either from want of financial success or for other reasons, it was soon abandoned. The trepang is commonly used as food in China, which country derives the most of its supplies from the waters about some of the South Pacific islands, where one or more suitable species abound, and are prepared for the Chinese market in large quantities. It is questionable whether Americans could ever be induced to regard the trepang with favor as an article of food, although Dr. William Stimpson states that a New England species, *Pentacta frondosa*, when made into a soup, is very palatable. It was, however, for the purpose of supplying the Chinese trade that the Florida industry was

*The figures are furnished by Mr. Herman Witte, of New York. The quantity exported is included in the quantity imported, as only foreign leeches are exported from this country.

†The amounts given in the column of "All other ports," belong undoubtedly to New York, and there is evidently an error in the enumeration for 1878.

established, and its failure would indicate the impossibility of competing with a source of supply so much nearer home, and in a region where labor is much cheaper than in this country. It is, nevertheless, interesting to know that such a food product exists upon the coast of the United States in sufficient quantities to permit of its being utilized, should a demand for it arise.

TREPANG FISHERY AT KEY WEST.—Mr. Silas Stearns, of Pensacola, Fla., writes as follows, regarding the attempted fishery at Key West:

"In 1871 an Englishman came to Key West, Fla., for the purpose of gathering and preparing trepang for the Chinese market. He erected a shed, under which were built fire-places, with large kettles and other arrangements, and also frames for drying. He arranged with the fishermen, and fishermen's boys particularly, to bring him all the sea-slugs they could obtain, for which he was to pay a certain price apiece. As the slugs were very abundant on the shoals about Key West, and the prices paid for them were liberal, no trouble was experienced in obtaining large supplies."

The method of preparation was explained to Mr. Stearns as follows: "The sea-slugs, still alive and fresh, were thrown into the kettles and boiled a certain length of time, but as to the composition of the liquid in which they were cooked, my informant could not tell me. Then they were taken out, the outer rough skin rubbed off, and the body split with a knife, after which the intestines were removed and the body spread on canvas in the sun to dry. The next operation after drying, and the final one, was to smoke them; this was done in a smoke-house of the ordinary kind, in which they were suspended on slats. After the final process the trepang were packed in bales, covered with sacking, and shipped to New York, where they were probably reshipped to China. For two seasons (winters) this industry was kept up, and apparently with much success; but at the close of the second season the houses and apparatus were sold, and the operator left Key West. Since then nothing further has been attempted in the trepang industry there."

PART XXIII.

THE SPONGE FISHERY AND TRADE.

By RICHARD RATHBUN.

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THE SPONGE FISHERY AND TRADE.

By Richard Rathbun.

(a) THE COMMERCIAL IMPORTANCE OF SPONGES.

1. GENERAL REVIEW OF THE SPONGE INDUSTRY.

The sponge trade of the United States is very extensive, and supplies are obtained from all the principal sponge-producing regions of the world, not the least important of which is the coast of Florida.

As previously described,* all of the various grades of commercial sponges belong to a single genus, called *Spongia*, and, according to an eminent authority on the subject, may be divided into four natural species, including at least nine sub-species and a great number of varieties. One of these species, the *Spongia graminea*, an inferior grade of the grass sponges, is peculiar to Florida, but the other three species are common to both the Old World and the American grounds. They are as follows: *Spongia officinalis*, including the Levant toilet sponge and the Turkey cup sponge of the east, and the glove sponge of Florida and the Bahamas; *Spongia equina*, containing the horse sponge, the Venetian bath sponge and the Gherbis sponge of the Mediterranean, and the noted sheepswool sponge, the velvet sponge, and a portion of the grass sponges of American waters; *Spongia agaricina*, including the Mediterranean Zimocca sponge, and the American yellow sponge and "hard head."

The several varieties of sponges, based upon differences in structure, and the numerous qualities, resulting in part from the diverse influences of environment during growth, have given rise to the many commercial grades, according to which sponges are classified and sold in the markets. The Florida grades, strangely enough, have never been increased in number above the six sub-species recognized by naturalists as belonging to that region, and they are designated under five names—the same term, grass sponge, having been applied to two of the subspecies. These grades, arranged about in the order of their value, are as follows: Sheepswool, velvet, yellow, grass, and glove. The sheepswool sponges are by far the finest in texture of any of the American grades, but the relative qualities of the other grades are not always clearly defined; at least the dealers differ greatly in their opinions regarding them, and the market quotations do not always place them in the same order. The Bahama sponges, although identical subspecifically with the Florida, and including the same five principal grades, are still further subdivided, making a total of about fifteen grades recognized by the New York dealers. The secondary divisions are based

* Section I, of this report, Part V.

mainly on differences in shape and on the comparative openness of the texture. The Mediterranean grades number as many as twenty-five, in the classification of some of the New York importers, but not a few of these must be founded on differences of slight importance.

The finest grades of sponges are the so-called Turkish sponges of the Mediterranean, the wholesale prices of which range from about $5 to $50 per pound. Next in quality are the sheepswool sponges of Florida and the Bahamas, bringing from $1.50 to $2.25 per pound. Notwithstanding this great difference in price between the Turkish and the sheepswool sponges, it is not now generally considered that the latter is so inferior in quality to the former as their respective market values would appear to indicate, and for many of the nicer purposes for which sponges are used, the Florida sheepswool grade is often preferred. The sheepswool sponges are not quite so fine and close in texture, but they are equally elastic and far more durable, and when properly prepared, greatly outlast the Turkish sponges. The fact that the latter are more carefully bleached, and therefore generally present a cleaner appearance, and also that they are an imported article adds greatly to their value in the opinion of most persons. The American trade in foreign sponges is very extensive, all of the New York sponge houses engaging in it, while two or more deal in no other kinds.

The Florida sheepswool sponges are now regarded more favorably in the New York market than the Bahama sponges of the same name, the difference in quality being due, it is said, partly to the character and mode of growth, and partly to the method of preparation. Although belonging to the same species, the texture of the former is naturally somewhat the finer, and the masses grow in better and more compact shapes. An examination of a large assortment of Bahama sheepswool sponges as received from the producers will show that a considerable percentage are pierced from below by large and irregular cavities, which sometimes penetrate nearly to the top These are said to be mainly produced by the irregular character of the bottom on which they grow, but they probably also arise from a natural tendency to form a more open structure than the Florida sponges.

This grading of sponges according to compactness or solidity of structure is also recognized in classifying the Turkish and other Mediterranean varieties. For instance, the Turkish sponges are first graded according to their texture, into fine, coarse, &c. Then the finer and other grades are again sorted with reference to shape and solidity, the rounder and more compact forms being regarded as the best, while those of a flattened or very irregular shape, or with many large holes, are considered as inferior. So great is the difference between these several divisions of each grade, as determined by shape and solidity, that while the best shapes and structures of the finest-textured Turkish sponges sell sometimes at as high a price as $50 a pound, the inferior shapes and loose structures of the same texture bring but a few dollars a pound. Shape and solidity as well as texture must, therefore, be considered in grading sponges of all varieties, and many of the numerous grades of foreign sponges are formed in this manner.

Marketable sponges range in weight from about 1 ounce to 1 pound, but the smaller sizes within these limits are most in demand. The supply of good grade sponges, of both the Florida and foreign varieties, is unequal to the demand, and very many more could be sold annually than the fishing grounds have yet been made to yield. One dealer informs us that the demand upon him for the better qualities of Florida sponges is ten times greater than he can supply. There are, therefore, no indications at present of an overstocked market, but the question naturally arises as to whether there is not great danger of the fishing grounds becoming exhausted from the continuous drains being made upon them. Certain sections of the Florida coast, which have been most diligently fished over, have become more or less depleted, but new and extensive grounds

are being constantly discovered and the yield has not varied greatly from year to year. Still, there is strong foundation in fact for the belief expressed by many, that the present indiscriminate fishing will, sooner or later, result unfavorably for the Florida coast at least, and several of the New York buyers have expressed a desire for immediate legislation prohibiting the taking of the better qualities of sponges under a certain size, that size to be equivalent to a weight of about 1½ ounces. In this manner the younger growths would be protected, and the future supplies of large specimens would be more or less insured. This subject is one which merits prompt attention and it derives an additional interest from the recent successful attempts at artificial sponge culture about Key West.

Sponges have hitherto been bought and sold in large quantities entirely by weight, but some of the New York dealers advocate their sale by count, in order to circumvent certain fraudulent practices which are now largely indulged in, such as sanding and liming, and also because of their well known absorptive qualities causing them to weigh much more in moist climates than in dry. This new method of buying and selling has already been started to a slight extent.

At the fishing ports, of which Key West is the principal one in Florida, the sponges brought in by the vessels are, after drying, graded by the agent, each grade being packed separately in bales or cases, and are then ready for shipment to market. New York is the only distributing center for Florida sponges, and receives nearly all the foreign sponges imported into this country.

Sponges are used for a great variety of domestic and professional purposes, the most of which are familiar to every one. The clippings and small specimens are frequently employed for stuffing mattresses, cushions, &c., and also for packing, and in the manufacture of certain coarse kinds of cloth. In upholstery work its chief defect is its tendency to absorb moisture in wet weather, as previously noted.

