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THE ABUSE OF THE SCAPHANDER IN THE
SPONGE FISHERIES * * * * *

From BULLETIN OF THE BUREAU OF FISHERIES, Volume XXVIII, 1908

Proceedings of the Fourth International Fishery Congress : : Washington, 1908



WASHINGTON : : : : : GOVERNMENT PRINTING OFFICE : : : : : 1910



Class. SH396

Book. F5

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BUREAU OF FISHERIES DOCUMENT NO. 668

Issued March, 1910

APR 27 1910
U. S. F. D.

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THE ABUSE OF THE SCAPHANDER IN THE SPONGE FISHERIES



By Ch. Flégel

Member of the Austrian Fishery Society, Vienna



Paper presented before the Fourth International Fishery Congress
held at Washington, U. S. A., September 22 to 28, 1908

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THE ABUSE OF THE SCAPHANDER IN THE SPONGE FISHERIES.

By CH. FLÉGEL,

Member of the Austrian Fishery Society, Vienna.

[Translated from the German.]

I have the honor to report to the Fourth International Fishery Congress in Washington the unfortunate condition of the sponge divers of the Mediterranean Sea and the Gulf of Mexico. I do this with the well-founded hope that I shall meet here the active sympathy these sufferers so badly need.

A condition of this sort, of course, never arises without a precedent abuse or evil, and this rule is borne out in the sponge fisheries. The evil in this case lay and lies in inordinate greed of gain, uncontrolled by law, unchecked by any national regard for the general weal. Filled with this greed, which stops at nothing, men found it good forty-two years ago to adopt for the fishing of sponges the diving apparatus invented for quite other purposes. Although death and illness have ensued, these people continue this abuse at the present time so far as they are permitted. It is true that they did not succeed in winning the whole world over to their method; they met rather with strong resistance from their own compatriots, and thus a hot struggle began which has not yet ended, though fortunately the evil has lost ground before the good.

While in the island of Kalymnos in 1892, I accidentally learned of the sufferings of the sponge divers by asking a cripple the cause of his condition. The evils and abuses disclosed by his reply and confirmed by subsequent investigations of the subject led me to dedicate myself to the cause without in the least realizing that it would absorb years of my life.

The sponge fishermen everywhere lived in health and happiness so long as they gathered sponges by means of the three time-honored methods, hygienic and consistent with the public welfare; i. e., by means of diving naked, and by fishing with the hook and the dragnet. Since the scaphander was introduced in Greece and Turkey in 1866 numerous evils have befallen these formerly well-conditioned fishing people. There have been frequent cases of sudden and premature death, as well as of chronic diseases, worse than death, of youths

and men; a correspondingly large number of widows and orphans without means of livelihood, with the worst of consequences to the high morality of former times; fading girls on account of lack of marrying men; lack of work for many on account of the scarcity of sponges due to the destructive fishing; pauperism and emigration on account of the general misery—in short, a social disintegration of the worst kind. The suffering people sought relief in vain for twenty-six years, unable to make their protest heard or to obtain assistance in their struggle. The various governments in whose power it lay to remedy the evil were slow to recognize it, and it has been only by unremitting effort that action has been secured. Most of the Mediterranean countries, and also the United States, have within the past decade taken measures of prohibition or relief, but there still remains in many localities much to be desired.

METHODS OF SPONGE FISHING.

Sponge fishing by the three good methods had been an industry for centuries, especially in the eastern basin of the Mediterranean Sea. Sponges were found in great abundance before, both in shallow and deep waters, the fishermen, especially the naked divers, obtaining a good profit. The rowers were taken from neighboring localities, and youths and men, up to advanced age, were engaged for naked diving or the manipulation of the five-pronged hook and the dragnet. Whole fleets of small, excellent sailing vessels with naked divers departed to the East every spring after Easter, to the harbors of Syria, to the islands of Kalymnos, Syme, Chalke, and Kastelloriso; and other sailing fleets, with the five-pronged hook and the dragnet, left Tschesmé, Halikarnass, Hydra, Kranidion, Hermione, and Salamis, the village of Crappano in Dalmatia, the harbors of Italy, Tunis, Florida, Cuba, and the Bahama Islands. Healthy and jolly crews returned in September, from the coasts and the banks of the Mediterranean Sea and the Gulf of Mexico, with a rich harvest of sponges to sell to the local merchants for exportation.

The inhabitants of some of the islands and coasts of the Ægean Sea have from early generations been excellent divers, and were skillful also with hook and dragnet. The divers of Delos were famous in antiquity; those of Kalymnos and Syme are so to-day.^a

The naked divers descend to the considerable depth of 75 meters and remain under water from $1\frac{1}{2}$ to 2 minutes, a few even $2\frac{1}{2}$ to $2\frac{3}{4}$ minutes. In a quest by the commander of a Russian gunboat in the harbor of Suda on August 10, 1907, one of several divers proved to be the best of them by remaining under water 2 minutes and 5 seconds at a depth of 17 meters, moving about hurriedly. In

^a Herodotus mentions in Urania (chap. 8) the celebrated diver Skyllias of Skione. The sponge is mentioned by Homer in the Odessey (song 22, verse 455) and by Æschylus in Agamemnon (verse 1,329).

order to reach bottom the more rapidly, the diver grasps in both hands a flat block of white marble weighing from 14 to 16 kilograms, holds it in front of him, and jumps from the side of the vessel head downward into the spray, while a rope, passing through a hole in the stone and fastened also by means of a cord to the right wrist of the diver, follows him into the sea. Scarce touching the ground with his toes, the diver places the stone under his left arm, tears off the large sponges, and places these in a net fastened to his neck and waist. The crew of a sailing vessel with naked divers consists of 5 to 7 divers and 2 rowers. The only danger threatening the naked diver is the attack of a shark, but he does not consider this eventuality, as it is a very rare one.

The second mode of gathering sponges is by means of a five-pronged hook of iron, weighing from 2 to 2½ kilograms and fixed to a handle 9 meters long. Each bark of the Ægean Sea carries 4 to 6 hooks, 3 of which are bound together and braced end to end by 2 smaller handles of 2 meters each, making a combined length of 27 meters. For still greater depths, up to 45 meters, the sponge fishermen of the Ægean Sea use a five-pronged hook 1 meter long and weighing 12 to 15 kilograms, which is let down on a rope. The handles of the hooks of the Italian fishermen and the fishermen of Crappano in Dalmatia reach a length of 18 meters, while those of the Italians were, some sixteen years ago, only from 4 to 5 meters, according to the "Condizioni della Marina Mercantile Italiana," 1892. The crews of hooking vessels number from 2 to 5 men, one manipulating the hooks, the others rowing and assisting. Two men per bark are found only among the crews of Crappano, the crews in Italy, Tunis, Greece, and Turkey numbering 3 to 5 men. The sponge fishermen of Crappano, in order to be able to see the bottom of the sea more easily, pour oil on the surface of the water to render it smoother. A more practical and cheaper method is that of the fishermen of the Ægean Sea, who use for this purpose a special apparatus consisting of a tin cylinder with a glass bottom. The smoothing of the surface by a slight pressure of the glass bottom of the cylinder allows the eye to examine the bottom of the sea better than does the use of oil.

The third method of gathering sponges is by means of the dragnet, which is fastened to a rectangular frame 4 to 7 meters long and 0.35 to 0.45 meter high, and is dragged by means of three ropes joined to a heavier rope. The part of the frame lying on the ground is of iron and weighs 20 to 30 kilograms; the three other parts are of wood. The net has a depth of about 3½ meters and its meshes are 8 centimeters square. A sailing vessel equipped with a net is of 4 to 40 tons, and has a crew of 3 to 6 men, though the larger sailing vessels from Torre del Greco have more. The dragnet takes sponges at a depth of 120 meters, although not frequently. As it needs, for one thing, a flat sea bottom, and for another wind for the sails and room for maneuvering, it is evident that this work takes

place far from the coast in deeper water—taking up, it is true, all that lies in its path, but this is what would otherwise be left to die off, as no other means can reach the depths at which the dragnet works. The clamor against this apparatus on the ground that it harms schooling fishes is an exaggeration, but some countries, as the United States of America and Cyprus, have forbidden the use of it. This is regrettable, for thousands of people live by this mode of sponge fishing, without harm to themselves or others.

The fourth mode of sponge fishing is by means of the scaphander, or diver's suit, in which the sponge fisherman may descend to greater depths than the naked diver, and may secure great numbers of sponges not otherwise obtainable. The sailing vessel equipped with such an apparatus takes on board 4 to 10 divers and 8 to 12 sailors, and is always accompanied on long expeditions by a second sailing vessel, to carry provisions and to receive the sponges. The equipment of such an expedition for a summer's cruise of seven to eight months along the coasts of Africa costs 30,000 francs, that of a sailing vessel with naked divers 3,000 francs, that of a bark with the five-pronged hook 2,000, and of a sailing vessel with the dragnet 1,500, with the exception of the big vessels of Torre del Greco, the equipment of which is always more expensive.

