

NORTH AMERICAN FAUNA

No. 46

[Actual date of publication, June 20, 1923]



A BIOLOGICAL SURVEY OF THE PRIBILOF ISLANDS, ALASKA

I. BIRDS AND MAMMALS

By EDWARD A. PREBLE, Assistant Biologist, Division of Biological
Investigations, and W. L. McATEE, In Charge Food Habits
Research; Bureau of Biological Survey

II. INSECTS, ARACHNIDS, AND CHILOPODS

By VARIOUS ENTOMOLOGISTS, With an Introduction
by W. L. McATEE, Biological Survey



NORTH AMERICAN FAUNA.

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(Continued on page 3 of cover.)



SMALL HAREM OF FUR SEAL (*CALLORHINUS ALASCANUS*).

Only a few of the cows are present, the remainder having gone to sea to feed. Photograph by G. Dallas Hanna, summer, 1920, on Kitovi Rookery, St. Paul Island, Pribilof Islands, Alaska.

U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF BIOLOGICAL SURVEY

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WASHINGTON
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1923

LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF BIOLOGICAL SURVEY,
Washington, D. C., May 8, 1922.

SIR: I have the honor to transmit herewith, recommending that it be published as No. 46 in the series of the North American Fauna, a report on a biological survey of the Pribilof Islands, Bering Sea, Alaska, by Edward A. Preble, assistant biologist, and W. L. McAtee, in charge of food habits research, of this bureau, assisted by a number of specialists in entomology. This report treats of the birds and mammals of the group, together with the insects and related invertebrates, and the life-zone relationships of the region. The Pribilof Islands constitute a national reservation and are especially noteworthy as being the sole breeding place of the largest herds of fur seals in the world, which are the property of the United States Government and are managed by the Bureau of Fisheries of the Department of Commerce. Numbers of valuable blue foxes, which by selective breeding under normal conditions have been developed to a point of excellence nowhere else attained, are also found on the islands, as well as two herds of reindeer. The present report will be of great assistance to students and others interested in the natural history of Alaska.

Respectfully,

E. W. NELSON,
Chief of Bureau.

HON. HENRY C. WALLACE,
Secretary of Agriculture.

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Part I. BIRDS AND MAMMALS.

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and W. L. McATEE, *In Charge Food Habits Research; Bureau of Biological Survey.*

INTRODUCTION.

By EDWARD A. PREBLE.

THE ISLANDS.

The Pribilof Islands consist of five small islands situated in Bering Sea, in latitude 57° north and longitude 170° west, 200 miles from the nearest lands, being this distance north of the Aleutian Chain and approximately the same distance south of St. Matthew Islands. The largest and best known of the group are St. Paul and St. George, the former, about 13 miles long, with a coast line of 45 miles; and the latter, 12 miles long, with a coast line of 30 miles (Pls. II, III, and IV). The smaller islands are all close to St. Paul—Walrus, about 6 miles to the east; Otter, about 4 miles to the south; and Sealion Rock, a mere rock close to the south shore (Pl. III).

The group is of volcanic origin and the shore lines are mainly rocky, in many places precipitous (Pl. V). On St. Paul these rough stretches are interrupted by sandy beaches, which often extend for miles; on St. George, the beaches are few in number, and not extensive. Back from the shore the land usually rises, gradually sloping plateaus being surmounted by rocky or sandy eminences, in some cases the craters of extinct volcanoes. These hills are most numerous on St. Paul, where two attain elevations of 590 and 665 feet, respectively. The highest hill on St. George, Ulekiah, has an elevation of 945 feet.

The Pribilofs were discovered by Russian fur traders in 1786, while searching for the summer home of the hordes of fur seals which had been noted pushing northward each spring past the Aleutians. The islands were then uninhabited, but were at once colonized by Aleutian natives, planted there by the Russians to col-

lect the skins of the myriads of seals. In 1799 the islands passed into the hands of the Russian American Co., and there remained until 1867, when the United States purchased Alaska from Russia.

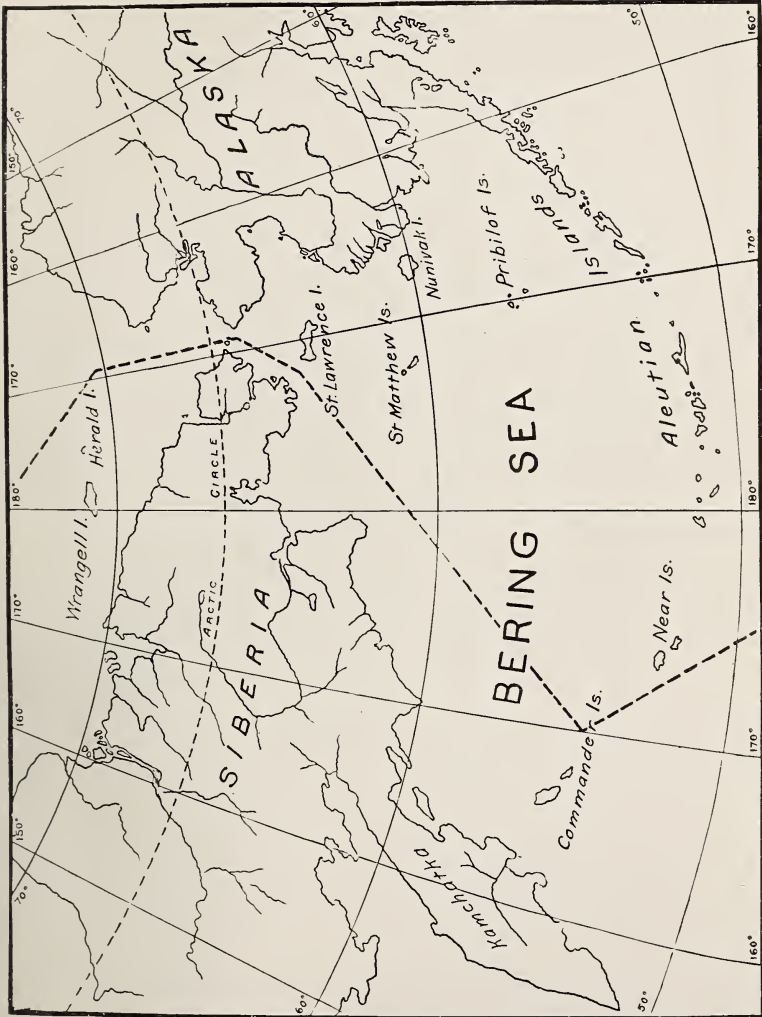
The Pribilof Islands now constitute a national reservation. In 1870 St. Paul and St. George Islands were made in effect a fur-seal reservation, under the administration of the Secretary of the Treasury. The remaining islands, Walrus and Otter, were set aside by Executive order as the Pribilof Bird Reservation in 1909, and in 1910 jurisdiction over the entire group was transferred to the Secretary of Commerce.

The three larger islands—St. Paul, St. George, and Otter—though supporting no tree growth, and only a few low shrubs, are thickly clothed with herbaceous vegetation, the moist summers inducing a luxuriance almost tropical. The list of plants includes many notable species, which, because of the peculiar summer climate, have a very long season of flowering. In consequence, large fields of arctic poppies, lupines, saxifrages, and other flowers of great beauty are found throughout the summer. Certain annuals attain so rank a growth as to add seriously to the labor of foot travel over the rougher areas.

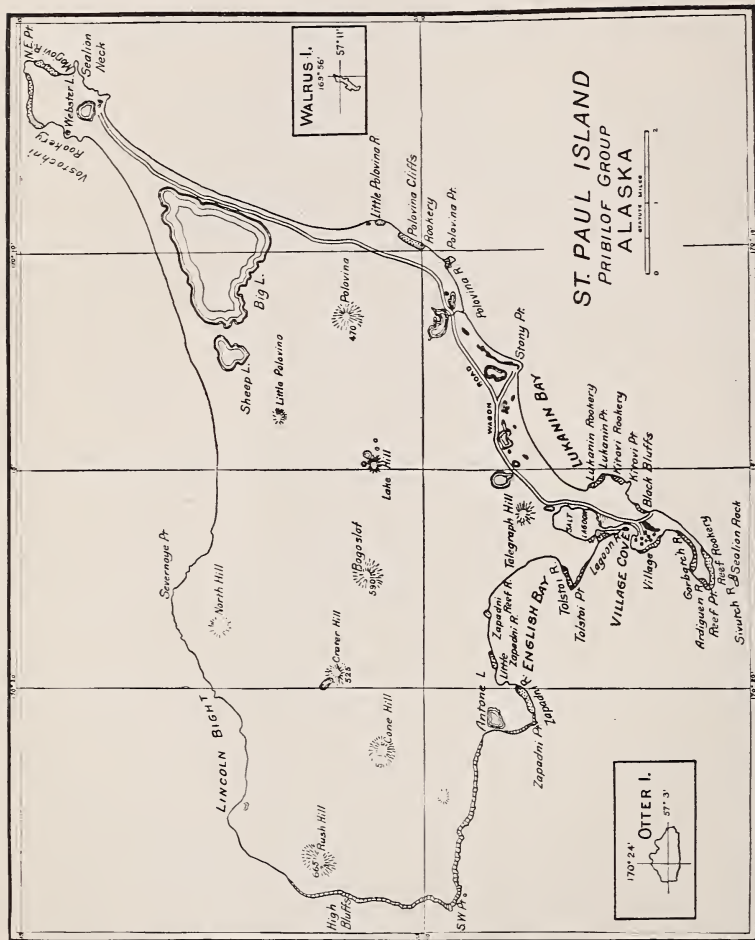
SCIENTIFIC OBSERVATIONS AND COLLECTIONS.

The teeming hordes of fur seals and the swarms of breeding sea birds seem to have interested the early inhabitants merely in a utilitarian way. It was not until 1840 that any work enumerating even the more conspicuous species of birds and mammals appeared. (See Veniaminof, 1840, in Bibliography.) William Palmer (1899, p. 360) summed up the history of the ornithological collections and observations made on the Pribilofs up to 1899, as follows:

Coinde in 1860 made a list of but nine species that were collected by an officer of the Russian Navy, Mr. Warneck, in 1852. The jealous care exercised by the Russians for the preservation of the seals prevented any outsiders from studying the avifauna, so that it was not until the islands passed under the control of this Government, and Mr. Elliott made his investigations, that any great effort was made to study the bird life. Dr. W. H. Dall had indeed in 1868 spent a short time at the islands and, together with the officers of his surveying vessel, had collected some specimens, one of which was described as new by Prof. S. F. Baird, but the first systematic investigation was made by Mr. Henry W. Elliott [in 1872 and 1873]. The result of this gentleman's work was a list of 40 species, based on copious notes and numerous specimens which were named and elaborated by Dr. Elliott Coues in Mr. Elliott's report for 1873 [=1874], and which was reprinted in 1875. Mr. Elliott made another more extensive elaboration in his monograph of the seal islands in 1882. Besides the above, various other Government expeditions which have visited the waters of Bering Sea for different reasons during the past 16 years have generally touched at the seal islands and given several naturalists opportunities for collecting and noting the bird life. Thus, Mr. L. M. Turner in 1878, Dr. T. H. Bean in 1880, Mr. E. W. Nelson in 1881, Lieut. J. E. Lutz in 1884,

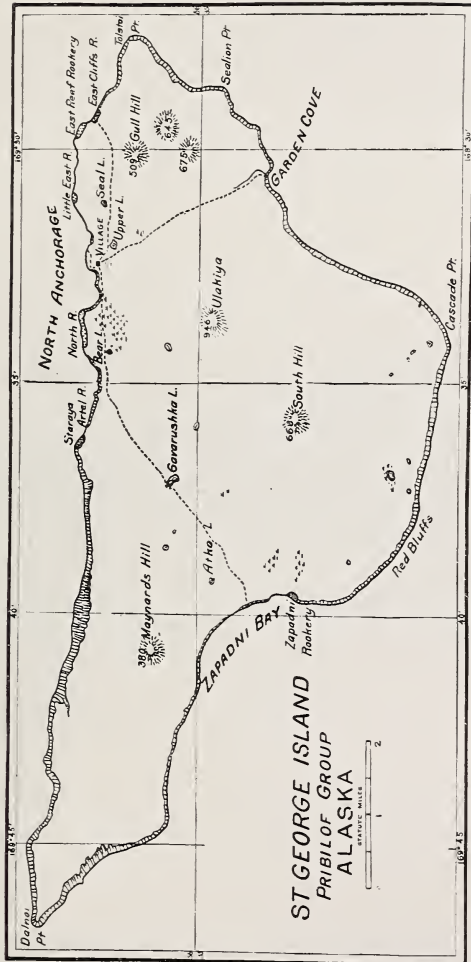


MAP OF BERING SEA, SHOWING POSITION OF PRIBILOF ISLANDS RELATIVE TO OTHER LANDS.
Their central position accounts in part for the variety of their transient bird life.



ST. PAUL ISLAND, PRIBILOF ISLANDS, ALASKA.

The large extent of sandy beach affords many easy landing places.



ST. GEORGE ISLAND, PRIBILOF ISLANDS, ALASKA.

On this island the shore line is generally rocky and often precipitous, making landing difficult and hazardous.



FIG. 1.—WINTER ON ST. PAUL ISLAND.

View looking toward head of lagoon from beach near Village Landing. Photograph by G. Dallas Hanna.



FIG. 2.—BLACK BLUFFS, NEAR VILLAGE, ST. PAUL ISLAND.

This is the most notable of the exposures of fossiliferous rock on the Pribilofs. Photograph by A. Christoffersen.



FIG. 3.—SURF-LASHED SHORE, ST. PAUL ISLAND.

In these seething waters the young seals play for hours. Photograph by A. Christoffersen.

Mr. C. H. Townsend in 1885 to 1896, myself in 1890, Messrs. F. W. True and D. W. Prentiss, jr., in 1895, Mr. F. A. Lucas in 1896-97 have spent from a day or two to several months on the islands.

Palmer spent the period from May 27 to August 11, 1890, on the Pribilofs, mainly on St. Paul. His time was spent largely in the study of the birds, but owing to regulations then in vogue regarding the use of firearms his opportunities for collecting specimens were somewhat restricted. His report, which is a painstaking and scholarly work, has remained the only completely annotated list of the birds of the group up to the present time.

In 1910, when the Pribilof Islands were placed in charge of the Bureau of Fisheries of the Department of Commerce, in furtherance of the policy to make a thorough study of the life of the islands, the breeding place of the fur seal, Dr. Walter L. Hahn was appointed naturalist. Evermann (1913, p. 15) thus refers to his work, and that of his successor:

Dr. Walter L. Hahn, at that time head of the department of biology in the State normal school at Springfield, S. Dak., was appointed naturalist in the summer of 1910. He arrived at St. Paul Island August 24 and immediately entered upon his duties with an energy and intelligence which could scarcely be excelled. His untimely death on May 31, 1911, from exposure in the ice-cold water of the village lagoon, resulting from the capsizing of a boat, was a severe loss to the fur-seal service and to biological science. During his few months on St. Paul Island, Doctor Hahn, from the voluminous notes and records which he left, appears to have been indefatigable in his field work and marvelously painstaking in recording his observations. His notes, typewritten up to noon of the very day of his death, record a vast number of new and important observations on the fur seals and blue foxes. They also teem with records of interesting observations on the birds and other animals of the islands.