There is an import duty on all grades of foreign sponges of 20 per cent. *ad valorem*. The wholesale prices of Mediterranean sponges in this country range from 50 cents to $50 per pound; of Bahama sponges, from 10 cents to $1.60 per pound; and of Florida sponges, from 15 cents to $2.25 per pound. The lower grades of Florida sponges range in price mainly from 35 to 50 cents per pound; and the better grades, or sheepswool sponges, from $1.25 to $2.25 per pound.

(*b*) THE FLORIDA SPONGE FISHERY.*

2. THE SPONGE GROUNDS.

The Florida sponge-grounds form three separate and elongate stretches along the southern and western coasts of the State. The first includes nearly all of the Florida reefs: the second extends from Anclote Keys to Cedar Keys; and the third from just north of Cedar Keys to Saint Mark's in Apalachee Bay. The Florida reef-grounds have a linear extent of about 120 miles, beginning near Key Biscayne in the northeast, and ending in the south, at northwest channel, just west of Key West. The northwestern half of the grounds is very narrow, having an average width of only about 5 miles and being limited to the outer side of the reefs. At about the Matacumbe Reefs, the grounds broaden out so as to cover the entire width of the reefs, which are much broader here than at the north. The entire southern half of the grounds

* The account of the Florida sponge fishery—including the sponge grounds, the sponging vessels, and the methods of conducting the fishery—has been furnished mostly by Mr. Silas Stearns, of Pensacola, who made a special study of the subject, in 1879 and 1880, in the interest of the U. S. Fish Commission, and a large part of his report is copied verbatim.

has more or less the same breadth which is about 13 or 14 miles. The second sponge-ground begins just south of Anclote Keys, with a breadth of 7 or 8 miles but rapidly broadens out toward the north to a width of 15 miles, which it maintains from a point about opposite Bay Fort to Sea Horse Reef, just south of Cedar Keys. The total length of this sponging-ground is about 60 geographical miles; its distance from the shore varies somewhat; at the south the inner edge approaches within 4 or 5 miles of the main land, and comes close upon Anclote Keys; but throughout the remainder of its extent it is distant 6 to 8 miles from the shore, until it touches the shallow bottom and reefs of Cedar Keys. The depth of water on these grounds, as indicated on the Coast Survey charts, ranges from 3 to 6 fathoms, but many portions are undoubtedly shallower than this. The northern ground, which maintains a nearly uniform width throughout, is about 70 miles long by about 15 miles broad. It approaches to within about 5 miles of the shore, and terminates just off the mouth of Saint Mark's River; the depth of the water is the same as upon the next one to the south, from 3 to 6 fathoms.

The total area of the Florida sponging-grounds, which are now being worked, including also those that were formerly fished upon but have since been more or less abandoned, may be roughly stated at about 3,000 square geographical miles. This probably does not include all of the sponge-grounds occurring in Florida waters, for the fact that new areas are being constantly discovered would indicate that there might still be more to find, and it is certain that no very strenuous efforts have yet been made to extend the grounds already known, the discovery of new ones having generally been made by accident.

3. THE SPONGING VESSELS AND THEIR OUTFITS.

General account.—The sponge fishery of the Florida coast differs greatly from that of the Mediterranean, in that sponges are not obtained by divers, but by means of hooks fastened at the end of a long pole and managed from a small boat. In the former region, small vessels of from 5 to 50 tons measurement are employed to visit the grounds, to afford quarters for the men, and to bring home the catch. These vessels are mostly of light draught and schooner rigged, having proportionately large decks on which to carry boats, working gear, and the sponges as they are taken. The holds are of considerable size for storing dried sponges, and the cabins generally small, indicating a sacrifice of comfort to working room. Each vessel carries, according to its size, from five to fifteen men, one as cook and the remainder (always an even number) as fishermen, and also a small yawl-boat to every two fishermen to be used by them in securing the sponges. In addition to the implements for taking sponges, they are provided with a sufficient quantity of provisions, wood and water for the trip, lasting from four to eight weeks.

The working outfit of a Florida sponging vessel consists simply of a few small yawl-boats called dingies, and a supply of sponge-hooks and sponge-glasses. Many of the dingies are built by the fishermen themselves; they are from 12 to 15 feet long, and 4 to 5 feet wide, and are built of the lightest and strongest material obtainable, the frame of mulberry or white oak, and the planking of juniper or southern white cedar. The idea is to have the boats light enough to enable two men to haul them in and out over the side of a vessel, and yet strong enough to withstand the rough handling to which they are subjected, and to safely carry the rather heavy load resulting from a half day's catch. While gathering sponges it is necessary to scull the dingy from the stern, and, for convenience in so doing, the following form of sculling-notch has been introduced: A piece of oak plank about 6 inches wide and a foot long is notched at one end to fit an oar, and inserted at the other between two guiding strips securely fastened to the stern sheet. This

sculling-notch is placed at one side of the center of the stern sheet and is made to be easily removable in order that it may be taken out of the way when not needed.

The sponge-hooks are made of iron, with three curved prongs, measuring in total width about 5 or 6 inches. The entire length of a hook is about 8 inches, the upper end being made into a strong socket for the insertion of a pole.

The sponge-glass as originally constructed consisted of a small, square, wooden box having a glass bottom. More recently, however, this form has given way to an ordinary wooden water-bucket, the wooden bottom of which is replaced by one of plain window glass fastened in by means of putty; the inside of the bucket is painted a dark color. In using a sponge-glass, it is placed upright on the surface of the water and the head is thrust down into it is far as convenient. In this way very small objects can be distinctly made out on the bottom even at a considerable depth. It is customary to leave the handle or bail on the bucket, and allow it to pass around the neck when in use, so that when a sponge is discovered the sponger is not delayed in grasping his hook and bringing it into play.

THE KEY WEST FLEET.—The sponging-vessels of Key West are the pride of that place and with good reason, as they are trim and fast sailers. They rank next after the fishing-smacks in size, ranging in measurement from 5 to 45 tons, and are nearly all schooner rigged. Many of them were built or rebuilt at Key West or in that vicinity, and like the smacks are strongly put together. The frames are made of Madeira wood, red cedar, and dogwood, and the planking of yellow pine or cypress. Before being painted, every outside seam and crack in the hull is filled with beeswax to render it tight and form a smooth surface. The masts, sails, rigging, and iron work are all of the best quality and all neatly fitted. In shape they are rather wide for schooners, but being shallow and loaded with canvas, work well under sail. The mainsail and jib are of the ordinary shape, but the foresail is generally a "lug" sail, that is having no boom, and so wide as to extend aft beyond the mainmast. Otherwise it is similar to the foresail ordinarily used on schooners.

These vessels are all of light draught and provided with center-boards. The hold, from the after end of the center-board to the bow, is entirely clear and unobstructed to afford ample space for the storage of sponges, boats, and hooks. The cabin, extending from the bulkhead at the after end of the center-board to the stern, is generally a small affair with but few conveniences, and is composed almost entirely of sleeping compartments for the large crews that live on board. The trunk of the cabin is therefore very small in proportion to the size of the deck, the hatches being also small as well as the bitts and windlass gear forward. Cooking is done on deck, on a stove that is boxed up and kept between the masts. When ready to start for the sponge reefs, there is but little empty space anywhere on board; the decks are crowded with boats and men, and with piles of spare ropes, anchors, sponge poles, water glasses, &c., while below is stored a large quantity of wood, water, and provisions. The sponging-vessels of Key West are quite as expensive to build as the fishing-smacks, and according to the statements of several builders and owners cost on an average about $3,000 complete, for a vessel of 15 tons.

The Key West sponging-fleet consisted in 1879 of 86 vessels, all but five of which were schooner rigged, the balance being sloops. The combined measurement of this fleet, with the exception of four vessels the tonnage of which was not ascertained, was 1,105½ tons. The tonnage of each vessel ranged from about 5 to 45 tons. Two vessels were under 5 tons; thirty-six between 5 and 10 tons; thirty-five between 10 and 20 tons; three between 20 and 30 tons; two between 30 and 40 tons; and four between 40 and 45 tons. The total value of the vessels of the fleet was $151,350. The crews numbered most commonly either five, seven, nine, or eleven men each; the total number of men in the combined crews of the entire fleet was seven hundred and forty-four. The majority

of these were Americans and a large percentage negroes; the remainder were either from the British West Indies or of unknown origin. In addition to the vessels described above, there are many small boats which fish for sponges about the reefs.

The Key West vessels are divided into two distinct fleets, one called the "Bay Fleet" being composed of the larger vessels that cruise on that part of the coast lying between Anclote Keys and Saint Mark's, and the other called the "Reef Fleet" consisting entirely of the smaller vessels that gather sponges on the reefs from Key West to Cape Florida. The vessels of the bay fleet are gone from home from one to three months according to their capacity and the success of their cruise, while those of the reef fleet are absent from one to two weeks only.

The bay fleet vessels send out two men with each dingy, one to scull and one to hook the sponges, but those fishing on the reefs assign only one man to a dingy, and he can easily manage both the sculling and the hooking as the reef areas are smooth, clear, and shoal, and the currents not strong.