EVILS OF THE SCAPHANDER.

The scaphander is in itself a splendid invention and very important and useful in submarine work at small depths, but its abuse in sponge fishing is equally harmful to the divers, the sponge grounds, and the economic welfare of the state. The diver in the apparatus may work without risk at a depth up to 16 meters, although accidents happen at smaller depths, as demonstrated by practice and as stated by Professor Katsarás.^a But at the greater depths of 16 to 75 meters, to which the unhappy diver is often forced to descend, the air, which is being driven down to him by two strong men by means of a pump, is correspondingly compressed in order to withstand the pressure of the water, which increases with every inch. This pressure hermetically fastens the rubber garment to the lower extremities of the diver, driving the blood continuously toward the heart and head. The air breathed by the diver in the apparatus, saturated with carbon, penetrates into the blood through the lungs, renders it frothy and clogs the small vessels with bubbles, causing local obstruction and impediment of the circulation.

The degree of harm depends upon the depth to which the diver descends and the time he passes under water, then on secondary conditions, as colds, a heavy meal before diving, and fatigue. The disease of the divers, which is of

^a In his excellent work "Recherches cliniques et expérimentales sur les accidents survenant par l'emploi des scaphandres," Paris, 1890, p. 292-293.

but one nature, is protean in its manifestations. It affects mostly the spinal marrow and the brain, the most important life centers, but appears in the most varied forms, as hemorrhages, stomach troubles, articular rheumatism, complete or partial lameness, lameness of separate limbs, fainting, vertigo, vomiting, dumbness, deafness, madness, brain stroke, heart stroke, hemorrhages of the brain, gangrene, loss of the finger nails, and frequently death, which is relief to these unfortunates. It should also be observed that the offspring of these divers have a weak constitution, especially of the nervous system. It is only if the diver is slightly attacked by the disease and immediately discontinues his work and subjects himself to treatment that it is possible for him to regain his health. Otherwise he is doomed to die prematurely, or he limps through life on crutches, or spends long years in bed covered with wounds. If the air-supply tube of the apparatus is punctured the unfortunate diver is immediately squeezed to death by the pressure of the terrible mass of water, which had received until that moment the necessary counter pressure from the air laboriously pumped down. His head grows black and swells so that it can not be pulled out of the metal helmet. It must, consequently, be detached from the body and cut to pieces before being removed. The body is lowered to the bottom of the sea in a sack weighted with stones, or it is buried on the coast. Soon after another diver assumes the helmet which but shortly was covered with the blood of his comrade, and goes to meet the same danger, like a gladiator of ancient Rome.

Since the dreadful consequences of the abuse of the diving apparatus are so evident, it is astounding that this business has spread and lasted so long, and in spite of the protests of the population and of individual philanthropists. Five conditions, however, explain partly the extraordinary duration of so great an evil: (1) The abuse is practiced on the high seas and concerns poor fishermen of distant, isolated localities, from which, moreover, they are absent the greater part of the year. (2) The evil is not confined to one country, but appears in all the sponge-bearing countries of the Mediterranean Sea and some of the Gulf of Mexico; the sponge fishermen do not live in compact settlements but dispersed on islands, peninsulas, and coastal strips of these two great basins. Thus the question is an international one. (3) The owners and partisans of diving apparatus endeavor to influence the governments, the press, and public opinion by such means as concealing the terrible consequences of this abuse or by excusing them. (4) There is a lack of official or private statistics on the mortality and diseases of divers using the diving apparatus and on the harm done by the apparatus to the sponges in respect to their reproduction. (5) There is a lack of responsibility on the part of harbor masters or captains for the death or illness of a diver; nor is there in

the countries where these divers live, i. e., in Greece and Turkey, any insurance on their lives, or in case of illness due to the diving apparatus.

The diver is circumscribed by an evil circle from which he can be released only by a beneficent law prohibiting this mode of sponge fishing. Greed, bravado, and necessity sent the first divers into the scaphander at the instigation of the harbor masters and captains. Now, with premature or sudden death or chronic disease before him, the "machinist" (*μηχανικός*, the sponge diver working in the machine, *μηχανή*, is named by the Greek people) sells his health and life as dearly as possible. He is paid for a summer season of seven to eight months 2,000 to 3,500 francs. This, however, he soon spends, as he is tortured by a craving for enjoyment, as a man condemned to death or with thoughts of suicide. The high wages of the divers, moreover, are often accompanied by rough treatment. They desert, and the harbor masters and captains punish them for it as long as they can by the exaction of high percentage, of extraordinary returns in sponges, of inordinately high prices for the provisions delivered to their families, or by pitilessly requiring them to dive to too great depths, where they meet death or disease as a result.

The sponge-fishing population of the Ægean Sea, Greeks and Albanians, was a religious one without being fanatic or superstitious. They maintained faithfully the ancient simple rites and customs, and their mode of life was honorable and patriarchic. But what a change has come in all this since the abuse of the diving apparatus shook to the depths the moral and material life of these brave fishermen! Both those who use and those who do not use the diving apparatus have fallen into misery, but the worse fate and the responsibility for the evil has befallen the users. A victim of premature death, or of chronic diseases worse than death, the unfortunate diver seeks in his affliction to forget his terrible fate in amusement and profligacy to-day, for to-morrow leaving his aged parents or his young wife and small children in misery; or still worse, he is left to share this misery with them as a cripple; or, by the height of misfortune, he limps through his native place or a foreign land as a beggar, if he is not so crippled as to have to be carried in a cart. The harbor masters and captains, as already stated, bear no responsibility for the frequent accidents, and with no provisions of insurance for cases of disease and death, the entire burden of the misfortune falls upon the family and the nearest relatives of the victim. The sponge trade likewise has for years suffered from the high prices of the sponges, a natural consequence of the destruction and scarcity caused by the diving apparatus and by the expensive hire of the divers.

Specialists have for some time been studying and publishing the results of their observations on the frequent and varied diseases and the numerous cases of death from working in compressed air, and more recently especially among

the sponge fishermen working in diving apparatus. Paul Bert, Guérard, Febvre, Feltz, Bouchard, Petit, Couty, Chabaud, Vivenot, Schultze, Saeger, Leyden, Pierre Marie, Rameaux, Bucquoy, Hermann von Schrötter, Kononoff, and others have written on the general subject, and Paul Bert, Leroy do Méricourt, Gal, Lampadarios, Kotsonopoulos, Parissis, Tetsis, Charpentier, Katsarás, Savvas, Livadá, and the Greek naval officer Melás have treated it with especial reference to the divers. It will be to the purpose to cite some of these writings.

Michael Katsarás, professor of nervous diseases at the University of Athens, published in 1890 the already mentioned work on diseases of divers,^a which were not sufficiently considered by the governments of the interested countries.

Katsarás observed and described 62 cases of diseases of divers, and made experiments with the diving apparatus on dogs. I refer to his book all those who desire better acquaintance with the subject. The celebrated scientist lives in Syme, one of the principal seats of abuse of the diving apparatus, and is, consequently, well acquainted with this evil.

Katsarás limits himself to purely scientific demonstrations without uttering any cry of horror. After having described all the forms of the diseases, he indicates the means of curing the slighter ones. These treatments, however, demand so much time that only persons in prosperous circumstances can take them, and not divers weighted down by debts. Katsarás gives the following advice as to what the diver must do to avoid disease:

(1) Regulate the duration of the sojourn under water according to the depth, as one hour at depths of 10 to 15 fathoms, one-quarter of an hour for depths of 15 to 20 fathoms, ten minutes in depths of 20 to 25 fathoms, five minutes in depths of 25 to 28 fathoms, 3 minutes in depths of 28 to 30 fathoms, and one minute in depths of 30 to 32 fathoms.

(2) Rise very slowly, stopping for one minute after each 2 fathoms.

(3) Avoid consecutive diving by the same person.

(4) Do not dive too deep.

(5) Do not dive while afflicted with a cold.

(6) Have the intestines empty before diving, and eat only in the evening after the completion of the work.

(7) Avoid fatigue.

What would become of pecuniary profit, which is the most important consideration in each trade, if the seven prescriptions of Katsarás were followed? Of these the most important is the fourth, and this according to his own words it is not possible to follow. Katsarás himself says:

Of these the fourth precaution can not be considered; to forbid the divers to descend too deep would be to forbid them their trade, for a sufficient quantity of sponges can not be found at small depths.

^a "Recherches cliniques et expérimentales sur les accidents survenant par l'emploi des scaphandres," Paris, 1890.

This is the only passage, but a very important one, in Katsarás's work, which indicates that the diving apparatus is likewise very harmful to the reproduction of sponges.