Mr. Millard C. Marsh, pathologist of the Bureau of Fisheries, was appointed to the vacancy caused by the death of Doctor Hahn. He reached St. Paul Island August 23, 1911, and took up and continued with commendable industry and intelligence the work so ably begun by his predecessor.

As a result of this work Evermann (l. c.) was able to add 18 species of birds to the Pribilof list; four of these were for the first time added to the North American list. In addition, the present writer has been able, through the courtesy of the Bureau of Fisheries, to use the notes on occurrence of many species recorded by Hahn and Marsh. Copies of the notes in the St. Paul Island log relating to many species of birds and mammals, carefully transcribed by Hahn, and arranged under specific headings, have also been available.

Alvin G. Whitney, school-teacher on St. Paul Island from the summer of 1912 to the summer of 1914, made considerable collections of insects and shells and some other invertebrates, but his contributions to ornithology and mammalogy were small.

The next naturalist to work on the Pribilofs was G. Dallas Hanna. He arrived on St. Paul in July, 1913, and was transferred during the next month to St. George. Although his regular duties as school-

teacher and volunteer radio operator involved long hours, he found time to make notes and collections. In early August of 1914 he was transferred to St. Paul, where he remained (with the exception of two trips to St. George in the summer of 1915) until September, 1915, when he returned to the United States. During all this period he devoted most of his spare time to ornithology. In 1916, mainly as a result of his own work, he added 13 species to the Pribilof list in a paper published in *The Auk*.

In the meantime the visit of the writer and his colleagues, Wilfred H. Osgood, of the Field Museum, Chicago, Ill., and Prof. George H. Parker, of Harvard University, Cambridge, Mass., on a special investigation of the fur-seal herd in the summer of 1914, afforded an opportunity for further study of the fauna. It is needless to state that the extremely interesting wealth of bird life on these islands, then for the first time observed by the writer, determined him to prepare a fully annotated list of the birds, and this forms a part of the present report.

Mr. Hanna returned to St. Paul in June, 1916, and remained there (excepting short visits to St. George each summer and a residence there from October, 1916, to May, 1917) until September, 1918. As a result of the work done there, he was able to publish a paper adding 21 species of birds to the Pribilof list, 4 of which were new to North America. He later spent two summer seasons on the islands (June to September, 1919 and 1920) on seal work, and each season made additions to the list. In 1919 he published a list of all the birds known at that time to have occurred on the Pribilofs, 129 in number, in which the various species are classed as breeders, regular migrants, or transients, and the author first reporting the species from the group is indicated. In addition, he has published other papers of a general nature or relating to certain species, and he has very generously furnished the writer with numberless unpublished notes on the occurrence of birds and mammals, extending practically throughout his period of service on the islands. Without his records and those of Hahn, above referred to, the preparation of the present lists would scarcely be justified. Notes on a number of species of birds made by H. P. Adams on St. George Island in 1915, 1916, and 1917, have also been available. All such notes, when lacking citations, are understood to be hitherto unpublished.

The foregoing account has been written mainly from the standpoint of the ornithologist; since the birds are so abundant and so far outnumber the other vertebrates in species and individuals, it is natural that they should have received the greater share of attention. Practically all workers, however, have done some work on the mammals. In the bibliography (pp. 121-128), therefore, the titles are merged in one list; indeed, many articles refer to both groups.

LIFE ZONE RELATIONSHIPS.

By EDWARD A. PREBLE.

While the Pribilof group as regards its zoogeography is most closely related to the Arctic, there are many elements that forbid its unqualified reference to that zone. The small size of the islands, their distance from other lands, and probably to some extent the ocean currents have all been factors which helped to determine its present faunal and floral characteristics. The severe winds which sweep the islands have also had their influence. Other important contributing causes have been the original freedom of the islands from human habitation, and their rugged topography, combined with an abundant food supply, which have favored their selection as breeding stations for myriads of aquatic birds and a number of species of mammals. All these factors have combined to produce a fauna and flora peculiar in many respects.

MAMMALS.

Among land mammals we find only three species, all more or less peculiar to the group. Of these the foxes (*Alopex pribilofensis*) were probably originally brought to the islands by floating ice and have become slightly differentiated from the original mainland stock. The shrew (*Sorex pribilofensis*) and the lemming (*Lemmus nigripes*), peculiar to St. Paul and St. George Islands, respectively, have been so modified that their origin can not be determined. The fox and lemming, however, and perhaps the shrew, belong to groups which are essentially Arctic in distribution. All the other mammals, excepting those introduced by man, are aquatic and can not be discussed in terms applicable to the distribution of the others. The boundaries of their habitats are probably determined by the temperature of the water, acting to some extent directly, but more especially through their food supply. Of the strictly aquatic mammals, the bowhead whale (*Balaena mysticetus*), if correctly identified, is near the southern limit of its range; all the others, with the exception of the killer whale (*Orcinus rectipinna*), which visits the Arctic Ocean in summer, are near their northern limit.

In regard to the pinnipeds, less strictly aquatic, the Pribilofs are the meeting point of both southern and northern types. The Steller sea lion (*Eumetopias jubata*), Pribilof fur seal (*Callorhinus alascanus*), and Pribilof harbor seal (*Phoca richardii pribilofensis*) are at or near their northern limit; while the walrus (*Odobenus divergens*), ribbon seal (*Phoca fasciata*), and bearded seal (*Erignathus barbatus nauticus*) there approach their southern boundary.

The sea otter (*Latax lutris lutris*), now exterminated there, found about the Pribilofs one of its northernmost stations.

BIRDS.

In discussing the zonal relation of the group as reflected in its bird life it is advisable to deal only with species which regularly breed. These are as follows:

Lunda cirrhata.

Fratercula corniculata.

Phalaris psittacula.

Aethia cristatella.

Aethia pusilla.

Uria troille californica.

Uria lomvia arra.

Rissa tridactyla pollicaris.

Rissa brevirostris.

Larus hyperboreus hyperboreus.

Larus glaucescens.

Fulmarus glacialis rogersi.

Phalacrocorax pelagicus robustus.

Phalacrocorax urile.

Clangula hyemalis.

Lobipes lobatus.

Arquatella maritima ptilocnemis.

Leucosticte griseonucha.

Plectrophenax nivalis townsendi.

Calcarius lapponicus alascensis.

Nannus troglodytes alascensis.

Sixteen of these (excepting *Rissa brevirostris*, *Larus glaucescens*, *Phalacrocorax urile*, and *Nannus t. alascensis*) breed commonly on the St. Matthew group to the northward (a number of them still farther north, to and beyond Bering Strait), and one other, *Plectrophenax nivalis townsendi*, is represented there by a closely related species, *P. hyperboreus*. *Rissa brevirostris* reaches its northern limit on the Pribilofs, and *Larus glaucescens* in the northern part of Bering Sea. *Phalacrocorax urile* is a summer visitor from the Siberian coast, and *Nannus t. alascensis* is peculiar, but has close relatives on the Aleutian Islands. It will be noted that these are mainly sea birds, some of which nest as far south as California, but which, finding abundant food combined with convenient nesting sites on these northern islands, breed successfully there also regardless of the lower temperature. These, like the aquatic mammals, can not be regarded as coordinate in value with land vertebrates as regards zonal significance. *Clangula hyemalis* and *Lobipes lobatus*, which nest about fresh-water ponds, and *Arquatella m. ptilocnemis*, *Leucosticte griseonucha*, *Plectrophenax n. townsendi*, and *Calcarius l. alascensis*, are distinctly Arctic types.

It will thus be seen that both the mammalian and avian inhabitants of the Pribilofs, excluding those which can not legitimately be considered as furnishing criteria for the definition of life zones as currently considered, favor the reference of this group to some division of the Arctic Zone.

But while the aquatic species of mammals and birds must be considered from a standpoint different from that accorded those inhabiting the land, they can hardly be ignored in the consideration of a fauna of which they constitute an overwhelming majority. Palmer, indeed, our principal authority on Pribilof birds, considered

the breeding water-birds as mainly characterizing a zoogeographic area to which he accorded the rank of a subregion of the Holarctic—the Aleutican. This is practically the same as the Aleutian Faunal District of Nelson, extended to include the Pribilofs and other islands and the immediate coasts of Alaska and Siberia north to Bering Strait, and includes the insular and coastal portions of the Alaskan Province of the Holarctic region of Newton. (Dictionary of Birds, Part II, p. 331, 1893.)

PLANTS.

The botany of the Pribilofs has been carefully studied by James M. Macoun, who has published an annotated list of 184 species, including the vascular cryptogams. His paper includes a table, prepared in collaboration with Theodor Holm, one of our most eminent students of Arctic plants, which shows the distribution of the various species in other parts of the Arctic region. Regarding the phaenogams only, 172 species, we find that 141 species are found on the east coast of Bering Sea, and 126 on the west coast, while 101 grow on both coasts; 74 are found in Arctic America. Twenty-three are not known from either the east or west coasts of Bering Sea, and of these 23 only 6 are found in Arctic America; of the remaining 17 the majority are species which have been described from the Pribilofs, while the remainder are presumably found also on the Aleutians.¹ It will thus be seen, as might be expected, that the great majority of the Pribilof plants are arctic or subarctic species.

The phaenogams classed as Arctic by Macoun and Holm are the following:

Ranunculus tricophyllus Chaix.
Ranunculus hyperboreus Rottb.
Ranunculus pygmaeus Wahl.
Ranunculus reptans L.
Ranunculus eschscholtzii Schl.
Coptis trifolia Salisb.
Papaver radicum Rottb.
Draba hirta L.
Draba wahlenbergii Hartm.
Eutrema edwardsii R. Br.
Cochlearia officinalis L.
Cardamine bellidifolia L.
Cardamine pratensis L.
Silene acaulis L.
Lychnis apetala L.

Arenaria peploides L.
Stellaria humifusa Rottb.
Stellaria longipes Goldie var. *laeta*
 Was.
Cerastium alpinum L.
Sagina linnaei Presl.
Sagina nivalis Fr.
Rubus chamaemorus L.
Rubus arcticus L.
Potentilla anserina L.
Comarum palustre L.
Potentilla emarginata Pursh.
Saxifraga hieracifolia Waldst. and Kit.
Saxifraga stellaris L. var. *comosa* Poir.
Saxifraga hirculus L.

¹ The late James M. Macoun, in 1914, informed me that a few species of Pribilof plants, evidently of Aleutian origin, were known by him to occur only near Southwest Point, St. Paul Island. Since Mr. Macoun on that occasion added several species to the list, which I do not now remember, and which are probably yet unpublished, the particular ones referred to by him can not be determined. A direct comparison of lists of the Pribilof and Aleutian species would be desirable in the present connection, but I have found no work giving a complete list of the plants of the latter region.

Chrysoplenium alternifolium L.
Parnassia kotzebuei Cham. and Schl.
Hippuris vulgaris L.
Epilobium spicatum Lam.
Selinum benthami Wat.
Valeriana capitata Pall.
Achillea millefolium L.
Chrysanthemum arcticum L.
Petasites frigida Fries.
Campanula uniflora L.
Pyrola minor L.
Armeria vulgaris Willd.
Veronica serpyllifolia L.
Pedicularis sudetica Willd.
Pedicularis lanata Willd.
Euphrasia officinalis L.
Gymandra stelleri Cham. and Schl.
Koenigia islandica L.
Polygonum viviparum L.
Polygonum bistorta L.
Oxyria reniformis Hook.
Rumex acetosella L.
Salix arctica Pall.

Salix reticulata L.
Empetrum nigrum L.
Lloydia serotina Reich.
Streptopus amplexifolius DC.
Juncus biglumis L.
Eriophorum polystachyon L.
Eriophorum vaginatum L.
Carex vulgaris Fries, and vars.
Carex membranopacta Bailey.
Carex rariflora Smith.
Carex saxatilis L.
Hierochloa pauciflora R. Br.
Alopecurus alpinus Smith.
Arctogrostis latifolia Grisb.
Calamagrostis purpurascens V.
Pitacum subspicatum Beauv.
Phippsia algida R. Br.
Arctophila effusa Lange.
Dupontia psilosantha Rupr.
Glyceria angustata Fries.
Festuca ovina L.
Elymus mollis Trin.

The following species of plants have been described as new from Pribilof specimens (some of these are not currently considered valid):

Papaver macounii Greene.
Nesodraba grandis Greene.
Cardamine umbellata Greene.
Chrysoplenium beringianum Rose.
Primula macounii Greene.
Primula eximia Greene.
Polygonum macounii Small.

Salix rotundata Rydberg.
Salix cyclophylla Rydberg.
Carex pribylovensis Macoun.
Alopecurus howellii Vasey var. *merriami* Beal.
Elymus villosissimus Scribner.
Calamagrostis arctica Vasey.

ZOOGEOGRAPHY OF NEIGHBORING AREAS.

It is scarcely possible to discuss the zoogeographic aspects of the Pribilofs without considering also the neighboring Aleutian Peninsula and Islands. The latest treatment seems to be that of Osgood,² who has discussed the zoogeography of the Alaska Peninsula at some length, and while assigning the treeless part of that region to the unqualified Arctic Zone admits the possibility that a more extended study may show the terminal part of the peninsula and the adjoining islands to belong to a subdivision of the Arctic. The writer believes that recognition of such a subdivision is desirable, and would retain the name first applied to it by Nelson, the Aleutian Faunal District,³ considered as a subdivision of the Arctic Zone, and includ-

² A Biological Reconnaissance of the Base of the Alaska Peninsula: North American Fauna No. 24, pp. 21-25, 1904. I have also had the benefit of suggestions from Dr. Alexander Wetmore, who spent the summer of 1911 on the Aleutian Islands and the Peninsula.

³ Report on Nat. Hist. Collections made in Alaska, p. 26, 1887.

ing the western end of the Alaska Peninsula, the Aleutian Islands, and the Pribilofs. The St. Matthew group and perhaps other islands in Bering Sea might also best be included here.

It is evident, however, that this subdivision, and especially the Alaska Peninsula, by no means shares its characteristic fauna and flora exclusively or even principally with the Arctic proper. In the first place it should be borne in mind that although the summer temperatures alone on the Pribilofs and at Unalaska are sufficiently low to limit the growth of trees, absence of trees over large areas on the peninsula is evidently due in part to some other factor. There is little doubt that this contributing cause, as suggested by Osgood, is the severe wind which sweeps the region at all seasons. This, however, has not sufficed to prevent a luxuriant growth of alders and willows in the more sheltered parts of the peninsula beyond the line of tree growth, and these afford breeding sites for the following birds, which over most of their ranges are not considered to nest above the Hudsonian Zone:

Pica pica hudsonia.

Zonotrichia coronata.

Passerella iliaca unalascensis.

Melospiza melodia insignis.

Riparia riparia.

Dendroica aestiva rubiginosa.

Wilsonia pusilla pileolata.