The Apalachicola fleet.—The vessels engaged in the sponge fishery from this port are all of small size and light draught, and are mostly schooner-rigged in the ordinary American style. Many of them were formerly owned in Pensacola or New Orleans, where they were probably built, while others were built up from large ship's boats, and small yachts.

Taken as a class they are rough and homely, and rather poor sailers, thus contrasting strongly with the Key West fleet. The total number of vessels in the Apalachicola fleet in 1879 was sixteen, one being sloop-rigged, the remainder schooner-rigged; they ranged in size from $5\frac{1}{2}$ to $36\frac{1}{2}$ tons, the total measurement amounting to $154\frac{3}{4}$ tons. The combined crews numbered 84 men.

In addition to this fleet of vessels there were a few small open boats engaged in sponging from Apalachicola, which were not entered upon the custom-house books. The estimated value of the sixteen vessels of the regular sponging fleet was $10,700, or at the rate of about $71.30 per ton; and of the small open boats about $800. The outfit of these sponging vessels consisted of some forty dingies (two or three to each vessel), valued at $35 each, or $1,400 for the entire number; and of sponge-hooks and sponge-glasses, estimated to be worth about $100. The total amount of capital invested in the sponge industry at Apalachicola in 1879 was, therefore, about $13,000.

4. METHOD OF CONDUCTING THE SPONGE FISHERY.

General account, including Key West.—The Florida sponge fishery may be carried on throughout nearly the entire year, providing the weather continues favorable. The principal season for work is from May or June until the last of August, for during that period the water is generally smoother and clearer than at other periods; but it sometimes happens that the best conditions of water occur in winter, and at such times the fishery can be conducted with great success. The winter sponge fishery, when it can be carried on continuously, is said to be even more profitable than the summer, for the fishermen claim that sponges average larger in the winter than in the summer, though they cannot account for the fact. Decomposition does not begin in cold weather for three or four days after the sponges are taken. During the usually stormy months of September, October, and March, nearly all the vessels are laid up, for the owners, being unable to insure them, are unwilling to risk them off the coast for such long periods when heavy gales may spring up at any time.

At the commencement of a fishing season, the owners of vessels appoint their captains, who, in turn, select their crews. As soon as the crew and outfit of a vessel are ready, it sails from port

and in from one to three days is on the fishing-ground and at work. The cook remains on board, keeps the vessel under way, and prepares the meals, while the spongers pair off into the dingies. Of the two men who occupy each dingy, one is called the "sculler," and the other the "hooker." The former stands in the stern of the boat and sculls it slowly and steadily forward, being prepared to stop it and hold it exactly in place at a moment's notice from the "hooker," or "bowman," who kneels down amidships, or at the bow, with the upper half of his body projecting over the side. The duty of the latter is to scan the bottom, and, as soon as a sponge of sufficient value comes into view, to fasten into it by means of his long sponge-hook, and bring it to the surface. It is very evident that both "sculler" and "hooker" must be men of considerable experience and dexterity in their respective occupations, in order to work together advantageously. The instant a sponge is sighted, the boat must stop, and without a moment's delay the hooked pole must be plunged downwards, sometimes to a depth of 25 to 35 feet, with sufficient accuracy to pierce an object which at the most is only a few inches in diameter. As might be expected, the task of hooking sponges is rendered much more difficult, when, as frequently happens, the water is rough or clouded by sediment. To make his position more comfortable and prevent sores and blisters, the hooker ties sponges about his knees where they would come in contact with the bottom of the boat, and also across his chest to raise it above the rail. His posture is an exceedingly tiresome one, lying as he does with his head and shoulders over the rail, and he must retain it all day.

Formerly, when sponges were collected only in shallow water, no difficulty was experienced in detecting them with the unaided eye, but of late years, since they have been gathered most abundantly in depths of 20 to 35 feet, it has become necessary to make use of the sponge-glass already described. The "hooker," wearing the handle of this rude glass about his neck, has both hands left free, when he wishes to use the pole, which his companion first hands to him, having started it over the side of the boat. In addition to his skill in detecting a small object on the bottom, and bringing it to the surface, he must be able to tell at sight whether it is a valuable sponge or not; and if not, pass it by. Some sponges grow so firmly attached to the bottom that it is almost impossible to pull them off with the hook. Instances are cited where the hooker, in his strenuous efforts to loosen such a specimen from the bottom, has actually pulled the bow of his boat under the water and caused it to partially fill. Sheepswool sponges are said to be the most difficult to detach, and yellow sponges the easiest of those growing in moderate depths of water. When a small sponge, attached to a large one is taken, it is pulled off and thrown back. These sponges are said not to attach themselves again but to remain loose at the bottom, and to be rolled about by the movement of the water. When they are again taken, showing no point of attachment, they are called "rolling johns." The useful sponges taken by the fishermen are the so-called sheepswool, boat, yellow, grass, and glove sponges; and the worthless ones which they sometimes hook, are termed by them "loggerhead," "bastard sheepswool," bastard yellow," and "finger sponge."

The gathering of sponges from the depths in which the fishery is now mainly carried on, on the west coast of Florida, is very hard work, and only the strongest and most skillful men can succeed. Capt. Ben Pearson, of the schooner Champion, and others, state that they hook up the sponges from 30 and 36 feet of water. When working in such depths as these, they have to contend with stronger currents and rougher water than in shoaler localities, and in addition there is the unwieldiness of so long a pole. Sponges from those depths are, however, superior in quality to those from inshore.

Collecting goes on at all times when the water is smooth and clear—conditions not always met with. Some of the Key West spongers have partially removed the inconveniences of rough water by distributing oil over the surface, and are thus enabled to work more continuously. A tea-

spoonful of oil, it is said, will produce a smooth surface for as long a time as a small boat cares to work in one spot. Shark oil is considered the best for this purpose, though no reason for it is given. In summer many Key West people kill the nurse-shark and try out the liver for this oil, which sells at $1 a gallon. During the day the dingies work steadily along the reefs, picking up sponges here and there, until dinner-time or night arrives, when they return to the vessel. When on the sponging-grounds the men breakfast at daylight, and soon after are in their boats, prepared for work. At dinner-time—12 o'clock—the cook blows a horn to recall them, and after a short rest the work continues until sunset. Should a boat wish to regain its vessel at any other time, in order to leave sponges, an oar is hoisted blade up as a signal, whereupon the cook sails the vessel to that vicinity. As soon as the sponges are brought on board, they are spread carefully over the deck of the vessel in their natural upright position, so as to allow the slimy matter, called "gurry" by the spongers, to run off easily. During the first stages of decomposition they smell strongly of ammonia, and are extremely noxious to most persons unaccustomed to the odor. Later the ammonia scent disappears, leaving a stronger one very similar to that of decaying seaweeds. The fishermen say that after having endured this stench for a few days they do not notice it at all.

Some of the larger of the sponging-fleet remain at anchor on the "grounds" through the night, but the majority run inshore, a distance of 10 or 15 miles.

It is the general custom among them to go to the place for curing their catch every Friday night, carrying with them the results of a week's work. Each vessel has one or more crawls (an inclosure of stakes 8 or 10 feet square, situated in water 2 or 3 feet deep) at the rendezvous. A small island, called Rock Island, located a short distance southeast of Saint Mark's River, and near the sponging-grounds, is the principal place for these crawls and is visited by both Key West and Apalachicola vessels. The latter have a number of crawls near the Saint Mark's light-house, and the former have them scattered all along the coast from Rock Island to the Anclote Keys. Many of the reef fleet have their crawls at Key West and cure the sponges at home.

The Saturdays are passed in depositing the past week's catch, and cleansing the deposit of the week before. Sponges as kept on deck will generally die and lose the greater part of their gelatinous matter in one or two days; therefore, when thrown into the crawls, the chief part of the curing to be done is the removal of the outside skin or covering. In cold weather they live much longer than when it is warm, and it is sometimes difficult to cure them properly in winter. Vessels at Rock Island have sometimes been unable to cure their catch there and have brought them all home to die and then be cured.

In summer, and when they are dead at the time they are placed in the crawl, the week's soaking that they undergo softens all the remaining slime and skin they contain, and a little squeezing and beating with a short, heavy stick, called a "bruiser," suffices to cleanse them perfectly. They are squeezed as dry as possible and thrown into a dingy, to be strung on rope-yarns 6 feet long, in the form of bunches, which are first strung up to allow the sponges to bleach and dry, and afterwards stowed in the hold. As soon as dry they are in condition to sell to the wholesale merchants of Key West and Apalachicola.

When vessels have crawls in company and employ a watchman, the cured sponges are left ashore until they are ready to start home, otherwise they are carried in the hold. Until within a year or two a watchman for the crawls was not considered necessary, but so much thieving was done that the spongers were finally obliged to resort to this method of protection. Each vessel pays her share towards the watchman's expenses and wages.

Sponging-vessels spend from one to two months on a trip, the state of the weather and the

amount of provisions on board influencing their stay on the "grounds." The results of the trips vary quite as much as with other fishing-vessels, fair winds, clear water, experience, and skill, all being indispensable to success. On some trips hardly enough sponges are secured to pay expenses; on others the men's shares amount to fair wages, and again they will share several hundred dollars for four to six weeks' work. On an average they make rather more than almost any other class of fishermen.