Katsarás gives other specific advice:

I advise the affected divers to dive daily for two or three months to a depth of 8, 10, and 12 fathoms, staying under water from fifteen to thirty minutes; and to vary the treatment by compressed air for one month by first cautiously eliminating the pressure, and then resuming it again, etc. * * * The authorities of these sponge-fishing islands should therefore establish small hospitals on the seacoast in order to introduce the systematic treatment with compressed air by means of the diving apparatus. Each small hospital ought to possess 2 or 3 apparatuses for this purpose, and other treatment should be included.

Can anything be more obnoxious and futile than this system? Rendering men ill in order to cure them, and recommending to them a trade with such precautions that it must cost more than it would yield? Katsarás has likewise failed to give statistics of deaths; he contents himself with far too mild a statement when he says on page 2 "No year goes by without at least 10 dead."

Katsarás wrote as a clever physician, leaving others to apply his results. These others are in the first place the authorities of the localities and countries in which the sponge divers live, and in the second place the authorities of the countries in which the abuse is practiced, and unfortunately they pay no attention to the work of the great scientist. It has therefore brought scarcely any aid to the unfortunates to whose weal it is dedicated. Only by enforcing the important logical deduction from the excellent work of Katsarás can the solution of this question and the salvation of these unfortunates be brought about. The diving apparatus in sponge fishing must be prohibited, a thing which has now taken place in some countries, thanks to the pains we have taken.

ATTITUDE OF THE GOVERNMENTS.

As already stated, my work in behalf of the sponge divers began with my visit to Kalymnos in 1892. My plan was to appeal to the governments of each of the sponge-producing countries of the Mediterranean Sea, beginning with the smaller and nearer ones and going to the larger and more distant, and including countries without sponge fisheries, but with sponge beds, as well as those with sponge fisheries with and without machine diving. According to this programme, after Kalymnos came Samos, Crete, Cyprus, Egypt, Tunis, Italy, Austria-Hungary, Greece, and Turkey, all of which except Tunis I visited in person. It will be best to discuss first the conditions in Greece.

GREECE.

The sponge fishermen of Greece live at Kranidion, of 8,000 inhabitants, and Hermione, of 2,000 inhabitants, on the Argolic Peninsula, at Hydra with

7,000, Spetzæ with 6,000, Ægina with 8,000, and Salamis with 3,000 inhabitants; with the exception of the Æginetes, they are all Albanese. There are no naked divers in Greece; the sponge fishermen of Kranidion, Hermione, and Salamis use the hook and the dragnet; those of Hydra use the diving apparatus, which was introduced in Greece in 1866 by several men from Nauplia for the sponge fishermen of the neighboring localities of Kranidion and Hermione. After these machines had brought death to several men and had crippled others, also had cost a great deal of money, they were voluntarily relinquished in the two latter places. A new attempt to introduce them in Greece was made in 1882, however, after they had been operating without interruption in Turkey. This occurred at Syme and was more successful financially, since it was in direct communication with the world market of London and especially because much less heed was taken to spare the human victims which must be sacrificed if financial success is to be obtained in this deadly trade.

The evil made thus great progress notwithstanding the protests of the people from time to time, the terrible abuse growing at last into a recognized industry. The fearful consequences were excused by citing that in other industries, as in mining, accidents happened likewise. It was not taken into account that in the mines it is the natural conditions that bring about accidents, while in sponge fishing with the diving apparatus men make deliberate choice of this over the three safe modes of fishing, because by this means they can gain money more rapidly, the sacrificing of human lives, the misery of their neighbors, as well as the future of the sponge fishery being unheeded, and nobody held responsible for the evil.

The Greek Government, however, does not ignore the cause of the sponge divers. On the contrary, as appears from various official reports, the evils of the business are well recognized.

The ministry of war published on April 12-24, 1896, a circular on the precautions to be taken by machine divers, and sends out every summer the dispatch boat *Kreta*, sometimes also a second war ship, to the coasts of Africa from Derna to Sfax for the purpose of supervising the sponge fisheries, of supplying the fishermen with drinking water, and of lending the necessary assistance in cases of illness. This ministry also founded in April, 1904, at the recommendation of Her Majesty Queen Olga of Greece, a hospital for seriously diseased divers at Tripoli, the lighter affections to be treated on board the *Kreta*; and it published in March, 1904, the very noteworthy report of Constantine Savvas, member of the board of health, professor of hygiene at the University of Athens, and physician to His Majesty King George of Greece, on the diseases of the divers and remedy for the evils existing.

According to the data furnished by the Greek Naval Office and by private individuals (Savvas, p. 10), Hydra sent out, during the summer season of 1903,

171 vessels with 1,370 sponge fishermen, of which craft 36 were sailing vessels equipped with diving apparatus, 342 divers, and 667 sailors; 15 were sailing vessels with the dragnet and 80 fishermen, and 70 were barks equipped with hooks and 281 fishermen. Ægina sent out 40 sailing vessels with the diving apparatus, of which 24 were accompanied by another sailing vessel, with 214 divers and 508 sailors. According to the harbor master of Spetzæ this island put out in that year 8 sailing vessels with the diving apparatus, 43 divers, and 80 sailors. Kranidion sent out 52 barks carrying hooks, with 162 fishermen, and 21 sailing vessels with the dragnet and 93 fishermen, moreover 2 vessels with 24 sailors carrying supplies to the fishermen on the coast of Africa. The number of 12 sailors on each of these vessels is extraordinarily large, and Hermione is not mentioned by Savvas. The total of the above figures is 318 vessels with 2,494 men, of which 134 carried 599 divers and 1,173 sailors, 122 carried hooks and 443 fishermen, 36 carried the dragnet and 173 fishermen, 24 were escort of the diving vessels and had 82 sailors, and 2 were packet boats with 24 sailors. According to the commander of the *Kreta*, Stamatios Vuduris, the fishermen flying the Greek flag gathered in 1902 120,000 to 130,000 oka, or 153,600 to 166,400 kilograms, of sponges, valued at 5 to 5½ million drachmas.

From the data furnished by the Greek naval physician, George Sphinis, who served on the *Kreta* from 1900 to 1903, Savvas gives the following statistics:

Under the eyes of the officers of the *Kreta* in 1900, 12 divers died, 228 fell slightly ill, 34 fell seriously ill. In 1901, 396 fell ill, 34 were treated on the *Kreta*, and 5 of these died. In 1902, 3 died on the *Kreta*, 232 fell slightly ill, and 23 gravely ill. In 1903, 56 sick were treated on the *Kreta*, of which 9 were completely cured, 17 improved to such an extent that they could do some work, while 27 improved, but needed after treatment. Three died.

Savvas observes:

The number of divers treated on the *Kreta* seems small in comparison with the cases of illness in previous years. This is due to the fact that the captains of the sponge vessels are distrustful toward the war-ship on account of its rigorous supervision and would not report their sick, going only so far as to ask for remedies.

But do not the men asking for remedies avow that there is at least one sick on board, and has not the commander of a war-ship the power to seek out the sick on board the small vessel should he earnestly desire it?

Savvas says further that Paul Bert had found that about 30 Greek sponge divers died every year. Katsarâs reduces this already inadequate figure to "at least 10," while Sphinis states that the number seen by him and the officers of the *Kreta* were 12 in 1900, 4 in 1901, 3 in 1902, and 2 in 1904. Savvas, however, observes, quoting official witnesses for corroboration, that "the number of deaths among the sponge divers is much larger." And the commander of the *Kreta*, Stamatios Vuduris, says that 60 divers had died at Bengazi and Derna in 1901. In the Great Desert there was found a sack containing the bodies of two divers.

The commander of the *Kreta* in 1903, Petros Zotos, obtained under oath names of 24 divers deceased in that year. This commander learned, moreover, from a reliable source, that 40 other divers, whose names he could not get, had died. He is of the opinion that of the 900 divers who work under the Greek flag in 140 scaphanders more than 100 died within the period of one summer cruise (from March to October), that the others all but a few "are either crippled already or will soon be so and absolutely incapable of any other work." My experience of many years confirms the opinion of Captain Zotos.

Savvas republishes in his report the already mentioned circular of the Greek Naval Office of April 12-24, 1896, on the precautions to be taken by the divers. This had never been enforced, a fact which has made the Greek Government since 1900 detail a war-ship each summer for the protection and assistance of the sponge fishermen. Savvas finds even this measure insufficient, however, without a special law, observing that—

The measures of the rapidly succeeding governments have unfortunately but a very small effect upon the sponge fishing conducted with diving machines. It is absolutely necessary to take more effective and thorough measures, and such ought to be inaugurated by a special law for the purpose of limiting the evil.

The measures recommended by Savvas are divided into three classes, (I) financial, (II) administrative, and (III) sanitary.