Hylocichla ustulata swainsoni.

Hylocichla guttata guttata.

The dipper, or water ousel (*Cinclus mexicanus unicolor*), a bird nesting in the Canadian and Hudsonian zones, also breeds in this area.

Opposed to this list is the following, including birds which may be considered truly Arctic in their affinities, and most of which nest largely on the higher grounds:

Lagopus lagopus albus.

Lagopus rupestris nelsoni.

Calcarius lapponicus alascensis.

Leucosticte griseonucha.

Plectrophenax nivalis townsendi.

Acanthis hornemanni exilipes.

Anthus spinoletta rubescens.

The remainder of the breeding land birds of the Alaska Peninsula, all wide-ranging forms, may be classed as follows:

Falco peregrinus pealei. Breeding from Transition to Arctic Zones.

Corvus corax principalis. Breeding from Canadian to Arctic Zones.

Passerculus sandwichensis sandwichensis. Breeding regularly to Hudsonian Zone.

Archibuteo lagopus sancti-johannis. Breeding in Hudsonian and Arctic Zones.

Haliaeetus leucocephalus alascanus. Breeding from Canadian to Arctic Zones.

It seems evident, therefore, that while it may be desirable to include the terminal part of the Alaska Peninsula in the Aleutian Faunal District, a majority of its breeding land birds belong at least in part to zones below the Arctic.

BIRDS OF THE PRIBILOF ISLANDS, ALASKA.

By EDWARD A. PREBLE and W. L. MCATEE.

In the annotated list of birds of the Pribilofs, the portions of the accounts relating to distribution, migration, nesting, and general habits are by Edward A. Preble. The attempt has been made to collect all available data referring to the various species, with special reference to dates of arrival, nesting, departure, and occurrence in winter, and in most cases the notes are presented in the order here indicated. The circumstances under which the observations were made have been described in detail in the general introduction, and need not be here repeated.

BREEDING BIRDS.

Of the 137 species now known to have occurred on the Pribilofs, only 23 are known to breed; of these *Anas platyrhyncha platyrhyncha* and *Nettion carolinense* are rare. The list follows:

Lunda cirrhata.
Fratercula corniculata.
Phaleris psittacula.
Aethia cristatella.
Aethia pusilla.
Uria troille californica.
Uria lomvia arra.
Rissa tridactyla pollicaris.
Rissa brevirostris.
Larus hyperboreus hyperboreus.
Larus glaucescens.
Fulmarus glacialis rodgersi.

Phalacrocorax pelagicus robustus.
Phalacrocorax urile.
Anas platyrhyncha platyrhyncha.
Nettion carolinense.
Clangula hyemalis.
Lobipes lobatus.
Arquatella maritima ptilocnemis.
Leucosticte griseonucha.
Plectrophenax nivalis townsendi.
Calcarius lapponicus alascensis.
Nannus troglodytes alascensis.

In addition, *Histrionicus histrionicus pacificus* is present in abundance all summer, but has not been found actually nesting. *Cephus columba* and *Larus schistisagus* also have been stated to breed, but on insufficient evidence.

REGULAR MIGRANTS.

Several of these, even some which breed abundantly, occur in greater numbers during migration. Examples are *Larus hyperboreus hyperboreus*, *Anas platyrhyncha platyrhyncha*, *Histrionicus histrionicus pacificus* and *Arquatella maritima ptilocnemis*. Sixteen others are known to be more or less regular migrants; these are the following:

<i>Xema sabinii</i> . Spring and fall.	<i>Pisobia acuminata</i> . Mainly in fall.
<i>Sterna paradisaea</i> . Spring and fall.	<i>Pisobia maculata</i> . Mainly in fall.
<i>Dafila acuta tztzihoa</i> . Spring and fall.	<i>Limosa lapponica baueri</i> . Spring and fall.
<i>Somateria v-nigra</i> . Mainly in winter.	<i>Heteroscelus incanus incanus</i> . Spring and fall.
<i>Somateria spectabilis</i> . Mainly in winter.	<i>Pluvialis dominica fulva</i> . Spring and fall.
<i>Oidemia deglandi dixonii</i> . Mainly in winter.	<i>Arenaria interpres interpres</i> . Mainly in fall.
<i>Branta canadensis minima</i> . Spring and fall.	<i>Anthus spinoletta rubescens</i> . Mainly in fall.
<i>Philacte canagica</i> . Spring and fall.	
<i>Phalaropus fulicarius</i> . Spring and fall.	

OCCASIONAL VISITORS.

All the remaining species of the list are transients which have been detected once or in some cases a number of times. A considerable number of these, as more observations are afforded, will probably be transferred to the list of regular migrants. In addition to those migrants which occur mainly as winter visitors from farther north, the following, of less regular occurrence, have also been noted chiefly in winter.

<i>Colymbus auritus</i> .	<i>Arquatella maritima couesi</i> .
<i>Cephus columba</i> .	<i>Hierofalco rusticolus sacer</i> .
<i>Polysticta stelleri</i> .	<i>Nyctea nyctea</i> .

VISITORS FROM EURASIA.

Those members of the avifauna which may fairly be classed as transients or accidental visitors number over 80 species. Of these the following are Eurasian, with general ranges as given; unless otherwise indicated specimens taken on the Pribilofs have proved to be the first records for North America:

- Mareca penelope*. Breeds in northern Eurasia from Scandinavia to Kamchatka, wintering to the southward.
- Eunetta falcata*. Occurs regularly in eastern Asia to Kamchatka, Korea, and Japan.
- Nettion crecca*. Of general distribution in northern Eurasia, breeding easterly to the eastern Aleutian Islands, where it was recorded previous to its capture on the Pribilofs.
- Fuligula fuligula*. Breeding in Eurasia eastward to Kamchatka, migrating in winter to northern Africa, India, China, and Japan.
- Aithya ferina*. Breeding in Eurasia east to Lake Baikal, wandering in migration and winter eastward to China and Japan.
- Glaucionetta clangula clangula*. Breeding generally throughout northern Eurasia.
- Limnocyptes gallinula*. Breeds in Eurasia east to the Kolyma River. In migration and winter occurs south to India and Burma, and occasionally to Japan and Formosa.

- Pisobia subminuta*. Breeds in eastern Siberia, Kamchatka, and the Commander and Kurile Islands. Migrates in winter as far as Australia and the Philippines.
- Rhyacophilus glareola*. Breeds in northern Eurasia eastward to Kamchatka and Bering Island, wintering south to Africa, southern Asia, Japan, and the Philippine Islands. Recorded previously from Alaska (Littlejohn, The Condor, vol. 6, p. 138, 1904, Sanak Island).
- Heteroscelus incanus brevipes*. Breeds in eastern Siberia and Kamchatka. Migrates southwardly to China, Japan, the Malay Peninsula, and Australia. Taken at least once on Bering Island in May.
- Philomachus pugnax*. Occurs in central Europe and Asia, eastward rarely to Japan and China, wintering in Africa and India. First record for western coast of North America, but has been taken many times in the eastern United States.
- Numenius tahitiensis*. Occurs on many of the Pacific islands, mainly in winter; has been taken several times in summer on the mainland of Alaska, once at least previous to its capture on the Pribilofs.
- Thalassoactes pelagicus*. Breeds in Kamchatka, and has been taken on Bering Island.
- Cryptoglaux funerea magna*. Described from the Kolyma River; probably of general range in northeastern Siberia.
- Cuculus canorus telephonus*. Breeds in Kamchatka, Manchuria, Japan, and China.
- Micropus pacificus*. Breeds in eastern Asia, including Kamchatka, Japan, and northern China. Has also been reported from the Commander Islands.
- Coccothraustes coccothraustes japonicus*. Occurs in Japan, Korea, northern China, and eastern Siberia.
- Fringilla montifringilla*. Breeds in northern Europe and Asia east to Kamchatka; in migration to southern Asia.
- Pinicola leucura kamtschathensis*. Breeds in Kamchatka.
- Anthus spinoletta japonicus*. Breeds in eastern Siberia and Kamchatka and the Kurile Islands; winters in Japan, China, and India.
- In addition, *Pluvialis dominica fulva*, added to the list of North American species from the Pribilofs, has since been found to be the breeding bird of northern and western Alaska.

BIRDS DESCRIBED FROM THE PRIBILOFS.

Five valid forms have been described from Pribilof specimens, as follows:

- Rissa tridactyla pollicaris*. Ridgway, in Baird, Brewer, and Ridgway, Water Birds of North America, vol. 2, p. 202, 1884. Type from St. George Island. Ranges generally over the North Pacific.
- Arquatella maritima ptilocnemis*. Coues, in Elliott's Rept. Seal Islands of Alaska, 1874 (unpaged), p. 182, 1875. Type from St. George Island. Breeding on the Pribilof and St. Matthew Groups, and on St. Lawrence Island.
- Plectrophenax nivalis townsendi*. Ridgway, Manual North American Birds, p. 403, 1887. Type from Otter Island. The breeding form on the Pribilof, Aleutian, and Commander Islands.
- Calcarius lapponicus alascensis*. Ridgway, The Auk, vol. 15, p. 320, October, 1898. Type from St. Paul Island. The breeding form on the islands and mainland of northern and western Alaska.
- Nannus troglodytes alascensis*. Baird, Trans. Chicago Acad. Sci., vol. 1, p. 315, 1869. Type from St. George Island. Confined to the Pribilof Group.

GENERAL OBSERVATIONS ON MIGRATION.

Although it seems very remarkable that so many species of birds otherwise known as regular breeders or migrants only on the neighboring coasts of Alaska or Asia have been taken on the comparatively small and distant Pribilofs, the fact that they have been detected is perhaps more to be wondered at than that they have reached there. During migration birds are often driven out to sea by winds of unusual velocity or become bewildered by fogs, while some habitually cross wide expanses of ocean. Such travelers, when weary and hungry, eagerly grasp the opportunity to seek the solid land. During the rather brief periods when the fogs lift, both the main islands are visible for a considerable distance. But the most potent factor in aiding the birds to find a landing place is probably the noisy herds of fur seals and sea lions.

During the seasons when most of the smaller birds are migrating the beaches are occupied by the thronging thousands, whose combined voices produce a clamor which can be heard above all other sounds of nature at a distance of several miles. So far reaching is this sound that it is frequently useful to navigators, helping them to locate the islands when driven from their course by winds and currents. There is no doubt that many storm-driven birds are thus guided to this haven, either to be put on record as rare visitors, or after resting again to try to traverse the storm-lashed pathway.

The fact that the Pribilofs have furnished so many additions to the list of North American birds, and that species from both North America and Asia continue to be taken there, has suggested comparison with Helgoland, the islet in the North Sea which has proved such a rich ornithological field. However, when we come to consider the characteristics of these two stations, and their data on migration, it is apparent that they have little common ground for comparison.

Although the Pribilofs and Helgoland are in nearly the same latitude, the climatic conditions and other phenomena affecting the avifauna are very different. Helgoland is so situated relative to Scandinavia, Germany, Russia, and the other parts of northern Europe as to lie directly in the migration pathway of vast numbers of birds which breed in those comparatively temperate lands, and which winter in southern Europe and in Africa. Furthermore, these hordes of regular migrants carry along with them many species, both northern and southern, which otherwise would not wander from their native haunts, and some of which have been detected while pausing on Helgoland. Other causes, apparently, have operated in the case of many species which are breeders in southern and eastern Asia and in North America.

The Pribilofs, on the other hand, lie in the midst of Bering Sea, in an environment essentially Arctic, and not on a migration route which is followed by any considerable number of birds, either those passing between their summer and winter homes in western America or those which habitually cross between America and Asia. Those which do use the islands as a stepping stone are certain waders and swimmers which nest in northwestern Alaska, and winter in the Aleutians, the Pacific Islands, or southeastern Asia. The more notable of this class are the following: *Philacte canagica*, *Limosa lapponica baueri*, *Heteroscelus incanus incanus*, *Pluvialis dominica fulva*, and *Arenaria interpres interpres*.

As regards land birds, however, it is a notable fact that none of the small species of birds which are essentially Asiatic, but which cross each summer to nest in Alaska (including *Budytes flavus alascensis* and *Acanthopneuste borealis*), have been detected on the Pribilofs.

A canvass of the list of birds which have been observed on Helgoland, leaving out those crag-nesting species which are influenced in their choice of homes by the presence of suitable cliffs and an abundant marine food supply, shows that about 283 species nest south of the limit of trees, while only 83, or less than 23 per cent of the total thus considered, are Arctic, nesting north of the tree limit. Applying the same test to Pribilof birds the proportion is exactly 50 per cent in each class. Helgoland has had the advantage of more intensive observations, continued over a much longer period, but since collections and observations in both places have been made indiscriminately it is unlikely that the relative numbers of species nesting above and below the limit of trees would be found to be materially different were the data more comparable in this regard.

It is evident, therefore, that the avifauna of the two places is radically different in character, since we have on Helgoland an overwhelming majority of non-Arctic species, many of which*are wanderers from their regular homes in Africa, Asia, or America, while those found on the Pribilofs which may be classed as strays are in all cases natives of the neighboring coasts of Asia and America. Furthermore, those transient land birds which have been detected on the Pribilofs seem to have reached there largely by chance rather than by following any regular migration routes.

FOOD HABITS OF BIRDS.

The notes on food habits of each species and also the following general account of the food resources of Pribilof birds and of the circumstances attending the elaboration of the available data on the subject were prepared by W. L. McAtee:

All pertinent previous reports on Pribilof birds have been examined and remarks on bird food quoted from them when desirable. Field notes of various naturalists who have visited the islands also have been drawn upon and when used the source is acknowledged. The contents of 32 bird stomachs from the Pribilofs were reported on by Dr. S. D. Judd in William Palmer's "Avifauna of the Pribilof Islands" (1899, pp. 380-427). In some cases these stomachs have been reexamined; in others the original report has been referred to. For the present account a considerable collection of stomachs has been available for examination, largely due to the efforts of G. Dallas Hanna.^a

Features of the food habits of birds of the Pribilofs that seem of sufficient interest to merit special mention are the great diversity of organisms fed upon by some of the birds resorting to the kelp beds, and the unusual preponderance of two-winged flies in the diet of birds feeding on land. In both cases, the phenomenon mentioned undoubtedly is merely a reflection of relative availability of food items. It is well known that Diptera are the dominant insects of high latitudes, and collections made in connection with the present investigation emphasize this fact. They are the most numerous insects both in species and individuals and consequently contribute most voluminously to the subsistence of the chief predatory creatures of the region, namely, birds.