The share arrangements are as follows: On Apalachicola vessels, the owners of vessels furnish the whole outfit, pay one-third of the provision bill, and receive one-third of the net proceeds of the trip, leaving the crew to pay two-thirds of the provision bill and to share two thirds of the net proceeds. When the members of the crew are not equally experienced and expert, the best men, such as the captain, cook, and the "hookers" draw whole shares and the others half or three-quarters of a share each. The captain usually receives additional remuneration from the owners. On Key West vessels the owners furnish the complete outfit including provisions, and take one-half of the result of the trip, thus leaving a clear half to be divided equally among the crew. The captains are paid a certain commission by the owners. As an illustration of the profits sometimes made in this fishery it may not be out of place to mention here one or two successful trips. During the winter of 1879-'80, the schooner Competitor, of Key West, of 44 tons, carrying about eighteen men, made a trip of eight weeks and stocked $4,200. The same season the schooner Lone Star, of Key West, 15 tons, carrying seven men, made a six or seven weeks' trip, and stocked $1,935, and many others did quite as well. During the month of January, 1880, the spongers had unprecedented success having brought in large loads of fine deep-water sponges that sold for two dollars and more per pound for the best quality (sheepswool); before that, the average price had been one dollar per pound for the first quality.

As soon as a vessel arrives in port with a catch the sponges are carried on shore and piled on the wharf, each variety or quality by itself. At Apalachicola, where there is but one dealer, they are inspected and purchased at any time during the day that is most convenient to him, but at Key West, where there are several dealers, there are certain times for inspecting and other times for buying these lots. During the forenoon the dealers examine them carefully, and cleverly estimate their worth by eye and touch in handling them. They are so expert that they can correctly judge the weight of a bunch of sponges by lifting it, and know perfectly the value of textures by sight; it is remarkable to see the accurate judgment of several of the largest purchasers. A choice lot being offered, each party separately examines it and makes a bid, and very often a party of three or more purchasers will not vary ten pounds in a lot of several hundred pounds, and the amounts offered will not vary five dollars. As they go over the lots they place a value upon them of which they keep a record on paper. During the afternoon when all the spongers are on shore for the day, a man sells them at auction, lot by lot, to those whose papers show the highest bids. Cash is paid at once, and the crews are not delayed in getting their shares, but are able to start off on another trip in about a week from the time of their arrival.

The principal varieties sold in these markets are called "sheepswool," "yellow," and "grass" sponges. The "sheepswool" sponge is the best quality; its texture is fine, soft, and very strong, and it sells for from $1.25 to $3 per pound, the average price being about $1.75 per pound for the best quality. The "yellow" sponge is of fine but not strong texture, and is not so soft and durable as the variety just named. It sells for 25, 30, or 40 cents per pound. The "grass" sponge is of very fine and hard texture, but is not durable and is usually so irregular in shape that it is torn easily. It does not sell for any set price per pound, and the few that come to market are sold by

the lot at a price that would not exceed 8 or 12 cents per pound. A few of the small velvet sponges are obtained and sold for a high price.

As the buyers of sponges require them to be very dry when buying by the pound, and as they are not always landed in that condition, a price per bunch is sometimes agreed upon. The bunches weigh from one-half to one pound each, and the price varies considerably, depending upon the quality, size, and success in cleaning and bleaching. It is the buyer's intention to obtain a pound of sponges in this way for less than when buying by the pound. There is supposed to be a difference of about 10 cents per pound in favor of the buyer when sold by the bunch, in the case of the best qualities. Several thousand dollars were paid out weekly for sponges in 1879. Twenty-two thousand dollars cash were paid for sponges during two weeks in June of that year, and the sponge trade of Key West from January 1 to March 1, 1879, amounted to $76,500.

The dealers of both Apalachicola and Key West buy for wholesale firms of New York and receive a commission as compensation. They are kept informed of the state of the New York market, and make their bids accordingly. The packing-houses are roomy and dry buildings, where large quantities of sponges can be hung up and kept dry. As soon as a lot of them is taken in, they are put through a process called "liming," that is to say, they are dipped in a weak solution of lime and sea-water, after which they are hung up out of doors to dry. Then they are stored away in the loft until needed.

The "liming" gives sponges a bright yellow color which adds to their value, but when not properly done, as by the excessive use of lime, the tissues are injured and the sponges become rotten and worthless. There is no doubt that even a little lime injures a sponge, and any considerable quantity adds greatly to its weight.

They are not "limed" at Apalachicola because the fresh water of that vicinity has a bad effect upon them; consequently it is not uncommon that quantities from that place are reshipped from New York to Key West simply to be "limed." As soon as "limed" they are laid out to dry, and they must be thoroughly dried, for if left together damp they soon become ruined. Long spells of rainy weather sometimes cause the dealer to lose thousands of dollars' worth of sponges, for they become damp, turn red, and finally decay; but now some of the dealers have lofts, or upper stories to their houses, where sponges can be hung up and kept dry in all weather. For convenience in handling, the sponges are strung in bunches; otherwise such large quantities could not be managed as they are.

After this process is completed sponges are trimmed, sorted, and packed. Preparatory to being trimmed, boys beat them with mallets so as to remove all particles of stone, shells, or other hard substances that would dull the shears. The trimming is done with sheep-shears, and all the uneven parts and ragged edges are cut off. After this an experienced man sorts out each variety and quality, weighing them in large crockery-crates in lots of 100 or 120 pounds each. These lots are then placed under a hydraulic press and formed into compact bales, measuring about 30 inches long, 18 inches wide, and 18 inches thick, which are covered with bagging and corded securely. In this form they go to the wholesale dealers of the country. The "trimmings" of the sponges are saved, and when a sufficient quantity has accumulated, are baled up in the same manner as the others, and shipped to New York to be used in upholstery work.

The sponge trade has steadily increased since it was first started, and at present constitutes a large business. During 1879, not as much was done as in 1878, because of the unusually boisterous winter, and the so-called poisoned water, which destroyed a great many sponges about the "reefs" which the reef fleet would have brought in; 1880 was also considered a poor year, as the total

sales at Key West amounted to only about $180,000, while the average annual sales have been about $200,000.

APALACHICOLA.—The crawls of the Apalachicola spongers were, until 1880, mostly located on Rock Island, a small island situated 17 miles southeast of Saint Mark's light-house and about 2 miles from the main-land.

In 1880, trouble arising between the spongers of Apalachicola and those of Ocklockony, the former built new crawls in the immediate vicinity of Saint Mark's light-house, but they still resort to their old crawls to some extent.

In 1879 there was but one dealer in sponges at Apalachicola, who sold entirely to New York parties. After purchasing from the vessels, the sponges are strung on cords and hung in the sunshine until perfectly dry, after which they are transferred to the packing-room, cleaned of the small fragments of coral-rock adhering to them, and then trimmed as at Key West. The sheepswool sponges are graded according to size, into large, medium, and small, but all sizes of yellow sponges are packed and shipped together. The method of weighing, pressing, and baling is the same as that practiced at Key West. The dimensions of the bales are about 36 inches by 18 inches by 18 inches, and their weight from 80 to 125 pounds. The clippings are treated in the same manner.

The prices paid to the fishermen for sponges in 1879 was from $1 to $1.10 per pound for sheepswool, and from 20 to 30 cents per pound for yellow. The total catch of the Apalachicola fleet for 1879, was estimated as follows: 18,000 pounds of sheepswool sponges, worth $18,000; 8,000 pounds of yellow sponges, worth $2,000; total value, $20,000.

The Apalachicola fishermen have carried on the sponge fishery to this extent for only about four years. When this fishery was first started only a few small boats owned in Apalachicola engaged in it, but the number of vessels and men increased from year to year until about four years ago, when the fleet reached its present size. Although no record of the amount of sponges taken during the past four or five years has been kept, the catch for 1879, which was somewhat under that for the year or two previous, is supposed to have been an average one.

CEDAR KEYS.—Although situated close to valuable sponge-grounds, and favorably located for engaging in the sponge fishery and trade, nothing of any importance has yet been attempted in this line from Cedar Keys. The summer of 1879 was the first in which sponges were sold at that place. A small schooner of 5½ tons, with a crew of five men, made one or two trips that season between Cedar Keys and Tampa Bay, and a few other lots were brought in, the entire amount probably not exceeding 1,000 pounds.

SAINT MARK'S.—While this place is not directly interested in the sponge fishery it furnishes a few men to the Apalachicola fleet. Sponges occur at the mouth of Saint Mark's River, and on either side of it, at distances of not more than 15 to 20 miles from town, and could be easily obtained. At the light-house there is a sponge-crawl, used, in 1880, by Apalachicola vessels. Previously their sponges had been cleaned every year at Rock Island, but in 1880 trouble arose between the men of the Apalachicola fleet and those of the Ocklockony, with respect to the watchmen employed at that place, whose fees for service were paid at the rate of $2 for every dingy or $1 for every fisherman, the cook being exempt. The dispute resulted in the Apalachicola fleet resorting to the mouth of Saint Mark's River, where no other watch was needed than that volunteered by the light-house keeper. After the sponges had been macerated and cleansed in the water, they were spread out on the ground about the light-house, and left until thoroughly dry, when they were stored in the holds of the vessels. No frames are used for drying the sponges, either at Saint Mark's light-house or at Rock Island.