I. The captains of sponge-fishing vessels borrow, at very high interest, a considerable sum which is to be paid back to the lender at the end of six months. In order to obtain sufficient sponges to be able to pay back the borrowed sum with the interest and, moreover, to support themselves and their families, they employ a comparatively small number of divers, who must work very hard and risk every danger. The captains exhibit a change of attitude as the fishing season advances. Until their indebtedness has been covered by the number of sponges obtained, they spare the divers, but after this the latter are driven to extremest effort for the captain's personal gain before the end of the season shall have come. Savvas proposes, accordingly, to decrease as much as possible the borrowed sum and the interest, which amounts each year to from 24 to 36 per cent. The prices of provisions for the crew and for the vessel's supplies are exorbitant, but the captain is obliged to accept; otherwise he does not obtain the necessary loan. Savvas would, therefore, as a first financial measure, decrease the interest to 10 per cent and 12 per cent, and allow the captains to purchase the provisions and other necessaries where most advantageous to them. Savvas does not discuss the question of source of the capital for the enterprise, whether to be supplied by banks or otherwise; but he deplores the advancing of money by the captains to the divers, since the latter spend it in orgies which are harmful, not only because the money is uselessly spent, but also because the physique of the divers, weakened by dissipation, is much more readily the prey

of disease. By this advance, moreover, the diver is placed in complete subjugation to the captain, who makes him work even when he is ill. As a second financial measure, Savvas would change the advance pay into a monthly salary. As a third, he proposes the founding of a relief fund for the divers, to which all captains and divers ought to contribute. From this fund assistance would be given to the widows and orphans and to the sick and disabled divers. The school for divers and the hospitals for the latter would likewise be maintained from the proceeds of this fund.

II. The first administrative measure proposed by Savvas is the founding of a diving school at Toros, Hydra, or at the navy-yard of Salamis. A diploma from this school would be demanded for permission to follow the calling of diver or to be a captain of a sponge-fishing vessel. Only when all the men are trained will it be possible, according to Savvas, to place upon the captain the responsibility for violating precautionary measures and not now when he acts in ignorance. The school would be under the direction of a naval officer, after the latter, if possible, has visited the diving school of the Russian fleet in Cronstadt, which is considered a model. A naval physician would likewise be detailed to this school, after having undergone a course of special studies on this subject in order to learn the elementary anatomical and sanitary knowledge in this domain. He would be present at the practical exercises of the students, to give immediate assistance in case of accident and to subject divers suffering from a chronic disease to a regular treatment, and if possible a hospital would be erected in the vicinity of the school. A course of one month should be sufficient training for the divers.

Savvas's second administrative measure is to subject the sponge-fishing vessels to a thorough examination before their departure, not only to ascertain the condition of the divers, but also to inspect the diving apparatus, the air pump, the rubber tube, the clothes of the diver, the manometer. Men suffering from lung and heart diseases should not be allowed to work as divers, nor should neurasthenic, weak, or anæmic persons, those suffering from chronic diseases of the ear and nose, those who are very lame, nor men under 20 and over 40 years of age. This inspection ought to be held by a commission consisting of a naval officer as president of the board, a naval physician, and a naval engineer, who should go in person to the point from which the fleet of sponge-fishing vessels is to take its departure. The board of inspectors should be authorized by a special law to issue permit and ship's papers to each vessel fulfilling the above-mentioned conditions, which permit and papers are at present issued by the authorities of the port; also to prohibit, by force if necessary, the departure of a vessel not fulfilling the conditions, or of a diver who does not possess the qualifications demanded.

The third administrative measure proposed by Savvas is to insure the correctness of the ship's papers, which heretofore have been supervised very carelessly by the port authorities. The captain should be compelled to keep his records with the greatest exactitude and to report each change in his crew to the nearest port authorities or to the commander of the cruising war ship. Upon returning to his native port, he must render account of the health of each of his crew individually, as well as of deserters and deceased. The harbor master must then make to the Naval Office a detailed report on the cruise.

Savvas recommends as a fourth administrative measure the supervision of sponge fishing along the coast of Africa by one or two men-of-war, which has been done since 1900. Savvas urges, further, that the naval commanders be empowered to take more active measures, to impose small fines for the violation of regulations, and even to deprive the captains of their permits.

As a fifth administrative measure Savvas recommends an exact regulation of the duties of the captain and the master of the divers in regard to the latter, as well as of the mode and duration of the work and an express definition of the responsibility of the captain and the master for each violation of regulative measures, thus to prevent all excuses based on ignorance.

The sixth administrative measure is the imposition of heavy punishment on the captain and the master for the violation of any regulation, and Savvas cites articles 300, 301, and 310 of the Greek penal code and articles 222 and 230 of the German, in force in the diving service of the German fleet. He does not deem the articles of the Greek penal code sufficient, however, and expresses the opinion that they ought to be made more rigorous by new legislation applying especially to the diving business, for only then could a limit be put to the requirements of the captains. The harbor masters and the commanders of the supervising war vessels should have authority to impose punishments upon the guilty, for too much time would be necessary for action in such cases by the court or by the Naval Office, and the effect of the punishment would be weakened.

III. The following are the sanitary measures recommended by Savvas:

- (1) Perfect health of the diver when entering upon his work.
- (2) Slow descent to the depths of the sea.
- (3) Regulation of the duration of the sojourn of the diver under water by the depth, according to Katsarás.
- (4) Slow ascent from the depth, according to Katsarás, Silberstein, Méricourt, and Kononoff.
- (5) Prohibition of continued diving by the same person, quoting the opinion of the inventor of the most popular diving apparatus, Denayrouze, that the duration of work for a diver in this apparatus should never exceed

2½ hours daily and, according to others, that the diver should dive but once a day.

(6) Avoidance of diving during a cold or with a full stomach.

(7) Avoidance of fatigue, of use of liquor, of fasting.

(8) Presence of remedies and means for first aid on each vessel, as (a) compressed-air treatment when the diver falls ill, a thing which Savvas himself admits is impossible, since there is room for only one diving apparatus on each vessel, and the latter serves for the work and not for curative purposes; (b) breathing of compressed air; (c) establishment of hospitals on the African coast and in Greece; such a hospital was founded in Tripoli in April, 1904.

Savvas says in chapter 8, under the heading "The result," that about 2,600 men are engaged in sponge fishing in Greece alone, that among these there are 636 machine divers on 134 vessels with 1,218 sailors, that according to the reports of the commanders of the *Kreta* at least 60 to 100 divers die each year, and that so many fall ill that four-fifths of them are more or less severely crippled, a fact that renders their work much more arduous or often completely incapacitates them. The remaining sponge fishermen, of whom those using the dragnet form the minority in Greece, while the naked divers form the majority in Turkey and are the only ones in the other countries—these, Savvas observes, suffer no harm. Why, then, does not Savvas state the conclusion to which every impartial person must come, that the harmless modes of sponge fishing should be encouraged and the harmful prohibited? He does imply this conclusion in the following statement:

If the execution of these measures is for one reason or another impossible (and it is impossible, for the profits, which are the principal incentive of every trade, would be lost), then should the prohibition of machine diving be considered, not only for the salvation of a large number of persons from death and disease, but also for the honor and good name of the country.

Regard for the life and health of the divers and for the good name not only of Greece but of all countries interested in the sponge fisheries, I share fully with Savvas; but I am amazed at the time required by most theoreticians, of whom Savvas is one, for recognition of the fact that no advance can be made by the execution of even a part of his measures—that their enforcement imposes the prohibition of machine diving. It is the same end at last, after all is said and done, i. e., the actual prohibition of the scaphander.

While Professor Savvas was writing his report, the Naval Office detailed in January, 1904, a board, consisting of 12 members, to which belonged Savvas and deputies from Parliament from the sponge-fishing districts as well as naval officers, for the purpose of working out a project of law to govern sponge fishing with diving machines. The board finished its work within a month. The drafted law contains all that Savvas demands in his report, but has not been

once brought up in the Chamber of Deputies during the four years that have elapsed since then. It may be gathered hence that the partisans of the diving machine, wishing not to be molested, know how to hinder the presentation of the question before the Chamber, and without the vote of the Chamber the execution of the measures is of course impossible. Thus, then, the well-meant regulations are absolutely unimportant because they are impossible of execution; and they are worthless and impossible of execution also because they cost more than the industry yields—and this is the worst to be said about an industry. This wretched business is profitable now because all responsibility, all burdens, all the suffering of it, can be shifted and because the two countries where it exists, Greece and Turkey, have indorsed it for forty-two years.

In January, 1907, the Greek Naval Office in Athens published the "Guide for Divers" by the naval physician, Dr. Spiridon Livadâs, and the naval lieutenant, Constantine Melâs. By the wish of Her Majesty the Queen of Greece, Livadâs and Melâs were detailed for a few weeks to the diving school of the Russian fleet at Cronstadt, in order to familiarize themselves with the innovations and improvements brought about in this work. Their "Guide" does not give any statistics of death in the sponge fisheries, but it reiterates the advice already given by Katsarâs and Savvas; and it has a highly suggestive title-page depicting a naked sponge fisherman lying on a bed in the hospital of Tripoli, his body covered with wounds, himself one of the numerous victims of the diving apparatus who died from gangrene after an illness of six weeks. This title-page, the short description of the sufferings of this victim, and the great number of precautions to be observed by the diver in order to avoid the grave danger threatening his life and health, are likely to frighten him, and thus this book renders a great service to the sponge fisheries. Not otherwise, however, can it prove of great benefit to Greek divers, for there is an enormous difference between the work of the divers in the navy, which is of great usefulness and harms nobody, and that of the sponge divers, who have to consider pecuniary remuneration and engage in work which causes the greatest harm to men and sponge resources.