The kelp pastures are the richest sort of feeding places for omnivorous birds, and such species as the eider duck seem to draw on all the inhabitants of these beds for sustenance. Representatives of most of the main branches of the animal kingdom in addition to various kinds of algae are frequently found in single stomachs. The following brief list of the mixed contents of four Pacific eiders will illustrate how the whole range of food items is drawn upon by these birds: Plume-algae (2 species), kelp, hydroids (2 kinds), mussels (3 kinds), sea snails (7 species), marine worms (2 kinds), starfishes, sea urchins, amphipods (2 sorts), hermit crabs (2 species), barnacles, sea-squirt, and sculpin. To some it may be surprising that so varied an assemblage of marine organisms is available in

^a Most of the stomach contents were analyzed by W. L. McAtee, but numerous stomachs of certain groups of birds were examined by the following: Ira N. Gabrielson, finches; Charles C. Sperry, shorebirds; and Alexander Wetmore, grebes and shorebirds. Identifications of many items found in the stomachs were based on the collections of invertebrates reported upon in the appendix to the present paper, and to the determiners thereof is due much of the credit for details in the statements relating to bird food. In addition many other specimens were directly referred to specialists for identification. Those who cooperated in this way were: W. A. Setchell, algae; Agnes Chase and F. P. Metcalf, grass seeds; C. C. Nutting, hydroids; W. H. Dall and Paul Bartsch, mollusks; R. C. Osburn, bryozoans; A. H. Clark, starfishes, sea urchins, and ascidians; Mary J. Rathbun, crabs; W. L. Schmitt, other decapods; Clarence L. Shoemaker, amphipods; H. A. Pilsbry, barnacles; S. A. Rohwer, sawflies; Leon J. Cole, pycnogonids; and Alexander Wetmore, birds. To all of these grateful acknowledgment is made.

this far-northern region, and this, too, during the winter months as well as the summer. It would seem that these Boreal kelp beds rival in abundance and diversity of life the famed tide-pools of the Tropics. While the birds frequenting them must necessarily be of hardy races that can endure the cold and buffeting of the wintry gales of the Bering Sea, it is apparent that insufficient and monotonous diet decidedly is not a characteristic of this environment, one usually thought of as extremely rigorous.

Family COLYMBIDAE.

Colymbus holboellii (Reinhardt). HOLBOELL GREBE.

The Holboell grebe was first recorded from the islands by Coues (in Elliott, 1874, unpagged, and 1875, p. 201), who recorded the specimen as *Podiceps griseigena*. This specimen, still in the U. S. National Museum collection (No. 64302 im.), has been correctly identified as *Colymbus holboellii* by Nelson (1887, p. 35) and Palmer (1899, p. 383). It was taken by Elliott at St. George Island, June 22, 1873.

A second specimen (No. 237485, male, U. S. Nat. Mus.) was taken by G. Dallas Hanna at St. Paul Island, December 6, 1914. It was feeding in the surf off Kitovi Rookery when shot.

Food.—The stomach contents of the December specimen was composed of a few feathers, and food items as follows: Otoliths of 40 or more small fishes, further unidentified, 99 per cent; and numerous amphipods of the family Pontogeneidae, 1 per cent.

Colymbus auritus Linnaeus. HORNED GREBE.

The horned grebe was first recorded from the Pribilofs by G. Dallas Hanna, who obtained specimens from both St. Paul and St. George Islands in 1913 and 1914, as recorded by him (1916, p. 401). Following are the records of the several specimens: Female, shot in Cemetery Lake, St. George, October 13, 1913 (stomach contained a quantity of decayed vegetation from bottom of lake); female, in surf, St. George, December 19, 1913 (feet and bill slate color; eye, orange); male, November 30, 1914, Southwest Bay, St. Paul; one (sex not recorded), January 6, 1915, St. Paul. Mr. Hanna states that other single birds were seen in the surf about St. Paul on December 4 and 13, 1914, and in the Salt Lagoon on at least two occasions, and that the natives consider it quite common in winter. All the specimens above listed are in the collection of the U. S. National Museum.

Food.—The contents of the stomachs of the three last mentioned have been analyzed. As in the case of grebes collected elsewhere, the bird's own feathers are a prominent part of the stomach contents,

varying in the samples at hand from 5 to 98 per cent of the entire bulk. Ignoring these, the food in these three stomachs was composed of Crustacea, 75 per cent; marine worms (*Nereis*), 23.3 per cent; and fish, 1.7 per cent. The crustaceans were exclusively amphipods identified as *Chironesimus multiarticulatus* and *Pontogeneia* sp., of the family Pontogeneiidae, and others of the families Calliopiidae, Metopidae, and Gammaridae.

Family GAVIIDAE.

Gavia adamsii (Gray). YELLOW-BILLED LOON.

The yellow-billed loon is a transient visitor, first recorded from the islands by C. H. Townsend, who says (1887, p. 98): "I saw a skin of the white-billed loon at the house of the United States Treasury agent on St. Pauls Island. It was killed there by a native in August, 1885." A second specimen was taken by M. C. Marsh on St. Paul, May 18, 1912, and is now in the Biological Survey collection. It is a male, and measured in the flesh: Length, 34 inches; extent, 61. The only other record refers to 10 individuals observed by G. Dallas Hanna off St. George Island, August 18, 1913.

Gavia viridigularis Dwight. GREEN-THROATED LOON.

The green-throated loon was first recorded by Coues in Elliott's Report (1874, unpagged, and 1875, p. 201) under the name *Colymbus arcticus*, from a bird found cast up nearly dead on the beach at Zapadni, St. George Island, June 22, 1873. This specimen, which is still in the collection of the U. S. National Museum (No. 64303, male), has been several times recorded under the name *arcticus*, and has played no small part in the claim of that species to be considered a North American bird. This specimen has been recently examined and found to be referable to the species lately described by Dr. Jonathan Dwight, *Gavia viridigularis* (Auk, 1918, p. 198), as, indeed, was intimated by Dwight in the introduction to his article (p. 196). Another of the two remaining specimens which have been referred to *G. arcticus* (No. 76004, U. S. Nat. Mus., St. Michael, Alaska, August 24, 1877, E. W. Nelson), is also plainly referable to *G. viridigularis*. Both these specimens have a decided green reflection on the dark areas of the throat, when viewed toward the light, while in *G. arcticus* and all its races these areas have a purplish reflection. As far as known *Gavia viridigularis* (type locality, Gichega, northeastern Siberia) is confined to northeastern Siberia and extreme western Alaska.

Family ALCIDÆ.

Lunda cirrhata (Pallas). TUFTED PUFFIN.

The tufted puffin was first recorded specifically from the islands by Coinde (1860, p. 403), although Veniaminof in 1840 (quoted by

Elliott, 1874, unpagcd, and 1875, p. 242) mentions puffins as occurring and probably refers in part to the present species.

An abundant summer resident on the Pribilofs, breeding on all the five islands of the group. It arrives about the middle of May and the majority leave the islands by the last of August.

Elliott gives May 10 as about the time of its arrival; the earliest dates I have for recent years are as follows: St. Paul, March 5, 1911, specimen, perhaps wintered (Hahn); St. Paul, May 20, 1911, several seen (Hahn); St. Paul, May 20, 1912, specimen (Hahn); St. Paul, May 19, 1914, eight observed (Hanna); St. Paul, May 15, 1915, three seen, arrivals (Hanna); St. George, May 21, 1917 (Hanna).

The eggs are usually laid in burrows dug by the birds in turfy soil at the edge of cliffs or on the summits of the smaller islands. Numbers nest in easily accessible locations on Walrus Island, Otter Island, and Sealion Rock, where they are safe from the foxes. On the other islands the birds nest among the rocks for protection. Dates for eggs are as follows: Otter Island, June 24, 27, 1884 (Lutz, 1889, p. 31); Sealion Rock, June 29, 1914, some fresh, but mostly heavily incubated (Preble); St. George, July 1, 1914 (Hanna); Walrus Island, July 7, 1911, eggs being incubated (Bent, 1919, p. 83); Otter Island, July 4, 1890; Walrus Island, August 7, 1890, slightly incubated (Palmer, 1899, p. 384). That many birds nest late in the summer is shown by the fact that, as elsewhere mentioned, Hahn observed many young birds taken from nests on Walrus Island as late as October 2.

The bulk of the individuals have left the islands before September. Later notable dates are as follows: St. Paul, early September, 1910, still common (Hahn); Walrus Island, October 2, 1910, about 40 young birds taken from nests by natives, adult and young specimens taken, numerous at sea (Hahn); St. Paul, December 8, 1910, one young bird found dead (Hahn); St. George, September 4, 1913, 150 observed (Hanna); St. George, September 15, 1913, 25 seen (Hanna); St. Paul, September 22, 1914, 75 seen (Hanna); St. Paul, December 6, 1914, 4 seen (Hanna); St. Paul, December 13, 1914, 10 seen (Hanna).

The following notes made by the collectors, and relating to fresh specimens, are of interest: No. 63, Hahn, female adult, St. Paul Island, March 5, 1911: Length, $15\frac{1}{2}$ inches; extent, $27\frac{3}{8}$; bill, deep orange on distal half; culmen and cutting edges washed with plumbeous; iris, pinkish; feet, pale flesh-color. No. 187, Marsh, female adult, St. Paul, May 20, 1912, length, $15\frac{1}{4}$ inches; extent, $27\frac{1}{4}$. No. 35, Hahn, Walrus Island, October 2, 1910 (young bird with much down remaining on neck and rump): Upper mandible, plumbeous; lower mandible, paler toward tip; eyelids, dusky; feet, dusky gray

above, with web sooty below. No. 36, Hahn, female adult, October 2, 1910, Walrus Island: Length, 15 inches; extent, 29; base of bill horn-color, tip deep orange; iris, yellow; feet, pale orange.

Fratercula corniculata (Naumann). HORNED PUFFIN. Pl. VI, fig. 2.

The horned puffin is an abundant summer resident on the Pribilofs, arriving early in May and usually departing in early September. It seems to be more abundant than the tufted puffin. Puffins were listed by Veniaminof in 1840; among the species occurring on the islands he could hardly have failed to notice this conspicuous one (Trans. by Elliott, 1874, unpagged, and 1875, p. 242). First recorded specifically by Coues, in Elliott (l. c., p. 202).

Arrival notes in recent years are as follows: St. Paul, May 9, 1911, one shot (Hahn); St. George, May 19, 1914, May 9, 1915, 5 observed (Hanna); St. Paul, May 10, 1915, 10 observed (Hanna); St. George, May 21, 1917, observed (Hanna).

The bird nests on all of the five islands of the group, laying its single egg in a cavity among the rocks. The egg is white with obscure spotting about the larger end. Dates for eggs are as follows: St. George, July 4, 1873, Elliott (Palmer, 1899, p. 385); Otter Island, June 19, 20, 24, 26, 30, 1884 (Lutz, 1889, p. 31); St. George, July 1, 1914 (Hanna). The majority leave the islands by early September. Some definite later dates follow: St. Paul Island, September 1, 1910, 25 observed; September 7, 10; September 8, 6; September 9, 10; September 11, 3; October 2, many observed on Walrus Island but less numerous at sea than the tufted puffin; October 18, 1 shot on North Shore; October 19, observed; November 29, about 20 seen off Kitovi Rookery, St. Paul; December 6, specimen (all by Hahn). September 28, 1913, about 500 birds seen about Garden Cove, St. George Island, although most of the birds had then left the cliffs on the north side of the island (Hanna). St. Paul Island, September 22, 1914, 100 birds observed; December 6, 5 observed; December 13, 75 observed, and many found dead on the beach (Hanna).

The following notes were made from fresh specimens; Adult male, St. Paul Island, September 18, 1910, Hahn; length $13\frac{3}{4}$ inches; extent, 25; eyelids deep orange; eye tuft plumbeous; legs deep orange; bill lemon at base shading to deep orange at tip. Adult female, St. Paul Island, December 6, 1910, Hahn; length, 13 inches; extent, $24\frac{1}{2}$; bill dusky, feet pearl gray above, dusky below. Male, St. Paul Island, September 23, 1911, length, 13 inches; extent, $25\frac{1}{2}$; bill uniform light yellowish on all basal portions including collar of upper mandible, the rest or terminal third dark orange-red; the grooves darkened. No vermilion red on the bill; edge of eyelids bright red; angle of mouth lemon-yellow; legs and feet orange, deepest on webs; yellow on outer surface of tarsus and outer toes, and more or less on

all toes. Male, St. George Island, August 23, 1913, Hanna; bill waxy olive-green; light orange in corner of mouth; point of upper mandible dark orange; of lower, light orange; a dark patch at edge of each mandible near tip, darkest on posterior edge.

Food.—The stomach of a specimen collected December 6, 1910, was reported in field notes of W. L. Hahn to contain a few isopods and fragments apparently of seaweed.

Phaleris psittacula (Pallas). PAROQUET AUKLET

Pl. VI, fig. 1.

The paroquet auklet, a beautiful and interesting species, the "Baillie Brushkie" of the Aleuts, is a rather common summer resident on the Pribilofs. It appears to have been first recorded from the islands by Veniaminof in 1840 under the name "white-breasted auk" (Trans. by Elliott, 1874, unpagcd, and 1875, p. 242).

Spring records follow: St. Paul Island, May 1 and 2, 1900 (common, notes from island log by Hahn); St. Paul Island, May 1, 1911, some taken by natives (Hahn); St. Paul Island, April 30, 1912 (specimen by Marsh); St. George Island, March 28, 1914, 8 observed; April 3, observed; April 8, 20 observed; April 19, begun lighting on cliffs; April 22, 20 observed (Hanna); April 24, 1915, 300 on Tolstoi Cliffs, St. Paul Island; April 27, 500 on Tolstoi Cliffs; May 4 and 9, abundant (Hanna).

It breeds on all the five islands of the group, most abundantly on St. George and St. Paul Islands, in large numbers on Otter Island, rather commonly at times on Walrus Island, and in small numbers even on Sea Lion Rock. Its single white egg, seemingly large for the bird, is usually laid beneath large bowlders or in practically inaccessible cavities in the cliffs; in some cases the egg is deposited in a burrow apparently excavated in the loose soil topping the volcanic cliffs. Dates for eggs follow: St. George Island, July 1, 1873; Walrus Island, June 13, 1890 (egg collection, U. S. Nat. Mus.); Otter Island, June 20, 23, 1884 (Lutz, 1889, p. 31); St. George Island, July 1, 1914 (Hanna); Pribilof Islands, June 8, July 7, July 16 (Bent, 1919, p. 120).

Autumn and winter dates follow: Elliott (1875, p. 205) states that they depart from the islands between August 20 and September 1, and this statement seems to be generally true. Later detailed observations are: St. Paul, 1910: August 30, specimen; August 31; September 7, one observed; October 2, several seen on way to Walrus Island; November 7, specimen (Hahn). St. George August 20, 1913, not seen later (Hanna). St. Paul, 1914: October 4, 4 observed; December 4, 20 seen; December 13, 200 seen, flocks abundant off-shore, many dead on beach (Hanna). St. Paul, February 18, 1915, large flocks just off-shore, Northeast Point (Hanna). St. George, February 6, 1917, 2 killed (Hanna).



FIG. 1.—PAROQUET AUKLET (*PHALERIS PSITTACULA*) AND GROUP OF LEAST AUKLETS (*AETHIA PUSILLA*).

Many of the breeding birds associate closely. Photograph by G. Dallas Hanna, summer, 1923, on St. George Island.



FIG. 2.—HORNED PUFFIN (*FRATERCULA CORNICULATA*).

These interesting birds nest chiefly in clefts among the rocks. Photograph by G. Dallas Hanna, on St. George Island.