5. ORIGIN OF THE FLORIDA SPONGE FISHERY.

Mr. Silas Stearns furnishes the following historical sketch of the Florida sponge fishery:

Prior to 1850 all of the sponges used in the United States came either from the Mediterranean Sea or the Bahama Islands, but about that time attention was first called to the abundant sponge growths occurring on the reefs of South Florida. The people of Key West had used these sponges for many years in their houses and about their boats, but considered them of little or no commercial value, and did not discriminate between the different varieties. In or about the year 1852, specimens of the most durable variety of Florida sponges, the so-called "sheepswool", were secured and prepared for market, and were found to compare very favorably with many of the Mediterranean grades. After this, the Key West firms of Samuel Kemp & Sons and Brown & Curry bought all the sponges brought in at the rate of 10 cents per pound. At first the business was little understood, and, from want of capital, the proper vessels, and working gear, it advanced but slowly. As foreign sponges became more costly, however, the demand for Florida sponges rapidly increased, and the profits became so tempting as to induce the Key West merchants to engage in the business much more extensively than before. Key West was nearer the sponge-grounds than any other moneyed city of the Gulf Coast, and moreover, its people were, as a class, accustomed to a sea-faring life. It was natural, therefore, that it should take the lead in the Florida sponge fishery, and year after year they have added to their fleet of sponging vessels, and to the number of their packing-houses, until now the business has assumed large proportions, and has become a source of great profit to the Key West merchants.

About the year 1870, Apalachicola first sent out several vessels to gather sponges, in consequence of the discovery of rich sponge-grounds between Saint Mark's and Cedar Keys. Before that time sponging had been entirely confined to the neighborhood of the Florida reefs. The discovery of this section and of a similar one between Cedar Keys and Anclote Keys gave a new impetus to the industry, for it was found that a greater quantity of a superior quality of sponges could be obtained from these regions by the same means employed about Key West, and the longer distance to be traveled by the Apalachicola vessels was not regarded as an important obstacle to the trade.

6. THE DANGERS OF OVERFISHING; ARTIFICIAL PROPAGATION OF SPONGES.

Danger of exhausting the sponge-grounds.—More than 75 per cent. in value of all the Florida sponges marketed are of the finest or sheepswool variety. Formerly only the larger specimens of the sheepswool sponges were taken by the fishermen, but when, from overfishing, the supply of large sponges became greatly diminished on the grounds then being worked, they began to bring in every size, down to the very smallest that could be sold, and a much larger quantity of the small and inferior specimens are now seen in the markets. Notwithstanding this indiscriminate fishing the annual yield has not increased during the past four or five years, and the receipts at the New York market have continued about the same. This condition of affairs, unless the facts have been overstated, does not promise well for the future of the Florida sponge fishery, and we can but hope that steps will be taken to thoroughly investigate the subject with the view of preventing, if need be, the destruction of so valuable an industry. The sponge, like the oyster, is a stationary animal, and is also restricted in its distribution to certain limited areas, which are favorable to its growth. The supply is entirely dependent upon the yield of these few grounds, and is in no way influenced by migrations from without. This renders it possible for a sufficiently large fishing fleet to completely exhaust the supply in a comparatively short time,

although it is doubtful if the regular fleet is yet extensive enough to accomplish such a result. A scheme to provide for a rotation in the grounds fished over, from year to year, would appear to offer the best methods of preserving the supply, and might be easily arranged. In this manner each section would be allowed a certain period (the number of years to be determined by experiment) in which to recover its growth, and the danger of permanent injury would be avoided. Such a course is pursued in connection with many of the oyster-banks of the Connecticut coast, with most beneficial results.

It is claimed that some of the Key West buyers have encouraged the spongers in their indiscriminate fishing, and that they are largely to blame for the inferior character of much of the present supply. In an editorial, in one of its issues for 1880, the "Oil, Paint, and Drug Reporter", of New York, published the following remarks upon this subject:

"The medium and large sponges therefore bring considerably advanced prices, while the small ones are more or less a loss to the merchant. These irregular sizes have led to frauds in packing, it being a common practice with many to 'top off' their bales with good sizes, and make up the bulk with small ones. Thus an annoying evil has grown into the trade, despite the strenuous efforts of the honest dealers to prevent it; but still more serious results seem to promise for the future, in the entire exhaustion of these fisheries, which have hitherto afforded a field for an important industry. It is evident that the constant scouring of the reefs will have the same effect upon them that would occur to oyster-beds if they were constantly dredged, or upon game preserves if they were not protected for certain periods each year from the ravages of the sportsman."

Natural causes sometimes occasion great injury to the sponge-grounds, as in the case of the so-called "Poisoned waters," which, although occurring at irregular and generally long intervals, appear to destroy nearly every living thing in the area within their influence. Not only are the free-swimming fishes thus affected, but also all the lower forms of life, attached to or growing upon the bottom. According to Mr. Ernest Ingersoll, this plague was severely felt in 1844, 1854, 1878, and 1880, and also occurred to some extent in the intervening periods. Several theories have been advanced to account for its appearance. Some think it is due to the overflow of swamp waters from the mainland, but others trace its origin to subterranean causes of volcanic origin, giving rise to poisonous gases, which ascend and pollute the waters. The latter belief is strengthened by the fact that the poisoned waters of 1878 and 1880 were immediately preceded by earthquake shocks, felt throughout the southwestern part of Florida. Mr. Ingersoll's account of the fatality in 1878, so far as concerns the sponges, is as follows:

"The earliest indication of it was the floating up of vast quantities of dead sponges, chiefly 'loggerheads.' All of those seen by Mr. Brady were less than 40 miles north of Key West, in what is known as 'The Bay,' nor has anything of the sort been seen at any time outside (*i. e.*, southward or eastward) of the Florida Reefs; but it was soon discovered that all the hitherto profitable sponging-grounds lying off the coast as far north nearly as Cedar Keys, and particularly off the Anclotes, had been ruined. These grounds are only now beginning to show signs of reproductiveness in sponges. The abandonment of these sponging-grounds from the reefs to Cedar Keys, during the three or four years following this attack, entails a loss which it is hard to estimate, because partially compensated in the increased price of the article in the market, due to its consequent scarcity; and because at all times the product there is an uncertain quantity; but I hazard the opinion that $100,000 would not repair the damage to this business interest alone. Had it not been for the fortunate discovery just at that time of the sponge tracts off Rock Island, northward of the Suwanee River, almost a famine in this article would have ensued."

THE ARTIFICIAL PROPAGATION OF SPONGES.

The threatened depletion of portions of the Florida sponge-grounds by overfishing has suggested the interesting problem as to whether sponges might not be propagated artificially, with as much success as has been attained with respect to many species of edible fishes. In the Adriatic Sea of Southern Europe, where the finest grades of sponges are obtained, successful experiments in this direction were carried on from 1863 to 1872, and the conclusion was reached that sponges could be profitably cultivated, though only after a considerable outlay in the beginning. The results tended to prove that about seven years were required for a small fragment or cutting of sponge, measuring about 1 or 2 cubic inches, to attain a marketable size, and that, therefore, during the first seven years of such an enterprise, there must be a continued expenditure of money, with no returns. On the other hand, the Florida fishermen have contended that the Florida sponges grow much more rapidly and reach a fair size within a comparatively short period. Recent experiments, made since this report was first written, have confirmed these surmises of the fishermen, and have proved almost beyond question the practicability of sponge culture on the Florida coast.

Sponge culture in Florida.—The first trials were made at Key West, by the agent of Messrs. McKesson & Robbins, sponge dealers of New York, who have recently contributed to the U. S. National Museum four specimens of the sheepswool variety showing the first fruit of this important work. We have not been able to obtain a detailed report of these experiments, but from a letter written at Key West, and kindly furnished by Messrs. McKesson & Robbins, the following brief account has been prepared:

The sponges were all raised from cuttings; the localities in which they were planted were not the most favorable for sponge development, and their growth was, therefore, less rapid and perfect than might otherwise have been the case. They were fastened to the bottom, in a depth of about 2½ feet of water, by means of wires or sticks running through them. The four specimens sent to Washington were allowed to remain down a period of about six months before they were removed. Fully four months elapsed before they recovered from the injury done them in the cutting, which removes the outer "skin" along the edges of the section, and the actual growth exhibited was for about two months only. The original height of each of the cuttings was about 2½ inches. One was planted in a cove or bight, where there was little or no current, and its increase in size was very slight. The other specimens were placed in tide-ways, and have grown to from four to six times their former bulk. Two hundred and sixteen specimens in all were planted at the same date, and at the last accounts those that remained were doing finely.

The chief obstacle to the artificial cultivation of sponges at Key West arises from the fact that the sponge fishermen infest every part of the region where sponges are likely to grow, and there is no legal protection for the would-be culturist against intruders. The enactment of judicious laws bearing upon this subject by the State of Florida, or the granting of special privileges conferring the right to occupy certain prescribed areas for sponge propagation, would undoubtedly tend to increase the annual production of this important fishery.