Thus, as shown by the official reports quoted; by the fact that the Greek Government maintains the hospital ship *Kreta* in the interests of the sponge divers; by the fact that a hospital has been established at Tripoli at the instigation of Her Majesty the Queen; by the issuance of circulars and regulations from the Greek Ministry of War—by all these various actions the evils of machine diving are acknowledged in Greece. I have obtained the favorable consideration of the King and the cordial sympathy and aid of the Queen in the cause of these suffering subjects. The people themselves have given evidence of their need and of their appreciation of efforts for their relief. But the logical and

hoped-for result, the suppression of the evil by entire prohibition of the diving apparatus, is not yet accomplished.

KALYMNOS.

In Kalymnos results were at last obtained by the promulgation, in 1902, of an irade from the Sultan, which in the extent of its prohibitions exceeded the expectations of both factions interested. In execution the irade has, however, been defective. Provision was not made for the confiscation of diving machines nor for their exclusion from Turkish import and export. And in spite of the prohibition, a considerable number of Greek and Turkish sponge divers worked until lately in Turkish and Cretan waters without being prosecuted. They contended that they worked in neutral waters, since they fished at a distance of 3 maritime miles from the coast, where, according to them, everything was free to everybody. This interpretation of the neutrality of waters is absolutely arbitrary and sophistical, since it is the sponges that are here in question and not the waters, and since the sponges, with the banks on which they grow, even if 20, 30, and even more maritime miles from the coast, belong to particular states, generally to the one whose coast is the nearest. But even if the owner does not wish to protect his sponge banks or if he can not do it, as happened with Crete, on account of the lack of a revenue cutter, the wrongdoers need by no means be allowed to carry on illegal operations, even in neutral waters. Civilized nations are solidary in this respect and do not overlook such criminality, as was shown in 1905, by the four protecting powers of Crete, Great Britain, France, Italy, and Russia, and lately again by France in Cretan waters. The sponge fishermen following the three older methods of fishing are naturally displeased at the disregard of the prohibition, and there have been some disorders on this account in Kalymnos and Syme.

SAMOS.

The Duchy of Samos possesses good sponge grounds, but no native sponge fishermen, and by reason of its small size would be of slight importance in the sponge fisheries had it not been the first autonomic country to prohibit diving machines. This prohibition took place in 1898, and in 1902 was revoked, but in 1904 the law was again changed, prohibiting the diving machine and permitting the dragnet, which in the meantime had been prohibited for an interval.

CRETE.

There are no sponge fishermen in Crete, with the exception of a few who allow themselves to be tempted to work on foreign sailing vessels in diving apparatus. But there are excellent sponges there, especially on the coast of

the eastern prefecture (Lasithi) and the islands belonging to it. Since 1898, the revenues obtained from licenses for sponge fishing fluctuated between 7,833 francs 40 centimes in 1903, and 26,360 francs in 1902. The naked divers and those using the dragnet paid in 1907, up to November of that year, 230 francs for each sailing vessel and since that date 250 francs, while the hook fishermen paid 90 francs, now 100 francs, for each bark. The working season in sponge fishing is considered on Crete from March 1 until February 28. The Cretan statistical data do not give, unfortunately, any information as to how many, whence, or on how many vessels sponge fishermen arrive, how many of them use the three proper modes of fishing, nor the quantity and value of the catch of each.

The first action against machine diving on the sponge banks of Crete was obtained in 1899, and consisted of a law of complete prohibition. The sponge beds flourished in consequence, and soon became a great temptation to the greedy machine divers of Greece and Turkey, who sought repeatedly, from 1901 to 1907, to have the law repealed. Failing in this they circumvented it by fishing secretly on the coasts of Crete on their return from the African banks, and in 1905 enlisted even a few Cretans in this illegal enterprise. I at once took steps in the matter, and had the satisfaction of seeing the four protecting powers—Great Britain, France, Italy, and Russia—send their war ships to seize the culprits. Unfortunately, however, proper punishment was not inflicted, and the situation became an open scandal. In government circles it was claimed that enforcement of the law was impossible because Crete owned no revenue cutter. But there were guilty Cretans who could have been apprehended without any revenue cutter, and the license fees from the sponge fisheries would have built a revenue cutter long since. The contention between the friends and opponents of the diving machines kept the question embarrassingly alive to the Government and Parliament of Crete, and finally brought about action in the fall of 1907, whereby a limited number (10) of diving machines were permitted for ten years to a syndicate under certain specified conditions. These conditions, however, were purposely made so difficult that no such syndicate could be found, nor ever can. Another provision of the law was for the payment of damages to the families of divers who died as a consequence of the use of the scaphander. Thus the law has been saved; but the lack of a revenue cutter in Crete is a disadvantage that calls for prompt remedy.

The cause of the sponge divers in Crete received a further signal support in 1908, when the French Government, at the request of the Cretan Government, ordered its war ship *Faucon*, stationed at Suda, to apprehend the sponge divers fishing illegally in the waters of Hierapetra, which are under French control. The *Faucon* captured 7 boats, with 80 men, from Kalymnos and Syme. The remainder escaped in a heavy gale, and three were wrecked, with

a loss of 25 men. The decisive action on this occasion of the Cretan Government has greatly encouraged the opponents of the diving machine, and has led to similar requests in regard to the sponge grounds of Turkey, Italy, Tunis, Cyprus, and the Gulf of Mexico. In any event, the governments of Greece and Turkey have before them the important duty, whether or not they forbid the diving machine in their own territory, to prevent their own subjects from violation of the laws of other countries. And such violation when it does occur should be punished by confiscation of the ship's papers for a year or more, and forever in case of repeated offense.

It will be noted from the foregoing that the position of Crete in regard to the sponge fisheries and her attitude in the present question is most important and worthy of admiration.

CYPRUS.

Cyprus likewise has rich sponge banks but no native fishermen. The harmless dragnet was long ago prohibited, but the diving machine was permitted until 1901, when, the authorities having been enlisted against this abuse, a law was obtained which remained in force for three years. In 1904 the partisans of the apparatus succeeded in obtaining authority for a limited number of diving machines, under pretext of work to be done in the harbor of Famagusta. The naked divers and hookers were driven away by the conditions operating to their hardship; and a plan for a colony of sponge fishermen, as in Egypt, likewise came to nothing, naturally, since it of necessity involved the discontinuance of machine diving. At the present time the Government of Cyprus leases to the highest bidder the privilege of using six diving machines in one and the other half of the waters alternately, a misstep which is the more astonishing in the face of the wholesome example of near-by Egypt.

TUNIS.

The Regency of Tunis has extensive sponge banks, and numerous sponge fishermen, about 1,500, on 400 barks equipped with hooks. A great number besides come yearly from Italy, Greece, and Turkey. I lack statistics for Tunis, however. At my solicitation the scaphander was prohibited in 1901, but unfortunately, notwithstanding the apparatus is termed "engin destructeur" in the language of the decree, enforcement of the prohibition has failed, through intrigues of the opposing forces.

TURKEY.

Turkey has the most and the best sponge fishermen, but unfortunately official statistics of the sponge fisheries are entirely lacking. The chief localities are Kalymnos with 18,000 inhabitants, Syme with 20,000, Chalke with 6,000,

Kastelloriso with 6,000, Halikarnass with 3,000, Tschesmé with 3,500, Aivali with 20,000, Moschonisia with 3,000, and Marmara with 2,000, also villages and cities of Syria. Before the introduction of the diving apparatus there were some sponge fishermen also in the islands of Patmos, Leros, and Telos. In Kalymnos, Syme, Chalke, and Kastelloriso all four kinds of fishing methods are represented, in Halikarnass and Tschesmé, only the dragnet; in Aivali, Moschonisia, and Marmora, only the diving apparatus, though in limited numbers; in Syria there are only naked divers. The first six places and the villages of Syria have always depended entirely upon sponge fishing for a livelihood. Since the introduction of the diving machine there has been a marked emigration, especially to Russia and the United States of America. The famous naked divers, who have inherited this skill from many generations of forefathers and have perfected it by practice, live at Kalymnos, Syme, Chalke, Kastelloriso, and on the coast of Syria.

A law prohibiting the scaphander was promulgated in 1902, but is not effectively enforced.

EGYPT.