FIG. 3.—PACIFIC KITTIWAKE (*RISSA TRIDACTYLA POLLICARIS*) ON NESTING CLIFF.

This is the most abundant of the two species of kittiwakes. Photograph by G. Dallas Hanna, on St. George Island.



The species thus winters at sea in the vicinity of the islands, and thence southward to the latitude of Monterey Bay, Calif., and the Kurile Islands, Japan.

A female taken on St. Paul Island, May 20, 1911 (Hanna), measured in the flesh: Length, 10 inches, extent 21; the bill was blood orange in color; feet and tarsus, bluish in front, dusky behind. A male, taken April 30, 1912, measured: Length, $10\frac{3}{8}$ inches, extent, 21; bill, coral red, rostral shield darker. A female, same place and date, length, $9\frac{1}{2}$ inches, extent $20\frac{1}{2}$; bill coral red.

Food.—H. W. Elliott stated (1874, unpagged, and 1875, p. 205) that the food of the paroquet auklet consists of amphipods and fish fry. He says further that "I have never seen one among the thousands that were around me when on the islands 'opening' the bivalve shells, such as mussels, etc., as stated by Professor Brandt." The suggestion of the latter author no doubt was a deduction from the shape of the bill of the paroquet auklet, but with little doubt is erroneous. The only stomach of this species available was collected at St. Matthews Island, July 12, 1916 (G. D. Hanna), and the content consisted entirely of remains of small Crustacea.

Aethia cristatella (Pallas). CRESTED AUKLET.

The crested auklet is a fairly common summer resident on the Pribilof Group, nesting on all the five islands excepting Sealion Rock. It usually comes on the cliffs in April or earlier, but this date is uncertain and difficult to determine, since large numbers pass the winter on the ocean in the vicinity and are likely to be seen in the surf at any time. It is called by the natives "Canooskie" (Little Captain). The species was first recorded from the islands by Veniaminof in 1840, under the name crested auk. (Trans. by Elliott, 1874, unpagged, and 1875, p. 242.)

Available spring records of occurrence later than February are as follows: St. Paul Island, April 5, 1901, a few brought in; St. Paul, April 10, 1906, some shot (notes taken from island log by W. L. Hahn); April 30, 1911, 5 or 6 shot by natives at Tolstoi Point, St. Paul (Hahn); St. Paul, March 12, 16, 18, 1912, specimens (Marsh); St. George, April 8, 1914, thousands observed (Hanna); St. Paul, 1915—April 15, hundreds; April 18, many near shore; April 24, 40 seen; April 27, 30 seen; May 6, abundant (Hanna).

This species usually nests about the high cliffs, the single white egg being deposited in a deep and usually inaccessible recess; occasionally the birds lay in the depths of the boulder beaches. Eggs have been taken on the following dates: St. George Island, June 19, 20, and July 4, 1873; St. Paul Island, July 10, 1895 (collection U. S. Nat. Mus.); Otter Island, June 20, 22, 1884 (Lutz, 1889, p. 31); Walrus Island, June 16, 1910 (James Judge).

Notes on fall and winter occurrence follow: St. Paul Island, January 31, 1904, and December 6, 1909, numbers seen (notes from island log). St. George, vast numbers seen about end of November, 1905 (Chichester, 1908, p. 49). St. Paul, 1910—probably 5,000 seen at sea November 8, usually flying at great speed close to the water; many seen at sea November 9, 22, and 29, off St. Paul (Hahn). A great many flocks of hundreds each seen about 1 mile off St. George January 4, 1914 (Hanna). Hundreds of thousands seen off St. Paul December 13, 1914, and February 18 and March 5, 1915 (Hanna). Taken on St. George, October 18 and 29, 1915 (H. P. Adams). Abundant at edge of ice pack off St. George, January 25, 1917 (Hanna). Some killed at sea near St. Paul, February 8, 1918 (Hanna).

These flocks wintering at sea are observed well into the spring. Thus Hanna noted them off St. George Island March 21 and April 8, 1914.

On several occasions numbers of the birds have been found dead on the beaches, usually in the early summer. These may represent merely the normal mortality from the large flocks which winter in the vicinity.

G. Dallas Hanna, who has had exceptional opportunities for observing this species, thinks that great numbers of crested auklets move northward in winter from their principal breeding grounds south of Bering Sea, and that this accounts for the immense numbers sometimes seen at this season, when they are much more abundant than in summer. He states:

This species evidently winters not far to the south of the Pribilof Islands, since after a severe storm from this quarter in winter the birds are almost always seen in small numbers and occasionally in enormous flocks, as in February, 1915, off St. Paul, and January, 1917, off St. George. At these times the birds gather on the water as closely as they can sit, and on both of the above occasions some flocks of the birds covered as much as 5 acres. This is a conservative statement, as applied to the larger flocks, as the areas were carefully estimated. At the same time there were many smaller flocks in the vicinity. The presence of drift ice does not prevent them from appearing after a blow; they then gather in the open spaces in their customary manner. (MS. notes, 1920.)

The flesh measurements of a number of specimens, recorded by M. C. Marsh, range as follows: Length, 9 to $10\frac{1}{4}$ inches; extent, $18\frac{5}{8}$ to $19\frac{1}{8}$. No appreciable sexual difference in size is apparent. A male (No. 104, M. C. Marsh) taken on St. Paul Island December 5, 1911, measured: Length, 10 inches; extent, 19. Notes on the colors of the soft parts follow: Iris with a ring of pale green within yellow, finally bordered by a black circle on the edge of sclerotic; legs and feet pale bluish, blackish behind, the web dusky in front; bill plain brown, lighter underneath.

A summer female (No. 349, Hanna) taken on St. George August 22, 1913, had the bill lead color at the tip, brown at base; iris white; feet and toes slate; webs, black.

Food.—Seven well-filled stomachs of crested auklets from the Pribilofs contained only amphipods, identified as *Parathemisto oblivia* in five cases and as *Socarneva vahli* in one. Another nearly empty stomach contained only two bits of kelp. Six of the stomachs holding amphipods were collected in midwinter, and the following note by G. Dallas Hanna is of interest as indicating the depth to which the birds must descend at that season to secure their staple food:

On several occasions I have been on fishing parties out among these birds and twice we pulled up codfish which had in their stomachs in one case one, and in the other case two, birds of this species. As the cod is a bottom feeder it seems evident that the birds descend to 30 fathoms, the depth of the water at the localities concerned. I believe it is customary for most of the diving birds to feed on the bottom, because I have been unable to secure amphipods at intermediate depths in the winter time. In summer, however, the crustaceans come nearer the surface and are more easily secured.

Aethia pusilla (Pallas). LEAST AUKLET.

Pl. VI, fig. 1.

The least auklet, the "Choochkie" of the natives, is excessively abundant on the Pribilofs during the breeding season, being present in countless thousands, probably millions. Palmer estimated their numbers as equaling the sum of all the other species. They breed on all the islands, but most abundantly on St. George, where an immense colony occupies the base and slopes of a high hill, Ulekiah, which rises near the center of the island. Elsewhere they nest in the cliffs and boulder beaches throughout practically the entire coast line of the different islands. The species was first recorded from the islands by Coinde (1860, p. 403).

Apparently the birds resort to land only to breed. A few winter at sea about the Pribilofs, and these flocks are augmented in spring by the arrival of the myriads which have wintered to the southward. A few days after their appearance offshore they begin to alight on the cliffs and boulder beaches, and soon become abundant on their breeding grounds.

Since these birds form an important and welcome addition to the spring food supply of the natives, their arrival is eagerly awaited, and many notes on spring arrival have been recorded. The following, referring to St. Paul Island, were taken from the island log by W. L. Hahn: April 30, 1886, arrival; April 25, 1889, arrival; April 18, 1899, arrival; April 28, 1900, small numbers; May 1 and 2, common; April 24, 1901, arrival; April 25, numerous; April 18, 1902, arrival; April 23, 1903, arrival; April 13, 1904, arrival; April 19, 1906, seen at sea; May 2, 1908, arrival; April 26, 1909, arrival; May 10, 1910, first seen flying over the land. Notes during recent years

are: St. Paul Island, 1911—April 18, arrival; April 27, about 100 seen; April 28, first seen flying over land; May 9, many thousands (Hahn). St. George Island, 1914—April 8, about 250 seen, first date when observed in numbers, though a few had been about all winter; April 14, upwards of 10,000 seen, small numbers flying over land and large flocks along beach (Hanna). St. Paul Island, 1915—March 30, flocks flew along nesting ground; April 15, flocks near shore; April 24, 27, thousands; May 6, abundant (Hanna). St. George, 1916—April 16, seen at sea; April 25, seen on land; 1917—April 17, offshore; April 23, on rocks (H. P. Adams). St. Paul, 1918—April 10, near shore; April 14, large flocks over boulder beaches (Hanna).

Eggs are usually laid in June; dates of collection follow: Otter Island, June 14, 17, 1884 (Lutz, 1889, p. 31). St. George, May 28, 1890; St. Paul, June 5, 1890 (Palmer, 1899, p. 388). St. George, May 24, June 8, 1913, June 16, 1914 (eggs well incubated) (Hanna). St. Paul, July 2, 1914 (Preble). St. George, June 5, 1916, eggs secured (H. P. Adams).

After the close of the nesting season in July the species rapidly becomes scarce about the shores of the islands. Hahn's observations in 1910 show records as follows: August 30, about 300 seen; August 31, 50; September 1, 8; September 10, 1; September 11, 1; October 2, none seen on St. Paul for some time, but still numerous at sea. In 1913, on St. George Island, Hanna saw none about the land later than August 20. In 1914, on St. Paul, I noted them only in small numbers during August, observing a few, however, almost daily up to the time of my departure on August 30, these late lingerers being probably the late hatched birds. After my departure Hanna recorded 6 observed on October 4, 1,000 on December 4, and 500 on December 13. H. P. Adams, in 1916, saw the last about St. George on August 28, and observed it at sea March 26, 1917. Hanna saw one off St. George January 25, 1917.

Numerous specimens taken by Hahn and Marsh in 1911 and 1912 measured in the flesh: Length, $6\frac{5}{8}$ to $7\frac{1}{2}$ inches; extent, $12\frac{3}{4}$ to $13\frac{5}{16}$.

Food.—The only information we have on the food of the least auklet is H. W. Elliott's credible statement (1875, p. 209) that "they feed on water shrimps and sea fleas."

Synthliboramphus antiquus (Gmelin). ANCIENT MURRELET.

The ancient murrelet was first recorded from the Pribilofs by W. H. Dall (Dall and Bannister, 1869, p. 310), who recorded it as "common at St. George." No specimens were taken at that time, and no further particulars as to the basis of the record are available. The first specimen was taken by W. L. Hahn on St. Paul Island, November 7, 1910; this is now in the collection of the Biological Survey. It measured in the flesh: Length, 10 inches; extent, $16\frac{5}{8}$.

Hanna observed three at St. Paul on December 4, 1914, and took a specimen there on April 18, 1918; another specimen, a female, taken on St. George Island, May 12, 1916, was sent in by Dr. H. P. Adams. Both of these are now in the collection of the U. S. National Museum.

Food.—The stomach of the April specimen above mentioned contained remains of more than 800 amphipods (*Pontogeneia inermis*).

Brachyramphus marmoratus (Gmelin). MARBLED MURRELET.

The marbled murrelet was first recorded from the Pribilofs by Hanna (1919a, p. 176, and 1920a, p. 251), on the basis of a specimen taken by him on St. Paul Island January 13, 1918. It is now No. 255110 of the collection of the U. S. National Museum.

Food.—The stomach of this specimen was about half filled with ground-up amphipods. These constituted 100 per cent of the food, a bit of hydroid present being much less than 1 per cent.

Cephus columba Pallas. PIGEON GUILLEMOT.

The pigeon guillemot was first recorded from the Pribilofs by Nelson, who states "they nest on the fur seal islands" (1887, p. 45). This statement was based on conjecture, from his having observed the birds under the cliffs of St. George Island. Palmer found the birds quite common, but very shy, on the ocean to the southward of Walrus Island, on June 13, 1890 (1899, p. 389).

Hanna has published the following note, based on his observation of the species (1916, p. 402):

This is a common winter resident, and by April 18, 1915, some had the black summer plumage almost complete though still slightly speckled with white. It is strange that this bird should not breed on the Pribilofs, since it is so abundant on the neighboring Aleutians. The last one seen in 1915 was on May 26. In winter it feeds along the surf line, is very tame, and utters a low, shrill whistle when observed. A male and a female were taken on each island. The species has been previously recorded from the islands, but apparently no specimens were secured prior to my work there.

His detailed notes taken on St. Paul Island, follow: 1914—December 2, 8 seen; December 9, 1; December 4, 6, and 13, about 200 seen each day. 1915—February 18, 200 seen at Northeast Point; April 6, 1; April 18, 12; May 10, 2; May 18, 2; May 26, 1.

According to his field catalogue, M. C. Marsh collected a male of this species on St. Paul Island, January 6, 1912, and made the following notes: Length, 13 inches; extent, 23. Legs and feet orange red in front, somewhat darker behind; tarsus black behind; claws black; mouth vermilion; iris brown.

Hanna, during 1913 to 1915, observed the species on a number of occasions, as follows: St. George Island, 1913—December 19 and 30. St. Paul Island, 1914, December 2, 8 seen; December 9, 1; December

4, 6, and 13, about 200 seen each day; 1915—February 18, about 200 seen at Northeast Point. During the same spring the species was noted as follows: April 6, 1; April 18, 12; May 10, 2; May 18, 2; May 26, 1. Single specimens, now in the U. S. National Museum, were collected by Hanna on the following dates; St. George Island, December 19 and 30, 1913; St. Paul Island, December 6, 1914; April 18, 1915. The specimen last mentioned has nearly finished acquiring the summer plumage, though the underparts are still speckled with white. H. P. Adams noted the species on St. George, February 4, 1917, and Hanna on January 24, 1917.

Food.—Of the seven stomachs of the pigeon guillemot from the Pribilof Islands only five were well-filled, and these contained the following food items: Amphipods, 56.8 per cent; hermit and spider crabs, 20.8 per cent; isopods, 17.2 per cent; fish, 4 per cent; kelp, 1 per cent; and univalves, 0.2 per cent. The amphipods were identified as *Allorchestes malleolus* and the isopods as *Idothea ochotensis*. The spider crab was *Lithodes brevipes*, and the hermit crabs include two species—*Hapalogaster grebnitzkii* and *Dermaturus mandtii*. No fewer than 13 of the last-named species had been eaten by one bird. The fact that almost no univalve fragments were present in the stomachs of birds eating so many hermit crabs shows that the crabs are either pulled from the empty shells they use for homes or are caught while transferring from one shell to another, a thing they frequently do. The fish remains in the present series of stomachs were unidentified, and the miscellaneous items of small importance, mostly contained in a single nearly empty stomach, were remains of marine worms, a pycnogonid or sea spider, and bits of kelp.

Uria troille californica (H. Bryant). CALIFORNIA MURRE.