Sponge culture in Europe.—The experiments in the Adriatic Sea were carried on by Mr. Buccich at the island of Lesina, on the coast of Dalmatia, and the results obtained were embodied in a report by Dr. Emil von Marenzeller, published in Vienna in 1878.* This report is so important and contains so many valuable suggestions that might be utilized in connection with future

* Die Aufzucht des Badeschwammes aus Theilstücken.

experiments on the coast of Florida, that we reproduce here certain portions of it, which have been translated by Mr. Herman Jacobson.

"After Prof. O. Schmidt, in an article in the *Wiener Zeitung*, and in his work on the sponges of the Adriatic,* had expressed the opinion 'that if a perfectly fresh sponge is cut into suitable pieces, and if these pieces, properly protected, are again placed in the sea, they will grow, and finally develop into complete sponges,' the government and a number of prominent merchants of Trieste had some experiments made during 1863–1872, and established a station on the bay of Socolizza, at the northeastern point of the island of Lesina, which in May, 1867, was placed under the direction of Mr. Buccich. This establishment was closed in November, 1872, as its continuance became impossible, because, in spite of Mr. Buccich's oral and written remonstrances, it was continually disturbed by the fishing-nets and was actually robbed several times. A species of worm which destroyed the wood-work appeared harmless compared to the hostile attitude of the population, which showed an utter want of respect for the property of other persons, and manifested deep-rooted prejudices against any innovations, as well as a reluctance to break with old habits.

"The most favorable season for raising sponges from cuttings is winter. It is true that the growth of the sponge and the new formations on the cut sides goes on slower in winter than in summer, but a high temperature of the air often endangers the entire crop on account of the tendency of the sponges to rot. In winter a sponge may remain on the dry land for several hours, while in summer it will perish in a few minutes especially if it has been injured and if it is not constantly moistened with sea water. Mr. Buccich exposed sponge cuttings to the air in a shady place for eight hours during February, when the temperature of the air was 48° F., and still they all took root.

"The best localities are bays where the waves are not too strong, but where the surface is not entirely smooth either, with a rocky bottom covered with green algæ and exposed to a gentle current. It is a well-established principle that the mouths of streams and rivers and of subterranean springs should be avoided. The fresh color of the algæ is a sure indication that the choice of locality has been fortunate. The worst enemy of sponge culture is mud. Under certain circumstances it would be well to close the entrance to the bay to vessels by a chain.

"The sponges which are to be cut should be very carefully gathered by experienced persons. * * * The sponges are brought up either with their base—and this is the most favorable way—or they must be torn from the base, which operation frequently tends to injure them. * * * In gathering sponges for cutting it is entirely unnecessary to select nice-looking specimens, for misshaped pieces which would be worthless in trade are just as good for this purpose as beautifully rounded ones. These latter should not be cut, but should be reserved for the trade. * * * Mr. Buccich found that it was not expedient to place the sponges, as they were gradually gathered, into a vessel, to keep them there until they were to be cut, because they are easily injured by pressing against each other or by being shaken too violently. He therefore provisionally fastens them with wooden pegs to the inner side of a sort of fish-box, which is held in tow by the fishing-boat. If the sponges are injured, the injured portions should be immediately removed; the remainder is likewise fastened with wooden pegs, either as it is, or subdivided into large pieces.

"When the temperature is low during the cold season, the sponges can be prepared for raising as soon as the place is reached where the process is to be carried on, while during the warm

* "*Die Spongien des adriatischen Meeres*," Leipzig. 1862, p. 22. See also O. Schmidt, "*Supplement der Spongien des adriatischen Meeres*," Leipzig, 1864, p. 24; and especially, Brehm, "*Thierleben*," 2d edition, vol. 10, Lower Animals, by O. Schmidt, 1878, p. 534.

season it will be found profitable to wait a little in order to see whether there are any indications of putrefaction. This can be recognized by the darker color and the softening of the respective portions. If anything of the kind is noticed, the sponge should be watched to see to what extent the process of disintegration has progressed. Small sponges will almost entirely fall a prey to it, while in large ones the evil may be confined within certain limits. The cutting should be done rapidly either with a common knife or—as Mr. Buccich found more advantageous—with a blade resembling a fine saw, which is less liable to be injured by the many foreign bodies inclosed in sponges. In cutting, the sponge had best be laid on a small board moistened with sea-water. The size of the cuttings is generally about 26 square millimeters. It is well if every piece has as large a surface as possible of intact outer skin. The cuttings should be fastened immediately to those objects where they are expected to grow.

"A healthy piece of sponge soon grows firmly on any object with which it is brought in close contact. Sponges which have been cut will again grow together. Those cuttings which have only a single cut surface will soonest grow fast to their new base, stone, wood, &c. Mr. Buccich thinks that during a calm lasting twenty-four consecutive hours, cuttings could simply be sowed on a rocky bottom and would soon grow. He has seen pieces laid on gently slanting rocks grow fast to them during a perfect calm. Induced thereby, and also by the natural occurrence of sponges, Mr. Buccich tried flag-stones, about 53 millimeters thick, as a basis. He bored holes in them and fastened the cuttings by means of wooden pegs, which were driven into the holes; but it soon became apparent that the mud and sand of the bottom, perhaps also the excess of light, were injurious to the further growth of the sponges. Experience has shown that light and mud are among the worst enemies of the sponge, and their influence must be avoided or limited by every possible means. Stones form the natural basis of sponges; they are cheap and are not attacked by the *Teredo*.

"Originally, Prof. O. Schmidt used wooden boxes closed on all sides but perforated, to whose inner sides the pieces of sponge were fastened with metal or wooden pegs. This exceedingly simple arrangement did not prove efficient; because the boxes when let down into the deep water became full of mud, and the holes being stopped up no light whatever could enter. The sponges began to look pale and sickly. It is not good to fasten them with metal pegs, for it seemed to retard their growth. The rust which forms very soon causes the pieces of sponge to become loose, and will ultimately destroy them. Laths or boards placed obliquely, on whose upper side there were floating contrivances in the shape of tables, to the lower side of which the sponges were fastened, were likewise used. With the former, the want of covering was keenly felt, and with the latter, the rays of the sun proved injurious, as well as all the different little objects floating on the surface of the water which may be grouped together under the collective name 'dirt.' Mr. Buccich at first prepared an apparatus consisting of two boards crossing each other at right angles with a third board serving as a sort of lid, and after this had proved unsatisfactory he adopted the apparatus which I shall now describe, and which he preferred to all others because the cuttings were exposed on all sides to the sea-water and assumed the favorite round form. This apparatus consisted of two boards, 63 centimeters long and 40 centimeters broad, one forming the bottom and the other the lid. Both were kept in a parallel position, one above the other, at a distance of about 42 centimeters, by two props about 11 centimeters distant from each other, between which stones may be placed as ballast. On the outer side of the lid there was a handle. Both boards had holes at a distance of 12 centimeters from each other, the total number of holes in each board, therefore, being 24. Mr. Buccich did not fasten the pieces of sponge singly to the apparatus, but he placed several of them on one peg and then stuck the pegs in the holes. For

these pegs he used bamboo, whose hard smooth bark defies all attacks of worms. These pegs were 42 centimeters long and perforated horizontally, the holes being at the distance of 12 centimeters from each other, and the lower end was split. Three pieces of sponge were put on each peg and pushed up high enough to be above the horizontal holes, through which a wooden peg was pushed, thus fully securing the sponges.

"If the pieces of sponge are simply to be fastened with wooden pegs, a three-cornered stiletto will suffice for making the holes in sponges, but when they are to be strung up on pegs this or any similar instrument cannot be used, because too great a pressure would have to be exercised to make a sufficiently large opening for the passage of the pegs. Any pressure will injure the sponges to some degree, and to limit its extent or force as much as possible should be the first object. Mr. Buccich bored the holes with a trepan 6 millimeters wide, fastened to a vertical turning-table, which was kept in rapid motion by a fly-wheel. One hand pressed the sponge lightly against the trepan, the other turned the wheel, and the operation was finished in a few seconds. The hole in this manner is perfectly smooth, none of the fibers have been pulled out, and none of the sarcode has flowed out. As soon as a peg has been furnished with sponge-cuttings, its split end is stuck in one of the holes of the apparatus and a wedge is driven through the crack. As lid and bottom hold twenty-four pegs, each with three cuttings a piece, such an apparatus can hold one hundred and forty-four cuttings. During this whole process the sponges should be continually moistened with sea-water, especially during summer. As soon as an apparatus has been filled, it should immediately be let down into the water if the temperature is high, while in winter a delay will not prove injurious. The letting down and raising of the apparatus had best be done by means of a small anchor, and it should be let down to a depth of 5 to 7 meters. Mr. Buccich does not consider it necessary to have the apparatus suspended from a sort of scaffolding. All the wood-work should be well tarred, as this will prove the only, though by no means always efficient, protection against worms. The *Teredo* does not only cause an increase in the capital to be employed, because it makes new apparatus necessary from time to time, but it also diminishes the results, because the pegs will gradually get loose and fall off. It would, therefore, be best to dispense with wood altogether, and either construct the apparatus of stone, taking the necessary precautions against mud and excess of light, or construct Mr. Buccich's exceedingly practical apparatus of iron.