I went to Egypt in 1901, after successful visits to Samos, Crete, Cyprus, and Tunis. I encountered considerable opposition, but a beneficent law was at length promulgated in the spring of 1902, to be followed in the autumn by a similar decree for the whole Ottoman Empire. The Egyptian Government has always shown great interest and care for its sponge fishermen, having founded a colony for them near the excellent harbor of Marsa Matruh, 160 kilometers west of Alexandria, and having also rigorously enforced the law by means of the coast guard.

In 1906 a rich new bank, extending 110 miles from Abukir and having a width of 1 to 3 miles in a depth of 20 to 60 meters, was discovered by some Italian fishermen, who found sponges in their nets. This El Dorado, known as the bank of Port Said, after a most successful cruise thither by a vessel from Syme, attracted sponge fishermen from everywhere. The sponges were of the finest quality, and conditions were most favorable, for the diving apparatus was entirely excluded.

In 1908, however, word began to be circulated that the Egyptian Government could not enforce its law outside the 3-mile limit. The sponge fishermen following the three good methods had meantime begun to assemble near Marsa Matruh, in Alexandria, where a fleet of 350 vessels with 3,000 men waited two weeks for decision from the Egyptian Government. Requests and petitions with thousands of signatures were of no avail. The advocates of the diving machine proved the more powerful, although they possess legal rights only in Greece. The Egyptian Government refused to assert control of the banks out-

side of the 3-mile limit, and the waiting sponge fishermen found themselves at once in competition with vessels equipped with diving machines and armed with rifles, revolvers, and sabers. A crew of naked divers from Kalymnos were fired upon, and in response to complaint of the captain the Egyptian Government apprehended 110 men with 9 diving machines 26 miles off the coast and brought them to Port Said. Instead of prosecuting them, however, and inflicting the punishment that was deserved; notwithstanding that arms and ammunition were found on board their boat; notwithstanding also that they were Turkish subjects and therefore liable to the laws of Turkey and Egypt against diving machines, they were allowed to depart, after twenty-four hours, in full possession of diving equipment, arms, and ammunition.

The hardship upon the original occupants of the sponge grounds was great. After paying their fees of 8 to 4 Egyptian pounds (200 to 100 francs) for permission to fish, they were driven away, and in Syria, whither they resorted, they must pay an equal fee. The banks of Port Said are thus, moreover, left at the mercy of the machine divers. I have appealed to the International Life Saving Congress, held at Frankfort on the Main, and now urge the International Fishery Congress at Washington to give support and sympathy to the unfortunate sponge fishermen who have undergone such loss this season at Port Said.

SPAIN, ALGERIA, AND MOROCCO.

Sponge fishing is not remunerative in Spain, Algeria, and Morocco on account of lack of good sponges. Those to be found there are mostly funnel-shaped, called elephant's ears and simply ears by the Greek fishermen. Ten sailing vessels worked in Spain in 1903 with diving apparatus, coming from Kalymnos, Syme, and Ægina; in 1904 there were only two sailing vessels from Kalymnos and none since then.

ITALY.

Official statistics of the sponge fisheries were attempted in Rome earlier than in Athens, and the Italian Naval Office has for twenty years detailed a small war vessel each summer for the supervision of sponge fishing in Italian waters. The commanders of these vessels see to the maintenance of order, give medical assistance and remedies to the diseased sponge fishermen, supply them with drinking water, and send in reports to the Naval Office. Articles based on these reports are there prepared for publication in the "Condizioni della Marina Mercantile Italiana," published each year by the Ministry of Merchant Marine, in a section devoted to the sponge fisheries. We find in these "Condizioni" abundant material on the sponge trade as carried on in Italy by natives and foreigners, and this material contains naturally some

statistical data. The majority of the foreigners are machine divers on sailing vessels flying the Greek and Ottoman flags, and the "Condizioni" report regularly cases of death, disease, and desertion among them. Since, however, the Greek divers conceal their accidents and misdeeds from the Italian authorities, the statistics are not very complete. In the summer of 1902 the Naval Office promulgated a partial prohibition of the diving machines, regulating the depth in order to prevent disease and death; but the enforcing of such partial prohibition is very difficult, and thus this measure is quite insufficient in practice, as shown by the report of the "Condizioni" for the year 1907 for the cruise of 1905, which mentions four new cases of illness of Greek sponge divers.

According to the "Condizioni" for 1906, there were in the Italian waters in the year 1904, 309 Italian fishermen on 63 sailing vessels of 1,302 tons. The total number of Italian sponge fishers for that year may, however, be computed at 1,270 men on 200 sailing vessels. The official statistics do not mention the 137 sailing vessels which departed for Tunis, nor the quantity and value of the sponges gathered by them. According to the same source, there were in the Italian waters 406 Greek fishermen on 37 sailing vessels, of which 110 on 22 sailing vessels from Kranidion were equipped with dragnet and 296 on 15 sailing vessels from Ægina carried diving apparatus. The fishing grounds were the extensive banks of Lampedusa and Pantellaria, where 36,864 kilograms of sponges, valued at 615,781 francs, were gathered as follows: For the 309 Italians, 247,184 francs; for the Greeks, 368,597 francs, or for each Italian 800 and for each Greek about 908 francs. If we consider, however, that the expenses of the fishery are far greater for the diving apparatus than for the other modes of fishing, we see that the profit of the Italians and of the minority of the Greeks without these machines was in no way smaller than that of the majority of the Greeks using the diving apparatus, with the great difference that all the Italians and the minority of the Greeks fished with harmless means, while the majority of the Greeks used apparatus injurious to their health and to the prosperity of the Italian sponge grounds. The Italian Government hoped to be able to protect these divers by its partial prohibition of 1902, but the desired results were not attained.

The Italian sponge fishers live at Terra del Greco, Porto Empedocle, Trapani, Naples, Palermo, and Catania, using mostly the dragnet and more rarely the hook, and fishing on the banks of Lampedusa, Linosa, Pantellaria, Ustica, the Æolian and Ægadian islands, along the coasts of Apulia and Calabria, Sicily, and Sardinia, and especially the coast of Tunis. In 1887 Captain Leonardo Angugliaro, from Trapani, discovered the extensive sponge banks of Lampedusa, and in the following year Greek fishermen with diving apparatus, under the Greek and Turkish flags, appeared there, to continue in Italy what they had

so thoroughly begun in their native country, i. e., the gradual but sure destruction of the sponge fishery. It was thus that the question of diving machines was introduced in Italy.

We must render the Italian Government the justice to acknowledge that it took and takes pains to obtain information. This is proved by the fact that as early as May 22, 1890, the Italian Naval Office sent a circular to the consuls at Tunis, Tripoli, Korphi, Canea, Piræus, Thessalonica, Smyrna, and Larnaka, containing questions as to the sponge fishing, but the result of this action was not published. In June of the same year the Italian Government detailed to the *Mark Antonio Colonna*, commanded by Eugenio de Gætani, Prof. Enrico Giglioli, of France, a scientist, now director of the Zoological Museum in that city. We owe to the joint work of these men several good maps of the sponge banks of Lampedusa, an unsuccessful attempt to raise sponges artificially, and a few partly correct and partly incorrect observations on the value of the diving apparatus for sponge fishing, which may be found in the report of the "Condizioni." Giglioli, a scientist of great ability, unfortunately favored the diving apparatus in this practical question, having not the least perception of the miseries it brought about. The evils of the method were thus not appreciated by the Naval Ministry and the Ministry of Agriculture, Industry and Commerce and the use of the diving apparatus was recommended to the Italian sponge fishermen often and warmly in the "Condizioni" until 1901.

These frequent official recommendations in the "Condizioni," based upon the reports of the commanders of war ships supervising the sponge fishing, and the success of the Greeks, who concealed carefully their dead and cripples from the Italians, showing only the advantages of the method, induced a few Italians in 1893 to make a few experiments with the diving apparatus. These attempts were without the desired success, however, because in order to obtain the most modest results the life and health of human beings must be sacrificed without pity and no one could or would understand this in Italy, neither the officials of the ports nor the divers who serve in the Italian navy. The experiment to obtain sponges by means of the diving apparatus was tried once and no more, as may be ascertained by the report published in 1894 in the "Condizioni." The observation of the necessary precautions for the divers being followed in Italy, sufficient pecuniary results were precluded. The Naval Office continued to recommend the use of the machines until 1901, however, though fortunately without any success, as may be seen from the reports of 1895, 1897, 1899, and elsewhere.

The following incident, mentioned in the report of the "Condizioni" of 1898 for the cruise of 1897, is very characteristic:

The naval authorities of Lampedusa learned that several Greek divers who met with accidents during their work were secretly buried on a neighboring island. The dispatch

boat *Rapido* brought the proper authorities to the above-mentioned point, and three bodies of Greek divers were found. Microscopic examination, made by the ship's surgeon, showed that the divers were suffocated, and it was found they were afterwards buried by their comrades without notice to the authorities of Lampedusa. Thanks to the presence of the dispatch boat *Rapido*, these regrettable facts were found out and it was shown that the Greek captains of sponge vessels do not observe all the necessary precautionary measures demanded by humanity in this work.