The California murre is the less abundant of the two species breeding on the Pribilofs, occurring in some numbers among the nesting colonies of the Pallas murre in practically all the sites on the islands, excepting Sealion Rock, and in some cases occupying extensive areas to the exclusion of the larger species. It was first recorded from the Pribilofs by Elliott (1874, unpagged, and 1875, p. 210).

It is difficult to fix even the approximate date of spring arrival on the Pribilofs, since most observers have failed to distinguish the two species, and the case is further complicated by the fact that both species occur in some numbers during the winter. The birds usually begin perching on the cliffs, probably indicating an awakening breeding interest, in late April or early May.

The bird breeds on all the islands of the group excepting Sealion Rock (Hanna, 1920b, p. 175). Mr. Hanna states that on St. Paul this species nests principally at Southwest Point, and on the high

cliffs on the western side of the island, among the colonies of the more numerous Pallas murre, but that it is not found among the extensive murre rookeries on Reef or Kitovi; this is in agreement with my own observations as far as they extend. It nests in great numbers on Walrus Island, usually apart from the other species. This circumstance has caused different visitors, judging from hurried observation covering only parts of the rock, to believe that the murre rookeries there consisted mainly of one or the other species. Palmer, however, in 1890, made two trips to the rock, and noted the Pallas murre exclusively on the western and northern parts of the island, and the present species on its southeastern part. During my own visit there on July 16, 1914, I noted that the breeding colonies on the higher central part of the island were principally of the present species. Further detailed observations are needed to show the proportionate numbers and the breeding areas of the two species on Walrus Island, and these may vary in different years.

The first eggs are laid in early June, and owing to various causes eggs still being incubated may be found until near the end of July; at the time of our visit there on July 16, 1914, young birds and eggs seemed about equally numerous. Eggs were taken on Otter Island, June 13, 1884 (Lutz, 1889, p. 31).

The birds leave the breeding rookeries in late August but continue about the islands during the autumn and winter, being by far the more common of the two species at that season, and being called the winter arrie by the natives, many of whom think it is found only at that season. Winter specimens in the collections of the Biological Survey and U. S. National Museum include the following: St. George Island, male, December 21, 1913; male, December 30, 1913; St. Paul Island, December 6, 1914. The species seems usually to be seen only in small companies during the winter. However, on February 18, 1915, Hanna observed upwards of 1,000 about St. Paul. He also found the birds abundant at the edge of the ice-pack off St. George, January 25, 1917.

Food.—Eighteen stomachs of the California murre from the Pribilofs, mostly taken in winter, have been examined. Of these only 12 were well filled and the contents of these were almost exclusively amphipods. The kind most frequently identified was *Pontogeneia* sp.; *Anonyx nugax*, *Allorchestes ochotensis*, *Hyale* sp., *Jassa* sp., and *Metopa* sp. occurring in smaller numbers. One of the well-filled murre's stomachs contained remains of 20 or more marine worms of the family Nereidae, and two of them held isopods (*Idothea ochotensis*). The nearly empty stomachs, which experience has shown do not as a rule fairly represent normal food habits, yielded remains of small sculpins (Cottidae), bits of barnacles, mollusks (in-

cluding *Aegobuccinum oregonense*), and hydroids; and the following vegetable matter: Algae, and glumes of grasses (*Phlerum alpinum* and *Festuca ovina* var. *violacea*).

Uria lomvia arra (Pallas). PALLAS MURRE.

The Pallas murre is a very abundant species, the more numerous of the two murre, and nests on all the islands of the Pribilof group. It was apparently first definitely recorded by Dall (Dall and Banister, 1869, p. 309), though Veniaminof (Trans. by Elliott, 1874, unpagcd, and 1875, p. 242), in referring to "arries" as occurring, referred, of course, to this species as well as to the California murre.

Since the species winters in small numbers about the Pribilofs it is impossible to give definitely its usual date of arrival or departure, especially since the two species are difficult to distinguish at a little distance. The following notes taken by Hanna in 1915 on St. Paul Island evidently refer to spring arrival of this species on the nesting cliffs: April 15, 150 killed by natives, hundreds reported on the cliffs at Southwest Point; April 26, 100 killed in same place; May 6, fairly common. On St. George, in 1917, Hanna noted the first of the season on April 20.

The Pallas murre is the more numerous of the two species on all the nesting rookeries. Egg laying begins in early June. James Judge (MS. report) states that two arrie eggs were found on Walrus Island on June 1, 1889, and that the birds had not begun to lay at the same place on June 8, 1904; on June 16, 1910, 932 fresh eggs were found at the same place; on June 21, 1909 (St. Paul Island log) about 6,000 eggs were obtained by the natives at the same place. (These notes may refer in part to the California murre.) Definitely identified eggs of the present species were taken as follows: St. George, June 27, July 1, 1873; St. Paul, July 31, 1890 (Catalogue eggs, U. S. Nat. Mus.); Otter Island, June 13, 30, 1884 (Lutz, 1889, p. 31); Walrus Island, June 13, 1890 (Palmer, 1889, p. 391); St. George, July 1, 1914 (18 eggs in collection U. S. Nat. Mus. selected from 100, to show variation in color, by G. Dallas Hanna).

By the end of August most of the birds have left the breeding rookeries; at this time many late-hatched young are deserted and soon perish, the desire of the mother to accompany the departing flocks evidently being stronger than the parental instinct. Hanna states that on August 31, 1913, most of the murre had gone, and that many young ones were falling from the cliffs.

A few are observed about the island during the autumn and winter; Hanna's notes for 1914 record 2 observed on October 4, 3 on December 4, and 3 dead ones seen December 13. As is the case with several others of the more abundant species, dead ones are frequently observed in large numbers. Notes taken from the St. Paul Island

log by W. L. Hahn include the following entries in the autumn of 1900: October 25, hundreds of sick young ones; November 2, hundreds of dead birds; November 10, at least 5,000 dead on the shores of the lagoon; November 24, both sides of Northeast Point covered with dead ones.

A female specimen taken by M. C. Marsh, February 5, 1912, measured in the flesh: Length, $15\frac{1}{2}$ inches; extent, $28\frac{1}{2}$; bill jet-black, excepting the border of light yellow at base of the upper mandible and the pale tip; legs and feet black posteriorly, dusky and dark yellow anteriorly.

Food.—If the relatively small number of stomachs available can be taken as a criterion, the food of the Pallas murre in the Pribilof region differs markedly from that of the California murre. Of six stomachs examined, four were well-filled, and the food in them consisted of fish remains, 48.75 per cent; flesh and mandibles of squids, 26.25 per cent; and crustaceans, 25 per cent. The nearly empty stomachs also contained fish and squid remains. The crustaceans which completely filled one stomach were shrimps identified as *Spirontocaris polaris*.

Family STERCORARIIDAE.

Coprotheres pomarinus (Temminck).⁴ POMARINE JAEGER.

The Pomarine jaeger is a somewhat rare visitor. It was first obtained by Elliott, who took a specimen on the uplands between Kaminista Lake and Polovina, on St. Paul (Elliott, 1874, unpagged, and 1875, p. 196). This is No. 62522, female adult, U. S. National Museum, June 23, 1872. Another specimen (No. 106857, male, June 16, 1885) was obtained and reported by C. H. Townsend (1887, p. 98).

Palmer (1899, p. 393) states: "During the summer of 1890 two were seen on St. George eating the carcass of a fur seal. One of these was killed and preserved by Mr. Ed. Lavender." The final disposition of this specimen is not known. Two specimens, a male and a female, were taken by H. J. Christoffers on St. Paul Island, June 10, 1916. These are now in the collection of the U. S. National Museum.

Stercorarius parasiticus (Linnaeus). PARASITIC JAEGER.

The parasitic jaeger was first added to the fauna of the islands by Elliott, who mentions seeing four or five individuals (1874, unpagged, and 1875, p. 197). A specimen taken by him, a female in the dark phase of coloration, collected June 15, 1872, is No. 62524, of the bird collection of the U. S. National Museum. This constituted

⁴ *Stercorarius pomarinus* of the A. O. U. check list, 1910.

the only record until 1914, when G. D. Hanna on September 24 took a dark male bird on St. Paul Island, now No. 237495, U. S. National Museum. Hanna observed another individual, also a dark-colored one, on June 14, 1915, on the same island.

Food.—The stomach of the September specimen taken by Hanna was filled with finely ground remains of small fishes. The grinding material it contained was three lumps of an old bryozoan colony.

Stercorarius longicaudus Vieillot. LONG-TAILED JAEGER.

Judging by the records the long-tailed jaeger is the most frequently observed of the three jaegers, and we may perhaps credit Veniaminof (Trans. by Elliott, 1874 unpagged, and 1875, p. 242) with first having observed it, since he records "jaegers" as one of the species occurring on the Pribilof Islands. Elliott took one June 13, 1872, which has been several times recorded, and is still in the collection of the U. S. National Museum. Though thus early noted, the species appears not to have been afterwards observed until recent years. Hanna shot one on St. George, May 23, 1914. This was a male which had a string about the right foot, showing previous capture. Later in the same summer Mr. Hanna and the writer observed a number on both islands. We saw it daily on St. George, July 12, 13, and 14, noting as many as 7 on the two latter dates, and taking a specimen on the 14th; I noted one near Kaminista Lake, St. Paul, on July 29. The next year, on May 27, Hanna took a specimen on St. Paul.

None of the jaegers are known to have bred on the Pribilofs nor to have remained through the breeding season, although the conditions there would seem to be favorable for nesting.

Food.—Five stomachs of the long-tailed jaeger collected on the Pribilof Islands are at hand, of which four are well filled, three of them with insects, and one with the remains of eggshell and an unhatched young of a deep-water duck (Fuligulinae). One of the stomachs containing insects held more than 90 individuals of 4 species. The most numerous species was the large gold and green ground beetle *Carabus truncaticollis*, of which one stomach contained 58, including one larva. Other ground beetles eaten were *Pterostichus pinguidineus*, *Pterostichus* sp., and *Amara brunnipennis*. One stomach contained 3 of the rather large yellow and brown moths (*Hyphoraia subnebulosa*), one a crane-fly (*Tipula* sp.) with eggs, one two flesh-flies (*Cynomyia hirta*) and 16 larvae of this or an allied species, and another a small parasitic wasp (*Amblyteles* sp.). A bit of fish bone was in one of the well-filled stomachs and a nearly empty stomach contained a single sawfly (*Amauronematus*, probably of the species *whitneyi*, described from material in the present collections).

Elliott (1874, unpagcd, and 1875, p. 198) states that two individuals seen by him on July 29, 1872, [on St. Paul] were apparently feeding upon insects, and upon a small black berry (*Empetrum nigrum*).

Family LARIDAE.

Pagophila alba (Gunnerus). IVORY GULL.

An ivory gull obtained by True and Prentiss in 1895 was first recorded by Palmer (1899, p. 395). Concerning it, Prentiss (1902, p. 99) says: "One was killed by the natives on St. Paul in February or March, 1895, and prepared by Mrs. Judge, from whom I obtained it. It was not previously known from the Islands." Other specimens were taken on St. George Island by A. H. Proctor on February 18, 1916, and by G. Dallas Hanna on March 27, 1917. All these specimens are in the collection of the U. S. National Museum.

Rissa tridactyla pollicaris Ridgway. PACIFIC KITTIWAKE. Pl. VI. fig. 3.

Rissa tridactylus pollicaris Ridgway, Water Birds North Amer., vol. 2, p. 202, 1884. (Type from St. George Island.)

The Pacific, or western black-legged, kittiwake is very abundant on the Pribilofs, nesting on the cliffs of all five islands of the group, and remaining in small numbers during the autumn and early winter. The species was first recorded from the islands by Coinde (1860, p. 401), and has been observed by all later students of the avifauna. It is eaten in large numbers by the natives.

The following notes on spring arrival are the only definite ones at hand: St. Paul Island, 1909, first reported April 20; hundreds May 1 (St. Paul Island log, fide Hahn). St. Paul Island, 1911, 2 seen, April 24; many shot, April 30 (Hahn). St. George Island, 1914, 2 seen April 8; 10 seen April 22 (Hanna). St. Paul Island, 1915, May 18, 40 killed at Northeast Point; May 28, abundant (Hanna). St. George, April 16, 1917 (Hanna).

The nests are built of grass and moss, with some mud, and are placed on small platforms on the faces of cliffs. The following dates will show the period of nesting: St. Paul, July 3, 1879; St. George, June 24, 1873 (catalogue eggs, U. S. Nat. Mus.). Otter Island, June 21, 1884, eggs taken (Lutz, 1889, p. 31). Palmer (1899, p. 396) gives the following pertinent data: St. George, May 28, 1890, a few nests, but no eggs; Walrus Island, June 8, 1889, two eggs collected by C. H. Townsend; St. Paul Island, August 2, 1890, most nests with young, but a few had a young one and an egg, or sometimes two or three eggs. In 1914, on St. George Island, Hanna noted that on July 1 the nests were being completed, and a few had eggs. During the same season, the writer found a few nests with eggs on Sealion Rock, on June 29, and saw many nests on Walrus Island on July 16,

and on Otter Island, July 27. Bent (1921, p. 49) gives 13 records for eggs on the Pribilofs from June 10 to July 7; of these, 7 records fell between June 25 and July 3.

Hahn recorded this species as common on St. Paul Island during September and October, 1910, and saw quite a number in November. He saw 12 on December 8, and noted it as numerous December 21 of the same year, and saw 6 individuals on January 4, 1911. Hanna, on St. Paul Island, during the autumn of 1914, observed the species as follows: September 14, 40; September 16, 10; September 20, 2; September 22, 100; October 4, 25; October 12, 3.

A female specimen taken by W. L. Hahn, August 31, 1910, measured in the flesh: Length, 15 $\frac{3}{8}$ inches; extent, 39.

Food.—Three stomachs of St. Paul specimens of the Pacific kittiwake (taken in July and August) have been examined but yield meager data on the food habits of the species. One, very well filled, contained fish flesh, with no bones, and therefore not identifiable, another held fragments of Crustacea, also unidentifiable, and the third only vegetable débris, evidently algae. A more valuable stomach content collected at St. Matthews Island, July 12, 1916, by G. Dallas Hanna, contained Crustacea exclusively: A spider crab, Lithodidae, 50 per cent; and isopods, including *Idothea ochotensis*, 50 per cent.

Regarding the kittiwakes Mr. Hanna says:

They both occasionally eat small fishes which come near the surface of the sea. At such times they dive down like a tern for their prey. They also eat the refuse from freshly cleaned fish which may be thrown into the sea, but I have never seen one eat carrion.

However, the record above of fish flesh without bones is very suggestive that carrion sometimes is eaten.

Rissa brevirostris (Bruch). RED-LEGGED KITTIWAKE.

The red-legged kittiwake, an exceedingly beautiful species, the "Goverooskie" of the natives, is much less abundant than its congener, but is nevertheless found in large numbers. It breeds on all the islands excepting Sealion Rock, and appears to leave the neighborhood of the Pribilofs in September, to remain until April. It is a favorite article of food of the natives, being more esteemed than the black-legged species. It was first credited to the islands by Coinde, who supposed it to be an undescribed species, and named it *Larus warnecki* (1860, p. 401).