"If, after three or four weeks, the sponges have grown firmly to their base, they are sure to develop successfully. Their most characteristic tendency is the desire to grow round. In order to facilitate this in all directions, Mr. Buccich strung the sponges on pegs. As regards the development of the sponge-cuttings within certain given periods, we have only very imperfect information, as it was impossible to make continued undisturbed observations. Mr. Buccich says that the cuttings grow two to three times their original size during the first year. He also mentions that the cuttings grew better during the first and fourth year than during the second and third. It is his opinion that, although some pieces will grow to a considerable size in five years, it will require seven years to raise completely matured sponges which are fit to become an article of merchandise. I cannot pass by the fact that besides well-developed and growing sponges there were some which outwardly looked perfectly healthy but had ceased growing.

"In conclusion, Mr. Buccich discusses the question whether the enterprise can, on the whole, be called profitable, and says that he must answer it in the affirmative. He thinks that if all the lessons taught by experience are carefully observed, the cuttings will always develop successfully, and that the loss would at most be 10 per cent., taking into account unexpected accidents and the stationary character of some of the sponges. Calculating the expense of an establishment for 5,000 sponges at 300 florins and the loss at 10 per cent., the price realized by 4,500 sponges would indi-

cate the profits. Mr. Buccich calculates the value of 4,500 sponges at 900 florins. This sum is, in my opinion, much too high, as the wholesale sponge-dealers in Trieste receive an average price of 8 and a maximum price of 10 florins per kilogram of Dalmatian sponges. Sponges fetching the price given by Mr. Buccich ought to have a very considerable size, and their slow growth justifies the supposition that even after seven years they will not yet have reached that size. It must also be taken into account that the market value of sponges which have been raised on pegs is one-third less than that of naturally-grown ones on account of the hole in the center. The profitableness of sponge-culture would be far more evident if there was not such a long interval between planting and harvesting; in other words, if the sponges would grow more rapidly. This was certainly looked for when the enterprise was started, but it is dispiriting to have to wait for your crop for seven long years. And in order that when that period has been reached there may be crops every year, it will be necessary to invest the same annual amount of capital for a period of seven years. The apparatus, moreover, is not so simple that every fisherman could easily construct it himself, for experience has shown that wood, which would be the easiest material for working, cannot be used on account of the ravages of the *Teredo*. As far as our present knowledge goes, it is certain that sponge-culture will not be profitable for poor men, but that it can only be carried on successfully on a very large scale, either by wealthy individuals or by joint stock companies. It would be very encouraging to know more concerning the progressive development of the sponge in its natural condition, and especially to know that this development was just as slow as that of the cuttings. Prof. O. Schmidt inclined to this opinion. But if it should prove erroneous, it would be more than questionable whether it is profitable to cut to pieces a sponge which uncut would have quicker reached the same size and weight than all the cuttings together in seven years. Under such circumstances sponge-culture had better be confined to the transformation of flat and therefore worthless sponges into round ones, which, though small, would find a ready market. Possibly several especially misshaped pieces of sponge might be made to grow together and form larger and better shaped ones. The experiments made by Cavolini and those of Mr. Buccich above mentioned show that there is no difficulty in doing this."

(c) THE BAHAMA SPONGE FISHERY.

7. THE METHODS OF THE FISHERY.

The Bahama sponge fishery is carried on in very much the same manner as the Florida, the sponges being procured by means of hooks attached to long poles. Negroes perform most of the work, and according to all accounts, the Bahama vessels and their outfit are inferior to those of Key West. The following brief notes made by Dr. Edward Palmer during a recent trip to the Bahamas were furnished by Prof. Alpheus Hyatt, of Boston, and will be found of interest in connection with the foregoing account of the Florida fishery:

Five hundred or more licensed crafts, of 10 to 25 tons burden each, are engaged in the Bahama sponge fishery. These boats are mostly schooner-rigged, and carry from two to four yawls a piece, each of which is manned by two persons, one as sculler, the other as hooker. The sponge-glasses are square or round, and the sponge-hooks two pronged. The crawls in which the sponges are macerated are in from 6 to 10 feet of water and are constructed by driving stakes into the sand. The sponges are left in them about a week. At the beginning of the season the owners select the captains and crews and furnish the outfit, but at the close of each trip they take from

the proceeds the cost of the outfit and one third of the remainder, two-thirds being divided among the captain and crew. Formerly the owner of the vessel or the captain sold the sponges, which for convenience' sake were strung in fathom lengths, by weight. Now, however, the law and usage require that sponges shall be strung in lengths called strands, each size and grade by itself. The owners are also obliged to select a person to act as agent for the sale, which is conducted in about the same manner as at Key West, the bids being made in writing. The agent's fee is taken from the joint proceeds of the cargo. Bidders take care in estimating, to deduct enough to cover the loss or waste in clipping. Nassau is the headquarters of the Bahama sponge industry, which is one of the most important enterprises of those islands. During the arrival of cargoes from the sponging-grounds and the sales of sponges, everything is excitement. Sponges are graded at Nassau as sheepswool, velvet, glove, reef, hardhead, yellow, and grass. Of late years many of the Bahama sponging-vessels have carried on their operations in waters adjacent to the coast of Cuba, for which they are obliged to pay a license fee to the Spanish authorities.

(*d*) THE MEDITERRANEAN SPONGE FISHERY.

8. THE METHODS OF THE FISHERY.

The method of conducting the Mediterranean sponge fishery differs greatly from that practiced in America, the sponges being mostly obtained from deeper water and by diving. Professor Hyatt describes the fishery briefly as follows:

"The diver goes either in diving armor or naked. The naked diver is carried down by a broad flat stone of marble of about 25 pounds weight, which he holds at arm's length in front of him, and which he uses to guide his flight, to protect his head when he first strikes, and to keep him down when he walks on the bottom. Fifteen to twenty fathoms is the average depth; but for depths beyond this up to 40 fathoms which is reached in the Mediterranean, more preparation is necessary. The man standing naked in the boat, with the greatest earnestness practices inflating his chest to the utmost for about ten minutes, and when the blood is thoroughly oxygenated by this means, seizes the stone and plunges headlong into the sea. The tremendous pressure of the water, at the depth of even 15 fathoms, is such as to cause bleeding at the nose and mouth when divers first begin the season; and only the most expert attempt greater depths. Two minutes is the usual duration of the dive, and three and a half the utmost extent of endurance. The skin of the shoulders is, in habitual divers, burnt off by the action of the sun and salt water; and the hair is of a greenish or greenish-brown during the height of the summer, returning to the natural black only in the winter time after diving has ceased to be profitable." Each diver has a net bag hanging down in front, and held in place by a cord extending around the neck. Into this he puts the sponges as he pulls them from the bottom, and when it is full or before, in case he has remained too long upon the bottom, he jerks the rope and is quickly pulled to the surface. A dredge consisting of a rectangular iron frame with a net bag behind it, something like the naturalist's dredge, is also used for procuring the deeper water Mediterranean sponges. In shallow water Mediterranean sponges are sometimes taken with a hooked pole as in Florida, but all the sponges growing in such localities are of a coarse and inferior character. "The Mediterranean sponges are prepared with greater care than ours, being beaten or trodden out after the killing, and not allowed to take care of themselves at all."

(c) THE SPONGE TRADE.

9. CHARACTER AND EXTENT OF THE NEW YORK SPONGE TRADE.

New York City is the principal port of entry in this country for all sponges, both foreign and domestic. A few other places receive small quantities of foreign sponges from time to time, generally brought in by sea-captains on private speculation, but all the regular importing and receiving houses are located in New York. The other ports which receive occasional supplies of foreign sponges are, according to the custom-house records, Boston, Philadelphia, Baltimore, New Orleans, and San Francisco. The same records show that during the past sixteen years the custom-house valuation of sponges imported into New York City, was about $1,700,000; while the importations at all of the other places combined, during the same period, amounted to only about $200,000. The quantity of Florida sponges received at New York City for the year 1879 was about 205,000 pounds, valued at something over $200,000.

There are eight principal sponge-houses in New York City, of which six deal in all the foreign and domestic grades, the remaining two importing the Mediterranean kinds only. It can be safely said that nearly all the Florida sponges sold pass through New York. None are exported direct from Key West, and only about $10,000 worth are exported annually from New York to foreign countries, principally England, France, and Germany. About one-half of the Bahama sponges exported yearly from Nassau come to this country, the remainder going to Europe. Some Bahama sponges are also sent to New York for shipment to Europe.

According to the statements of several New York dealers, the quantity of Bahama sponges imported into New York is, by bulk, two or three times as great as the quantity of sponges brought there from Florida, and the imports of Mediterranean sponges equal, in the same way, the combined quantities of Bahama and Florida sponges received. Florida and Bahama sponges are sent to New York mostly in tightly compressed bales weighing from 30 to 200 pounds apiece, but a few are also received in cases, weighing from 20 to 125 pounds each. Mediterranean sponges are imported in wooden cases, weighing 25, 50, and 100 pounds each. The Florida sponges are shipped to New York mostly by steamer.