In the interest of justice and humanity the Italian Ministry of the Navy requested the Greek Government to take measures in order that such incidents should not occur again, and the Greek Ministry published on the 3/15 of February, 1898, a circular to the harbor masters and the consular authorities, enjoining them to see that the captains of the sponge-fishing craft observed rigorously all requirements, including the circular issued by the Ministry of the Navy on April 21/24, 1896, on precautions for divers. But all these measures remained without result, because the Greek Government does not fix the responsibility for cases of death and sickness, as we have already mentioned. The Ottoman Government likewise holds no one responsible for the abuse of the diving apparatus in spite of the prohibition of August, 1902.

Fortunately a change has taken place since 1901 in the attitude of the Italian Ministry of the Navy in regard to the diving apparatus. In addition to the partial prohibition of 1902 in regard to the depth, we find in the "Condizioni" during the later years reports almost similar to that of 1906 for the cruise of 1904, which I transcribe here:

The use of diving apparatus, which was fortunately not adopted by our sponge fishermen, is, although preferred for the selection of the product, always harmful and often deadly to those using it.

This sentence and especially the word "fortunately," as well as the partial prohibition of 1902, is a declaration of the Ministry of the Navy of conviction that the diving apparatus is harmful, a conviction which ought to be substantiated by an entire prohibition. The limited questionable merit for selection of the product is of very small practical value and is easily changed into an evil if we think that after the selection of the large sponges soon the smaller and smallest are taken and the young growth is being crushed by the heavy and broad soles of the divers. The use of diving apparatus in sponge fishing is thus wholly condemned and ought to be prohibited by every wise government.

The other official body in Rome concerned with the fisheries, the Commissione Consultiva per la Pesca, which has been for more than twenty years a part of the Ministry of Agriculture, has as yet taken no action further than to recognize the question as deserving of study, action being deferred pending fuller information. Such delay is most dangerous to the interests at stake, since much evil may be done during the time consumed in further study of the subject.

AUSTRIA-HUNGARY.

The sponge fisheries in Austria-Hungary are located in the village of Crappano, district of Sebenico, in Dalmatia. There were, in 1904, 140 sponge fishermen on 70 barks. Each bark carries a rower and a fisherman, with a five-pronged hook which has a handle 18 meters long. The men smooth the surface of the sea by pouring oil over it, instead of using the tin cylinder with the glass bottom. The annual harvest of sponges per man varies from 225 to 500 crowns in value; a few earned 800 crowns in 1897. The two former figures are below and the latter is above the sum mentioned by the "Condizioni" for the Italian sponge fishers in 1904, i. e., 800 francs.

The Oesterreichische Gesellschaft für Seefischerei und Fischzucht, in Trieste, from whose reports I have taken the data for sponge fishing in Austria-Hungary, have recommended the diving machine to the sponge fishermen of Crappano since 1892, the Imperial and Royal authorities of Trieste prescribing that on the coast of Istria and in the vicinity of the islands of Quarnero the apparatus should not be used at a depth of less than 12 meters and in the Dalmatian waters at a depth of 20 meters; but the enforcement of this requirement is very difficult. Experiments with the diving apparatus failed, however, as in all cases in which an enlightened government provided for personal safety of the divers and the future of the sponge beds. Observation of the necessary precautions precluded all profit. These efforts were met likewise with an obstinate resistance on the part of the majority of the sponge fishermen of Crappano, who recognized a great danger in the diving apparatus. Their own experience as well as the resolutions of the International Fishery Congress at St. Petersburg in 1902, at which the Oesterreichische Gesellschaft was represented, caused the latter to desist from further encouragement of the diving apparatus.

The same society resolved in 1904 to make experiments with the dragnet at depths over 40 meters, having in mind the considerable results obtained by this mode of fishing in the waters of Lampedusa. Such an apparatus was made for the society by a Greek sponge fisherman in Trieste. I have not yet, however, obtained a report of the results it yielded. The Austro-Hungarian waters are divided into zones for sponge fishing, in order to allow time for the sponges to grow to their full size and propagate, and it is forbidden to take sponges of less than 6 centimeters in diameter.

UNITED STATES.

There are numerous sponge banks in the waters of the Gulf of Mexico, especially south and west of Florida, Cuba, Haiti, the Bahama Islands, which are situated outside the Gulf, and in other places. Sponge fishing in the state of Florida has its centers at Key West, Tarpon Springs, and Apalachicola. In 1900

this industry was followed in the first locality by 1,827 persons, in the second by 354 persons, and in the third by 64, making a total of 2,245. Among these, 1,239 men were working on small vessels, 874 on barks, and 132 on shore. There were 1,356 colored and 75 white men among the sponge fishermen, and among the workmen on shore there were 119 white and 13 colored men. According to nationalities, 1,268 were British subjects, mostly from the Bahama Islands, of which 1,013 were colored; 839 were citizens of the United States, of which 343 were colored, 5 Portuguese, and 1 Norwegian. Among the men working on shore 114 were citizens of the United States, all white, and 1 Greek. Up to 1905 the sponges were gathered in Florida exclusively by means of the hook. It is to be regretted that the dragnet is prohibited for the greater depths where the hook can not reach.

In 1900 there were used in sponge fishing 156 small vessels of 1,750 tons in all, valued at \$182,151, and 228 barks valued at \$176,465. The trade in native sponges was concentrated at Key West and Tarpon Springs, and was carried on by representatives of firms in New York, Philadelphia, and St. Louis, with the exception of one independent firm in each of the two above-named Florida localities. These firms had in this year 17 buyers and 124 other employees and workmen, the annual salary of whom amounted to a total of \$43,947. In 1900 there were obtained in Florida 418,125 pounds of sponges, valued at \$567,685, while in 1880 there were gathered 207,000 pounds of sponges, valued at \$200,750. (These data are taken from official reports of the United States Bureau of Fisheries.)

In February, 1905, the question of sponge diving arose in America. In the course of a few months 70 diving machines from Greece and Turkey, increasing to 100 in the following year, appeared in Florida, and, so far as I could ascertain at such a distance, operated without loss of life, since the work was done in shallow waters. It did so much the more harm to the future of the sponge beds, however, and the practical Americans did not need much time, fortunately, to see the danger threatening from these reckless foreigners. Thus the question arose in the United States, and those concerned were divided into two large groups with diverging interests for and against the diving apparatus, exactly as previously in other countries. All who could obtain a temporary profit declared themselves in favor of the diving apparatus, while all those who had regard for the future were opposed. Both parties had influence and sought justice and protection from the Government, and the matter came before the Houses of Congress in Washington, there to be very promptly investigated and acted upon.

On June 20, 1908, was passed the beneficent law by which the diving dress in sponge fishing was absolutely prohibited in depths of 50 feet and less, and

at depths greater than 50 feet it could be used only from October 1 to May 1. Moreover, the taking of the sponges of a diameter less than 4 inches was prohibited, under penalty of a fine of \$100 to \$500 or confiscation of the vessel and the diving dress. The important action of the Government of the United States was undoubtedly influenced by the resolutions of the International Fishery Congresses held in St. Petersburg in 1902 and in Vienna in 1905, as well as by the beneficent legislation of so many countries of the Mediterranean Sea, for these were frequently mentioned in the debates upon the subject, as were also the reports of American consuls in countries of this vast sea basin, who have given and still give this important question the consideration it merits, as may be seen from the report of Consul G. B. Ravndal in Beirut. The practical spirit of quick resolution in the Americans deserves high commendation and imitation, and it is to be hoped that this recent excellent example of forethought will influence the slower governments to early action in this important matter.

RÉSUMÉ.

Most of the sponge-bearing countries—Samos, Crete, Egypt, Tunis, and Turkey—exact only a moderate payment of dues from each vessel. Cyprus did the same until 1904; since that date the government of this island has exacted a very high percentage of the harvest of sponges, which is unjust and, moreover, unpractical, as it demands the continuous supervision of each sponge-fishing vessel. The United States, Austria-Hungary, Italy, and Greece exact no fees. I lack the necessary information in this regard as to Cuba and the Bahama Islands.

In fact, as I have stated, there is a lack of complete and general statistics on sponge fishing, especially as to injuries to health and life of the sponge fishermen and the condition of sponge beds arising from the use of the diving apparatus. I obtained the following approximate figures, which vary, however, from year to year, by long years of observations and investigations. The number of diving machines in use by part of the sponge fishermen of Hydra and exclusively by those of Spetzæ and Ægina in Greece; by part of the sponge fishermen of Kalymnos, Syme, Chalke, and Kastelloriso, and exclusively by those of Aivali, Moschonisia, and Marmora in Turkey, has varied according to the year from a few in 1866 to 225 with 1,200 divers and 1,500 sailors in 1898. The adherents of the three good methods may be computed at 10,000 in round numbers, fishermen and sailors, from Syria to Florida. Yet even this figure varies, though somewhat less, according to the years. With their families and the families of the classes closely united with them as priests, teachers, merchants, and artisans, the sponge fishermen form a population of more than 100,000 heads. The yearly mortality of sponge fishermen in the diving apparatus is

about 20 per cent and the seriously and slightly diseased reach annually 25 per cent. The health of the sponge fishermen working with the hook and the dragnet is not exposed to the slightest injury. Only the naked divers run at times the danger of being attacked by a shark, but accidents of this kind are so rare that the fishermen do not consider them at all. The number of victims of the diving apparatus during the entire time of the abuse, i. e., during forty-two years, may be computed at 5,300 dead and 2,300 seriously disabled, while cases of slight diseases, transformed into serious ones with time and ending in death or chronic ailment, attack all divers after a longer or shorter period of work in the machines.