Hahn noted that many were shot on St. Paul Island on April 30, 1911. All the rest of the available notes on spring arrival are by Hanna. On St. George Island, in 1914, he observed 4 on April 8, 50 on April 22, and upwards of 1,000 on May 6. His notes for 1915, on St. Paul Island, are as follows: April 18, 20 individuals observed; April

24, 6; April 26, 81 killed by natives at Southwest Point; May 4, 30 observed, abundant at Southwest Point; May 18, 100 observed at Northeast Point; May 28, abundant. In 1917, on St. George, he noted the first on April 22.

The red-legged kittiwake nests among the colonies of its more numerous relative. Prentiss (1902, p. 99) makes the following statement regarding its detailed distribution on St. Paul Island, from observations made in the summer of 1895:

The distribution of the red-leg on the island of St. Paul differs from that of the black-leg. Around the village and the southeast portion of the island the red-leg is comparatively rare, while at Half-way Point on the east side of the island, there is a marked increase in numbers. At the southwestern portion they form nearly one-half of the kittiwakes. * * * On the north side of St. Paul they were numerous, and also on the beach at Zapadnie.

Palmer (1899, p. 398) gives the measurements of eggs taken on St. George Island, by Elliott, June 25, 1872. Lutz (1889, p. 31) records an egg taken on Otter Island, June 29, 1884. The catalog of eggs in the U. S. National Museum notes eggs taken on St. Paul, July 15, 1895. Hanna took eggs on St. George Island, July 3, 1914. On August 31, he observed young still in the nest; on September 11, the young were all on the wing. This apparently was the signal for the departure of the species. On September 14, he records seeing 12 individuals; on the 16th, 4, and on the 22d, 10. These were the last seen that season. I find no winter records.

Food.—Fifteen stomachs of the red-legged kittiwake from St. George Island have been examined, eight of them being half or more full and seven nearly empty. Of the food in the former, 25 per cent consisted of squid remains, 37.5 per cent of fish, and 37.5 per cent of Crustacea. The Crustacea were small shrimplike forms, chiefly of the genus *Thysanöessa*, and were present to the number of several hundred in each of two stomachs. All of the nearly empty stomachs contained squid mandibles.

Larus hyperboreus hyperboreus Gunnerus. GLAUCOUS GULL.

The glaucous gull breeds in small numbers on the grassy summit of Walrus Island, among a large colony of glaucous-winged gulls, and during the summer season may occasionally be observed on the other larger islands. It is found in larger numbers during the fall, and Hanna (1917, p. 407) states that in winter it is the only large gull found on the Pribilofs, having replaced entirely the glaucous-winged gull with which it has been associated.

The species was first recorded by Palmer (1899, p. 395) under the name *Larus barrovianus*. A specimen taken by him there on June 13, 1890, has recently been referred by Oberholser, as a result of a critical study of the group, to the typical form (1918, p. 471).

On the occasion of my visit to Walrus Island on July 16, 1914, a few glaucous gulls, about 15 pairs, were found to be nesting on the extreme grassy summit of the island. At this time most of the nests contained well-grown young. No specimens were collected, and owing to the brief time we could stay on the island, no detailed study could be made of this or any particular species.

Hanna observed the glaucous gull on St. Paul Island, as follows: 1914, September 14, 1; September 16, 5; September 20, 1; October 12, 1; October 25, 20; November 27, 10; December 13, 4. 1915: February 18, 25; March 5, 2; March 18, 300; April 2, 1; April 24, 10; May 4, 30; May 28, 15.

The species evidently was common about St. George Island in the spring of 1917, since Hanna sent in the stomachs of nine birds taken on April 12.

Food.—Nine stomachs of glaucous gulls from St. George Island and one from St. Matthew Island, all well filled, were available for the present study. They reveal that this species shares the well-known propensity of gulls to feed largely on carrion. Fifty-eight per cent of the total food of these birds was fishes, the indications being that most if not all of them were found dead. Ten per cent of the food consisted of a large egg, perhaps of a duck, found in one stomach, another 10 per cent, approximately, of squid remains, a slightly larger amount of invertebrates including hydroids, mollusks, marine worms, and a crab, and a similar proportion of algae. The mollusks identified were the common blue mussel (*Mytilus edulis*), a sea slug (*Chiton (?) submarmorea*), and the crab was a hermit (*Dermaturus mandtii*).

Larus hyperboreus barrovianus Ridgway. POINT BARROW GULL.

A gull taken on St. Paul Island on June 21, 1890, has been referred by H. C. Oberholser (1918, p. 473) to this form, which is characterized as smaller, and having a darker mantle, than typical *L. hyperboreus*. This bird must have been a nonbreeding bird or a wanderer from some breeding colony. It was taken by William Palmer, but for some reason was not mentioned in his account of the birds of the Pribilofs. The specimen is still in the collection of the U. S. National Museum.

Larus glaucescens Naumann. GLAUCOUS-WINGED GULL.

The glaucous-winged gull is an abundant summer resident, breeding on Walrus Island, St. George Island, and Sealion Rock, and is also observed in winter, sometimes in considerable numbers. First recorded from the Pribilofs by Veniaminof in 1840 (Trans. by Elliott, 1874, unpagged, and 1875, p. 242), under the name of "chickee" (the native name), and noted by all subsequent observers.

Because of its wintering to some extent, the date of spring arrival is somewhat uncertain. The following dates of observation later than late March are available: St. George Island, 1914: March 28, 25 seen; May 6, 30 seen; April 14, 40 about stranded whale; April 22, 20. St. Paul Island, 1915: April 24, about 3,000 seen, appeared in numbers during the last few days; May 4, 20 seen; May 28, abundant.

The birds breed principally on Walrus Island, the foxes apparently preventing them from nesting on St. Paul Island and Otter Island, and on St. George except in a few places, as the birds prefer flat turfy situations for nesting. A few pairs breed on the summit of Sealion Rock, a small islet close to St. Paul. All through the breeding season the birds are common on St. Paul Island, feeding about the shores and numerous ponds, and apparently securing most of their nesting material there. On Walrus Island, in 1872, Elliott considered that 500 or 600 were nesting; in 1914 I estimated about 100 pairs. The eggs, usually 2 or 3 in number, are laid mainly in June. James Judge reported finding 359 eggs, all fresh, on Walrus Island, June 16, 1910. Palmer (1899, p. 394) on June 13, 1890, found some fresh eggs and many well incubated, while a few were already hatched. At the same place on July 16, 1914, I found many young, but only a few eggs, and those usually about to hatch.

A few fall and winter dates of observation follow: St. Paul Island, 1910, abundant during September and October; less so in November. December 8, 12 seen; December 21 numerous at sea; 1911, January 4, 3 seen; January 30, 6 (Hahn). St. George: 1913, September 4, 8 seen; September 15, about 20; October 9, 4; October 18, 50; November 11, a few along beach all the time; 1917, January 25, abundant (Hanna). M. C. March made the following notes on fresh specimens collected by him: St. Paul Island, October 16, 1911, female, length, $23\frac{3}{4}$ inches; extent, 53; basal half of bill whitish, scarcely tinged with flesh color; terminal part, black, excepting pale tip; legs and feet outwardly dirty brownish, paler on inner surface. Another female specimen, same place and date, measured: Length, 24 inches; extent, 52; iris purplish-silvery mottled; edges of eyelids pinkish; bill whitish and yellow, with a blotch of orange at angle; lower mandible yellow, deepest on curves; upper mandible lighter along straight edges of commissure and above nostrils; legs and feet faded pinkish.

Food.—William Palmer in his report on Pribilof birds (1899, p. 395) noted that the glaucous-winged gull feeds "on pretty much everything in the way of offal. Even the dead seals are devoured by them, and they vie with the foxes in their ability to search out and dispose of all animal matter." Results obtained in the present

investigation bear out this bird's reputation as a scavenger. Three of the four well-filled stomachs contained fish bones and flesh and eggs, undoubtedly carrion, which amounted to 41.25 per cent of the total food. A rib of a fur seal was the principal food taken by one bird; the bone was 6 inches long and extended from the throat to the stomach, where the lower end was undergoing digestion. One full and one nearly empty stomach contained exclusively remains of eggs and young of a bird of the auklet family. Miscellaneous contents were remains of univalve, sea urchin, crab, and algae.

Larus schistisagus Stejneger. SLATY-BACKED GULL.

The slaty-backed gull was included among the birds of the Pribilofs by Palmer, whose account (1899, p. 394) may be quoted in full:

Several of the natives informed me that a large black-backed gull, different from the following, bred sparingly on the cliffs of Otter Island, and that they rarely visited St. Paul. Daniel Webster, an old experienced sealer who had then spent 22 years on the islands, also told me that a large dark-backed gull was to be found in small numbers on the cliffs of St. George. On June 11, on St. Paul I saw three, and on June 12, another, which came in over the Reef from the direction of Otter Island. Several evenings after August 1 I noticed some large gulls flying slowly in from the Reef (on one evening I counted seven). The mantle was much darker than in *glaucescens*. They were probably this species, the status of which is very uncertain on the American side of Bering Sea.

Gulls observed by Hanna on two occasions were apparently of this species. On December 21, 1913, he saw about 25 large white-tailed gulls with slate-colored backs, off St. George Island; and on October 15, 1919, saw two dark-backed gulls, with black-tipped wings, and slightly smaller than the glaucous-winged gull, about the ship's anchorage off St. Paul Island. He has no evidence of the breeding of the species on Otter Island.

Rhodostethia rosea (Macgillivray). ROSY GULL.

A specimen of the beautiful rosy gull was shot by a native on a fresh-water lake on St. George Island May 25, 1911, and was preserved by A. H. Proctor. The specimen, which is now in the collection of the Biological Survey, was recorded by Evermann (1913, p. 17). A second specimen, a female, taken on St. George March 24, 1917, is now in the U. S. National Museum.

Xema sabinii (J. Sabine). SABINE GULL.

The Sabine gull appears to be of regular occurrence in early summer and in the autumn. It was first credited to the islands by Palmer (1899, p. 398), who mentions one seen on St. Paul Island by H. W. Elliott June 4, 1890, and one (perhaps the same individual) seen later about the lagoon by himself. He also lists a specimen

taken June 26, 1890, and refers to others taken during the summer of 1896, and one on St. George Island by D. W. Prentiss. Prentiss, referring to observations made in 1895, says (1902, p. 100): "I saw them occasionally on both St. Paul and St. George, and secured several."

W. L. Hahn, during the autumn of 1910, observed the species as follows on St. Paul Island: August 31, 1; September 1, 7; September 7, 2; September 8, 20; September 11, 20; October 2, 1. A specimen taken by him on September 8 measured in the flesh: Length, $13\frac{1}{2}$ inches; extent, $30\frac{1}{4}$.

G. Dallas Hanna, on St. George Island, observed two individuals, collecting one, May 19, 1914, and on June 16 saw three. In the year following, on St. Paul Island, he saw one on May 26. Two specimens, an adult and an immature female, were collected by him on St. Paul Island, August 30, 1916. They are now in the collection of the U. S. National Museum.

Food.—One well-filled stomach and crop of the Sabine gull taken May 19, 1914, on St. George, gives evidence that this bird feeds upon insects on the wing and is skillful in the pursuit. The food contained in this stomach included the remains of 6 gold and green ground beetles (*Carabus truncaticollis*), 2 other ground beetles (*Pterostichus* sp.), and 1 water beetle, together 4 per cent; a great many caddisflies, 16 per cent; and numerous two-winged flies (37 *Borborus annulatus*, 5 *Leria fraterna*, 3 *Scatophaga dasythrix*, 1 *Hydrophorus innotatus*, and 27 or more others), 80 per cent. A nearly empty stomach taken at the same time contained remains of amphipods, and marine worms (Nereidae).

Sterna paradisaea Brunnich. ARCTIC TERN.

The arctic tern is apparently of regular occurrence about the Pribilofs during migration. It was first recorded from the group by Palmer (1899, p. 398) on the authority of F. A. Lucas, who saw two on St. Paul Island July 26, 1890, and of Daniel Webster, an old sealer, who described a tern claimed to be found every fall about St. George. Later observations have added to the records. Hahn observed eight on St. Paul Island August 30, 1910, and one on September 24. Hanna saw four feeding in the surf off St. George Island May 19, 1914, and collected one. During the following spring, on St. Paul, he observed the species as follows: May 9, two; May 11, four; May 15, one; May 26, one; June 30, one. Two female specimens, an adult and an immature, now in the collection of the U. S. National Museum, were taken by Hanna on St. Paul Island on August 28 and 30, 1916. He also took a specimen on St. George, August 5, 1920.

Food.—Only two stomachs of the arctic tern from the Pribilofs (May 19, 1914, and August 5, 1920) have been examined; one of them was practically filled with remains of small sculpins, the other with amphipods (46 or more *Pontogeneia* sp.). Both stomachs contained traces of univalves, in each case less than 1 per cent.

Family DIOMEDEIDAE.

Diomedea albatrus Pallas. SHORT-TAILED ALBATROSS.

The short-tailed albatross used to be of common occurrence about the Pribilof Islands according to the testimony of the natives. Veniaminof, writing in 1840 (Trans. by Elliott, 1874 unpagged, and 1875, p. 242) stated that the albatross "is frequently to be seen about the beaches." Elliott took a specimen August 12, 1873, and was informed by the natives that 20 years earlier the birds had been very abundant but had disappeared with the whalers. Palmer (1899, p. 381) obtained an immature bird on St. Paul on August 4, 1890, and observed five others on August 10, off the reefs of the same island.

I have no recent records, excepting that of a sternum picked up on the beach at St. Paul by Hanna.

Family PROCELLARIIDAE.

Fulmarus glacialis rogersi Cassin. RODGERS FULMAR.

The Rodgers fulmar is a rather common summer resident, but the greater number apparently leave the islands as soon as breeding is over. A few are seen during the autumn, but they are very rare later. The species lays its single egg on narrow shelves on steep cliffs on St. Paul, Otter, and St. George, by far the greater number on the last. It was first recorded from the Pribilofs by Dall, who procured a specimen on St. George (1869, p. 323).

The birds usually arrive in March or April; I have few definite dates. On St. George Island in 1914 Hanna, on March 21, recorded having seen large numbers during the two preceding days, "the first since January, when one was seen"; April 3, numbers reported at Zapadni; April 8, 30 observed; April 22, 20. In 1917 it was first seen at Zapadni on March 8. Hanna's notes for St. Paul are as follows: 1915—May 2, 200 reported at Southwest Point; May 4, hundreds; May 10, abundant. 1918—February 8, killed at sea near island; large numbers on high cliffs.

The following dates refer to nesting: Otter Island, June 10, 1872, St. George, June 10, 1873, eggs in U. S. National Museum, collected by Elliott. Otter Island, June 14, 1885, eggs taken by C. H. Townsend (Palmer, 1899, p. 382). St. George Island, July 1, 1914, eggs taken by Hanna. On August 4, 1914, we found nests with well grown

young on the cliffs near Zapadni, St. George. H. P. Adams secured eggs on St. George, June 4, 1916.