The wholesale prices of the various grades of sponges were given as follows in the New York market quotations for 1880:

Table showing the wholesale prices of sponges in New York City in 1880.

Name of grade.	Price per pound.		Name of grade.	Price per pound.	
Glove	$0 25	to $0 75	Reef, No. 1	$1 00	to $1 30
Slate	45	80	Coupee, bathing	1 40	2 10
Carriage, yellow	35	65	Small bathing	1 00	1 50
Velvet	65	85	Forme	1 50	3 00
Nassau sheepswool	1 40	1 60	Zimocca, small	1 15	1 25
Florida sheepswool, unbleached	2 00	2 25	Zimocca, small and medium	2 00	2 40
Florida sheepswool, bleached	1 75	2 00	Potters	2 75	3 00
Reef, No. 2	80	95			

From this table it will be noted that some sponges are graded according to the uses to which they are put, and also that the more costly foreign grades are entirely omitted, probably because of their great variation in price, dependent upon their size and shape.

10. THE ORIGIN AND GROWTH OF THE NEW YORK SPONGE TRADE.

The following interesting account of the introduction of Florida sponges into this country and the subsequent growth of that industry, in connection with the introduction of Bahama sponges into France, is furnished by Mr. A. Isaacs, of New York, the oldest regular sponge dealer in the United States:

About the year 1840, a brother-in-law of Mr. Isaacs, Mr. Hayman, of Paris, who had been traveling in the United States and West Indies, sailed from Jamaica for Europe, but was wrecked on one of the Bahama Islands, near Nassau. Being detained there for some time, awaiting a vessel to carry him home, his attention was attracted by the great number of sponges in use among the natives, all of which, he was informed, came from the waters surrounding the island. Although wholly unacquainted with the sponge industry, and not knowing what might be the value of Bahama sponges in a country where the Mediterranean sponges had long been used, he decided to carry some home with him and to place them upon the market. Accordingly, when he sailed, he took with him about 500 or 600 selected specimens, which cost him from 5 to 10 cents a pound. He had no difficulty in disposing of them, and at once made arrangements through the French consul at Nassau for additional supplies.

Mr. Isaacs became associated with Mr. Hayman in the Paris house, but after remaining with him about seven years, or until 1849, he came to New York to engage in the same business, which, he was informed, had not yet received a start in this country. It was his intention to deal only in Bahama sponges, as he had done in Paris, but at that time he knew nothing of the value of the Florida sponges, and scarcely of their existence. When he arrived in New York, he found that no regular importation of Mediterranean sponges had yet begun, but the trade had been carried on in a very small way to supply the druggists with the finer qualities, for which only was there then a demand. He also learned that Bahama sponges were not regularly imported, the best quality selling for only 10 cents a pound, and that several cargoes of sponges from the southern part of Florida had been brought to New York, but had found no sale. There was thus presented to him every indication of a good opening in an important and profitable industry, which he determined to start himself.

After he had been in the country over a year, he ascertained that the shipping firm of S. B. Fish & Co., in South street, New York, had received sometime before a large quantity of Florida sponges, which they could not dispose of at any price. He visited their storehouse and found two lofts filled with loose Florida sponges, which a careful inspection showed him to be, if anything, superior to the Bahama sponges, in which he had dealt in Paris. The Messrs. Fish & Co., were about to throw the entire lot away, as they had no use for them, and glad to dispose of them at any sum, allowed Mr. Isaacs to set his own price. He gave them from 8 to 15 cents a pound, according to quality, and soon afterwards went to Key West to arrange for regular supplies. He was recommended to the same parties in Key West that had sent the sponges to Fish & Co., and found them willing to accept his own price in order to start a trade, from which they had previously realized nothing. He offered them 22 cents for the best grade, or sheepswool sponges, delivered in New York, and lower prices for the several inferior grades, and his offer was accepted.

Mr. Isaacs also began at the same time the importation of Mediterranean and Bahama sponges. For fourteen years he continued in the sponge trade in New York City without competition, but since then several other large houses have started, and now six principal firms deal in Florida as well as foreign sponges, while two others limit themselves entirely to importing the European varieties.

11. FRAUDULENT PRACTICES.

In connection with the sponge trade, several fraudulent practices have grown up, to the great annoyance of honest dealers, and strenuous efforts are now being made to check them. The two most serious are the so-called "liming" and "sanding" processes, which greatly increase the weight of sponges, and, thereby, their cost to the retail buyer.

The liming of sponges is a bleaching process, and consists in soaking the sponges in a solution of lime and sea-water. It was resorted to primarily for the purpose of improving the appearance of the sponges and giving them a lighter and brighter color. The use of the bleaching agent, however, results in great injury to their fibrous structure, and renders the sponges less durable. It has also been observed that a large percentage of the lime is generally left in the sponges from insufficient washing, and this tends to increase their weight to the financial gain of the bleacher. As these facts have become known to the trade and to people generally, the demand for bleached sponges has fallen off considerably, and it is now generally regarded that the liming process is continued partly for dishonest purposes. Our remarks on this subject apply more especially to the Florida sponges, regarding which we have the most definite information; but almost all the foreign sponges received at New York, and particularly those imported from Europe, are more thoroughly bleached than our own, and the practice of sanding is as fully understood on the other side of the Atlantic as it is here.

The liming of Florida sponges is done solely at Key West, as it is said the process has never proved successful at Apalachicola. All the sponges from the latter place have been shipped unbleached to New York, but Key West dealers claim that these same sponges are sometimes sent to them from New York for bleaching.

The sanding process consists in mixing with the sponges before packing a certain quantity of fine sand, which increases their weight from 25 to even 100 per cent., according to the amount used. Sponges are so exceedingly light in themselves and so open in texture that a large quantity of sand can be easily added without making any appreciable difference in their appearance: in fact, the quantity of sand required to double the weight of a sponge is so small that its presence in the sponge might almost seem to be a natural result of the curing of sponges on the beaches. The method of preparing sponges in Florida does not, however, require that any appreciable amount of sand should be left in them, and the handling to which sponges are subjected after removal from the beaches precludes their containing much sand unless it has been put there for unfair purposes. The sanding of sponges originated in Europe, and the process has only recently been introduced into this country.

The following editorial from the "Oil, Paint, and Drug Reporter," of New York, for April 21, 1880, gives a graphic description of these evils:

"Reports come to us from sources which we deem authentic beyond question that within the past week or ten days there have been shipments from Cedar Keys to Key West, Florida, of 25 barrels of quick-sand for the use of packers of sponges, one or two of whom are working with closed doors. To affirm from these reports that the packers in question were sanding their sponges would not perhaps be justifiable, yet the rest of the trade are disposed to regard that as a fact, and the reports certainly admit of that construction. The sponge business is in a position to be put upon a fair square footing, more readily than any other branch of trade we know of. The number of houses engaged in the trade is not large, and they have the means of readily forming a combination for the purpose of establishing uniform and honest methods in their business instead of retaining the contradictory, misleading, and senseless practices which now prevail,

and having themselves exposed to the dishonest ones which may so easily creep in. It is in connection with the Florida sponge trade that the most serious evils exist, and these above all others could be most handily remedied. The selling of sponges by weight, without reference to their size, is a practice which, while it cannot be deemed in any respect fraudulent, is most unsatisfactory to the purchaser, and fails to discriminate fairly between good, sizable sponges and the smaller and less valuable ones. A change could easily be made which would make the price depend more upon the actual value of the sponge, and this would have the effect not only of giving buyers what they wanted, but of checking the shipments of undersized sponges—an evil to which we have hitherto alluded in these columns, as being likely to exhaust the fisheries in time.

"The bleaching of sponges is more of a fraud upon the consumers. Doubtless this process is honestly carried on by some packers, but it is oftener taken advantage of as the means of weighting the sponges by leaving in them a greater or less percentage of the lime employed as a bleaching agent. Throughout this process the inexperienced consumer is easily duped. A bleached sponge has the appearance of being superior to an unbleached one, and might be purchased in preference, though its absolute inferiority becomes at once apparent upon use. The sanding of sponges is a clear and unmitigated fraud. It is a cheat upon the purchaser and its practice casts a stigma upon the entire trade, and will sooner or later bring into disrepute the very excellent Florida sheepswool sponge to which it is now chiefly applied. We caution the buyers of sponges to guard well against purchasing any packing which is not guaranteed to be entirely free from sand or lime or any extraneous matter. There is a disposition among the majority of the sponge houses, we believe, to root out the existing evils in their trade and especially those which are absolutely fraudulent. This they can readily do, and they will have no alternative if buyers will insist upon such a guarantee as we have suggested."

Other fraudulent practices charged upon the dishonest sponge trade are the substitution of Bahama, Mexican, or Cuban grades of sheepswool sponges for the Florida, which latter bring from one-third to one-half more in price than the same kinds of sponges grown in other American waters. Recently large numbers of small and inferior sheepswool sponges have been packed in the interior of bales made up on the outside of the better grades. This has resulted, as before described, from the falling off in the catch of large sponges, and the taking of all sizes by the fishermen. The inferior grades of sponges are not subject to fraudulent practices, the supply being much greater than the demand, and the prices low.

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