For the future of the fishery as well as the welfare of the fisherman the diving machine is most harmful. It has been contended that the diver fishes without disturbing the bottom. This is not true. The heavy apparatus breaks and crunches the embryo sponges that lie in the path of the diver, and he searches over the entire sponge-bearing area. He takes, moreover, not only the largest and best sponges but also the small ones, arguing that what he does not take to-day will be taken by some one else to-morrow, and he fears also the cruel captain. The naked divers, on the other hand, are unable to take so many sponges or to harvest so closely, since their stay under water must be brief. Their season is from April to September. The hookers and the dragnet fishermen work throughout the year, but it is to be noted that the dragnet can not be used either in total calm or in gale or storm, while calm or light breezes are necessary for the naked diver or the hooker. Thus it will be seen that each of these methods is subject to frequent and sometimes long-continued interruption. Their harmlessness as compared with the scaphander is obvious.

Experiments in artificial raising of sponges, although undertaken frequently, have never been successful and probably never will be on account of the very nature of things. When the sponges are torn from their roots a milky fluid flows from their elastic tissues, and it is this fluid that contains the germs of new sponges, which are carried along by the currents as the seeds of some plants are carried by the wind, until they attach themselves and grow. A sponge needs four to five years to reach maturity, after which it begins to die, having discharged its fluid with the germs. The sea currents, which the sponge needs for its growth, are an obstacle to artificial raising of sponges, for while they allow the microscopic embryo to fasten itself to a suitable spot, they do not permit cuttings selected for culture purposes to do so, and the equipment necessary to overcome this is easily destroyed by storms. Moreover, if it were possible for science to succeed in effecting this miracle, on a small scale and at a large expense, the result would be of no commercial value, as all the most effective conservation of the sponge beds would be accomplished by prohibition

of the diving apparatus. This would cost neither money nor labor, and under it the sponges would propagate abundantly, while hundreds of lives would be saved or benefited thereby.

APPEAL TO THE INTERNATIONAL FISHERY CONGRESS.

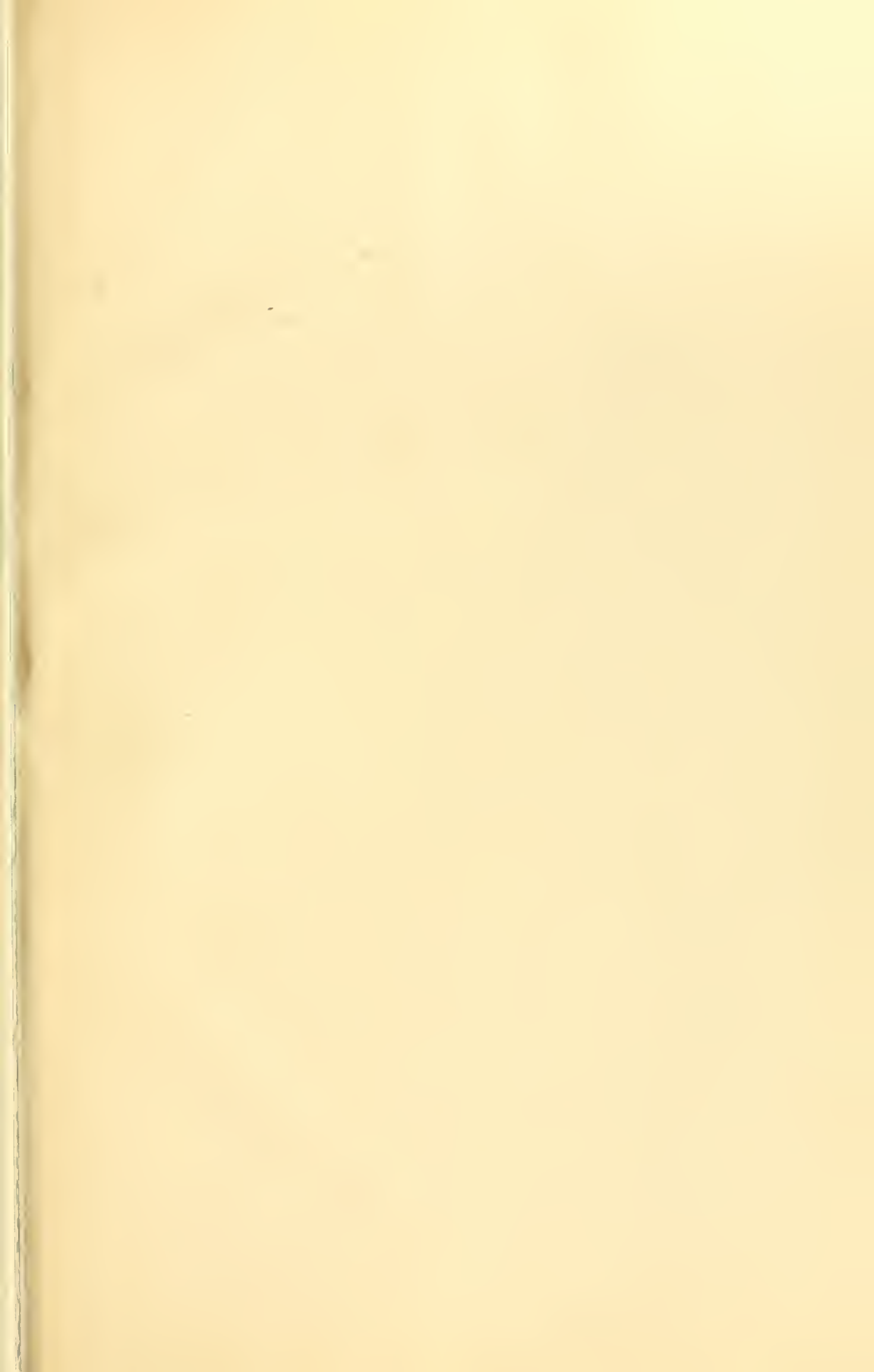
My work in the cause of the sponge divers at first consisted of efforts to arouse public interest in their behalf, by written communications and petitions, by publications in the press, and by lectures on the subject. I at length, however, resorted to direct appeal to the authorities of the different countries concerned, presenting my cause in person. I have likewise organized societies or enlisted the efforts of existing organizations wherever possible, and have brought the matter before various official and unofficial bodies. As recounted in the preceding pages, all of the sponge-bearing countries of the Mediterranean, and also the United States of America, have passed prohibitory or restrictive laws. For the most part, however, the laws have been ineffective, by reason of intrigues on the part of advocates of the scaphander and indifference on the part of the governments. The various international congresses before whom the question has been brought, while in one or two instances slow to act, have for the most part given prompt and full indorsement of my plea. I am now addressing the International Life-Saving Congress at Frankfort on the Main, and at the same time making a fervent appeal to the International Fishery Congress at Washington. The measures for which I solicit the support of these congresses are the following:

- (1) Prohibition of the diving apparatus and protection of the three good modes of fishing brought down from antiquity.
- (2) Inauguration of an international supervision of the execution of international measures against the illegal sponge fishing with diving apparatus in neutral waters where the national supervision is not sufficient.
- (3) Establishment of life and accident insurance as well as of savings banks for the sponge fishermen.
- (4) Care of the surviving victims of the diving apparatus.
- (5) Levying of dues for the permission to take sponges, and the utilization of part of this revenue in behalf of the sponge fishermen.
- (6) Rigid supervision of the execution of these measures on land and on water.

Since parts of this programme have already become law in various interested countries and have operated with the best of success, there is reason to hope that they will soon meet with recognition and execution in countries where little has as yet been done for the suffering sponge fishermen.

The question of maritime jurisdiction is a further problem of importance in the sponge fisheries. Greece, Turkey, Tunis, the United States, and lately

Egypt, have accepted the 3-mile limit in the dispute as to the use of the scaphander—an old formula not applicable in scientific administration of the sponge fisheries, since the sponge grounds often lie beyond that distance from the coast. It is to be hoped that all enlightened governments will give due recognition to this fact and in regard to the sponge fishermen will assume jurisdiction over a zone of 60 miles to seaward, abolishing the abuse of the scaphander within that territory. I earnestly solicit the International Fishery Congress to recommend such action.



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