Hahn found fulmars common at sea between Walrus Island and St. Paul, October 2, 1910. Hanna saw a few on St. George Island, September 11, 1913, and two on September 28. On St. Paul, in 1915, he noted two on October 4.

A considerable number of birds in the sooty phase of plumage occur in the breeding colonies. Hanna thinks that on St. George Island about one-fifth are dark birds. He has preserved two specimens of the dark phase of this species, and states (1920a, p. 249): "These birds are often seen in the large colonies which breed on the Pribilofs. They seem to mate indiscriminately with light colored birds and in one case a slate-colored downy young was seen which had light-colored parents." On July 12, 1914, in a breeding colony near the village of St. George, I saw a light and a dark bird, apparently mates, presiding over a nest containing a young one.

Food.—Of 19 stomachs of the Rodgers fulmar collected on St. George Island, 18 were nearly empty, but whether empty or well-filled the entire food remains present were those of squids. In one case mandibles representing at least 13 squids were present. G. Dallas Hanna also recognized the importance of squids in the dietary of this bird and gives the following interesting account of another food habit of the species:

Some species of squid is eaten extensively and the eyes, which resemble pearls, are found in the stomachs and the beaks have also been secured. But the huge brown-rayed jellyfish found in Bering Sea also is eaten. In the tide rips and eddies about the Pribilofs this jellyfish is often brought to the surface of the water. Fulmars attack it voraciously when an opportunity is presented and if possible tear it to pieces. The birds then gather around in large numbers to enjoy the feast. It seems that the attacks of the birds finding the jellyfish are chiefly an endeavor to so injure the animal that it will be unable to dive to safety. I have seen as many as 50 birds in one small circle eating these jellyfish, and I have never seen anything else being captured or eaten although in the course of a day's fishing many thousands of the birds are seen cruising over the ocean.

Puffinus tenuirostris (Temminck). SLENDER-BILLED SHEARWATER.

Hanna (1919a, p. 176, and 1920a, p. 251) added the slender-billed shearwater to the Pribilof fauna, and writes as follows:

A female slender-billed shearwater was picked up on the beach of St. Paul Island on June 4, 1918. Another bird was seen shortly after, flying about 2 miles out at sea. Mr. C. E. Crompton told me that numerous individuals were in the vicinity of St. George Island at about the same time. (l. c., p. 251.)

This specimen is now No. 255111 of the bird collection of the U. S. National Museum.

Oceanodroma furcata (Gmelin). FORK-TAILED PETREL.

The fork-tailed petrel has been observed on a number of occasions about the Pribilofs during the summer, but is not known to breed. It was first recorded from the islands by Palmer (1899, p. 383) on the strength of an individual picked up on the beach of St. Paul by True and Prentiss in 1895, and another similarly taken by D'Arcy Thompson in August, 1897.

M. C. Marsh next observed the species, collecting specimens on St. Paul Island on March 6 and April 28, 1912. Hanna saw a gray petrel, which was probably this species, on St. George Island June 16, 1914, and on July 15 of the same year, while crossing from St. George to St. Paul, the writer observed a few individuals at sea. Hanna took a specimen, now in the U. S. National Museum, at Northeast Point, St. Paul Island, on April 24, 1915; it was the only one seen at the time. He observed another off St. George, May 4, 1917.

Marsh made the following notes from the fresh specimens: Male, St. Paul Island, March 6, 1912, length, $9\frac{1}{4}$ inches; extent, $18\frac{5}{8}$; bill, legs, and feet, black. St. Paul (sex not determined), April 28, 1912, length, $8\frac{1}{8}$ inches; extent, $18\frac{1}{2}$.

Food.—A single stomach of the forked-tailed petrel from the Pribilofs (St. Paul, April 24, 1915) has been examined and it was practically empty, containing only traces of fish bones.

Family PHALACROCORACIDAE.

Phalacrocorax pelagicus robustus Ridgway. VIOLET-GREEN CORMORANT.

The violet-green cormorant seems to have been first authoritatively credited to the Pribilofs by Baird, Brewer, and Ridgway (1884, vol. 2, p. 161), who say: "It is also said to be abundant at St. George's Island, in Behring's Sea, where Captain Smith obtained several examples." Although the bird was thus early recorded, its regular presence has been generally ignored by observers, and it remained for G. Dallas Hanna to discover that the bird is rather common and breeds in a number of places. He states (1916, p. 402) that it is common about the Pribilof Islands in winter, and that it is recognized as differing from the red-faced cormorant by the natives, who call it "sea shag."

We found it nesting on Sealion Rock in 1914 and at a number of places on both St. Paul and St. George Islands, and it is believed also to breed on Otter Island.

Hanna has collected a number of specimens which are in the U. S. National Museum (one is No. 255123, St. George, May 2, 1917) and has furnished the writer with the following dates of occurrence on

St. Paul Island: 1914—September 22, 2 observed; December 6, 3; December 8, 18 killed at Northeast Point by natives; December 13, 10. 1915—February 18, 10; March 5, 2; March 15, 25; March 18, 30; March 24, 3; May 6, 4 seen on Reef Cliffs; May 9, 4 seen on Southwest Point Cliffs; May 18, 2 seen at Northeast Point; these May records in all probability indicate birds settled on their nesting cliffs. Hanna also reports the species killed at sea near the island February 8, 1918.

Food.—This cormorant, like all its race, is a great lover of fish food, but investigation discloses it is by no means exclusively piscivorous. The contents of 21 well-filled stomachs from the Pribilofs were: Fishes, nearly 74 per cent, and Crustacea, about 26 per cent. The fishes were chiefly sculpins taken by 17 birds; the species identified were *Myoxocephalus* sp., *M. polyacanthocephalus*, and *Megalocottus laticeps*. Three of these violet-green cormorants had captured rock eels (*Pholis fasciatus*), in one case to the number of 20, which in bulk were equal to about three-quarters of a pint. All but three of the stomachs examined contained remains of shrimps of the genus *Spirontocaris*, and no fewer than 30 individual shrimps were taken from a single stomach. Both *Spirontocaris polaris* and *S. groenlandica* were identified, and specimens of the latter species $3\frac{1}{2}$ inches in length had been eaten. Four of the birds also had devoured hermit crabs, which were identified as *Dermaturus mandtii*, *Pagurus undosus*, and *Hapalogaster grebnitzkii*. Ten of the latter were present in a single stomach. The nearly empty stomachs also contained crustaceans and fish remains, and one well-filled stomach yielded a bit of sea lettuce, no doubt accidentally taken.

Phalacrocorax urile (Gmelin). RED-FACED CORMORANT.

The red-faced cormorant is a rather common breeder, nesting on all the islands of the group excepting Sealion Rock. It was probably first noted from the Pribilofs by Coinde (1860, p. 401). Owing to this bird having been confused with *P. p. robustus* in many cases there are numerous notes of occurrence at various seasons which can not with safety be used for either. In the present account, therefore, all doubtful notes have been ignored.

Apparently the bird does not winter unless in very small numbers. It usually arrives in late April or early May. Hanna's spring notes for 1915 on St. Paul Island are as follows: April 15, only one *P. urile* among 25 cormorants shot by the natives for food; April 24, 30 observed; May 9, 8 observed at Southwest Point; May 18, 6 seen; May 28, 8 seen at Northeast Point.

The bird is an early breeder. Eggs were found on Otter Island May 22, and on Walrus Island on May 23, 1875 (notes from island log). Other dates for eggs include: Walrus Island, June 1, 1872,

eggs well incubated taken by Elliott; Walrus Island, June 13, 1890, eggs more or less advanced in incubation taken by Palmer (1899, p. 377). On the occasion of our own visit to Walrus Island on July 16, 1914, young about one-fourth grown were found.

The birds remain about the islands in small numbers throughout the autumn. Hanna's notes for 1914 on St. Paul Island are as follows: September 20, 2 observed; September 22, 1; October 4, 4; October 25, 2; November 16, 5; November 27, 6.

Palmer (1899, p. 373) has given a very full account of the species, especially of the nesting and the feather structure.

Food.—Five well-filled and one nearly empty stomach of the red-faced cormorant are at hand; the latter may be dismissed at once with the statement that it contained one mandible of a squid, the only trace of this type of animal in the series. The food in the other 5 stomachs consisted of fishes, 57.8 per cent; crustaceans, 41.4 per cent; and algae and hydroids, 0.8 per cent. The fishes included sculpins (*Gymnocanthus pistilliger*), rock eels (*Pholis* sp.), and an unidentified kind. The crustaceans were chiefly shrimps of the genus *Spirontocaris*; both *S. groenlandicus* and *S. polaris* were identified. No fewer than 66 of the latter species were present in one stomach. Hermit crabs (*Hapalogaster grebnitzkii*) were eaten also by one bird, and a spider crab (*Oregonia gracilis*) by another. Hydroids (*Abietinaria* sp.), sea lettuce, and plume algae (*Ptilota asplenoides*, and *Ptilota* sp.) were each found in a single stomach.

Family ANATIDAE.

Mergus merganser americanus Cassin. AMERICAN MERGANSER.

The earliest record of the American merganser is that of Dall (1873, p. 31), who stated that the bird winters on the Pribilofs. Palmer gives it as undoubtedly occurring during migrations and in winter, but gives no definite notes beyond referring to Dall's account. The first known specimen from the islands seems to have been taken on St. George Island, October 13, 1916, by Dr. H. P. Adams, and is now No. 253784, female, of the bird collection of the U. S. National Museum.

Mergus serrator Linnaeus. RED-BREADED MERGANSER.

The red-breasted merganser has been detected only a few times on the Pribilofs. It was first recorded from the group by Evermann (1913, p. 17), who listed a female specimen taken on St. Paul Island, December 16, 1910. Hahn, who prepared and sent in the specimen, states that it was shot on the lagoon by Doctor Morgan. It measured in the flesh: Length, 19½ inches; extent, 29.

Hanna states that he examined a specimen of this species which was shot by a native on St. George Island in the autumn of 1913.

Anas platyrhyncha platyrhyncha Linnaeus. MALLARD.

The mallard is a regular spring and autumn migrant on the Pribilofs. A few remain during the summer, and it has occasionally been known to breed. It was first added to the avifauna of the islands by Elliott, who recorded it from both islands (1874, unpagged, and 1875, p. 190).

Palmer observed a few during the summer of 1890 (1899, p. 380). The following notes on occurrence in spring, taken from the St. Paul Island log by W. L. Hahn, are of interest: May 9, 1888, 1 shot; about April 10, 1903, 2 shot; May 15, 1905, observed; May 7, 1908, 2 killed (first for season); May 1, 1909, several seen. Hahn himself reported it in 1911 as follows: April 22, 3 seen; April 24, 2 seen; April 29, 4 seen; April 30, many reported.

On St. George Island, in 1914, Hanna noted the mallard as follows: April 22, 9 seen; May 19, 6 seen. On St. Paul Island, in 1915, he recorded the following observations: April 30, 5 seen; May 2, 8; May 4, 15; May 6, 4; May 9, 20; May 17, 4 (paired); May 27, 2. During more recent years he has a record of 4 seen on St. George April 14, 1917, and 7 on St. Paul May 16, 1919. H. P. Adams noted the bird on St. George September 26 and 27, 1915; April 16 and 19, 1916; and April 26, 1917. The following are all the data regarding breeding that I have secured. Elliott (1875, p. 190) states that a pair bred at Polovina, St. Paul Island, in 1872. Hanna furnishes the following notes: In 1917 a pair nested in a pond at Little Polovina, St. Paul. In 1918 a brood of 8 young was hatched in the pool above Ice-house Lake, St. Paul. These were killed, with the parents, before they were half grown. Hanna was told by W. C. Allis, who has wide experience on the islands, that it was formerly not a rare occurrence to see flocks of young mallards in the various ponds on the road to Northeast Point, and that they were eagerly hunted by the natives. While on the Pribilofs in the summer of 1914, I observed the mallard only once, recording a male seen at Kaminista Lake, St. Paul Island, on August 17.

The following dates of occurrence in autumn are available: St. Paul Island, several shot October 9, 11, and 15, 1902 (island log notes transcribed by Hahn). Hahn himself thus recorded the bird on St. Paul in the autumn of 1910: October 9, several shot at Northeast Point; October 11, 1 seen; October 14, 5; October 15, 20 seen in two flocks of 6 and 14, flying in direction of St. George Island, in evening; October 16, 3; October 19, 5; October 20, 4; October 23, 1; November 9, 3. On St. George Island, in 1913, Hanna saw 1 on September 28, and 10 on October 18; on St. Paul, in 1914, he saw 4 on November 20, and 2 on November 21. In 1916, on St. George, Hanna noted it as follows: October 26, still abundant; No-

vember 5, 5 seen; December 24, 1 killed. He also found it abundant there on April 28, 1917.

The only winter record is of a female taken by M. C. Marsh on St. Paul Island, January 1, 1912. The following notes are from the fresh specimen: Length, 21 inches; extent, $35\frac{1}{2}$; legs and feet, orange-red; bill, yellow, blotched with black; nail, black. A male taken by Hahn on St. Paul, November 9, 1910, measured: Length, $22\frac{1}{2}$ inches; extent, $35\frac{1}{4}$. A female taken at the same time measured: Length, $20\frac{1}{2}$ inches; extent, $33\frac{3}{4}$.

Food.—Univalves (*Littorina atkana*) constituted three-fourths of the food of two mallards collected in a salt lagoon on St. Paul Island, November 20, 1914, and unidentified vegetable matter, the other fourth. G. Dallas Hanna notes that they usually feed in fresh-water ponds and that they prey extensively on the larvae of blowflies. W. L. Hahn examined a gullet which was filled with larvae of Diptera and of caddisflies.

Chaulelasmus streperus (Linnaeus). GADWALL.

The gadwall has been taken on the Pribilofs on only two occasions. It was first added to the list by Evermann (1913, p. 17), who recorded a female specimen taken by M. C. Marsh on St. Paul Island, November 13, 1911. The following notes, taken by Marsh from the bird in the flesh, are from his field catalogue: Length, $18\frac{7}{8}$ inches; extent, $33\frac{5}{8}$; iris, brown; lower mandible, light yellow, tip, dark; upper mandible, darker yellow along sides, black at tip, and along culmen, shading into yellow on the sides; legs and toes, light yellow. dark at the joints; web, and toes below, black.

A second specimen, also a female, taken from a flock of three at Halfway Point, St. Paul Island, May 20, 1919, has been recorded by Hanna (1920b, p. 174).

Mareca penelope (Linnaeus). EUROPEAN WIDGEON.

The European widgeon was first ascribed to the Pribilofs by Coues (in Elliott 1874, unpagged, and 1875, p. 190) on the strength of an adult male specimen taken on St. Paul Island, May 27, 1872, by Elliott, who also reported seeing a few others. A second specimen, also a male, taken by W. L. Hahn on St. Paul, April 30, 1911, was recorded by Evermann (1913, p. 17). Hahn's catalogue gives the flesh measurements of this bird as follows: Length, $19\frac{1}{4}$ inches; extent, 32. A third specimen, male, No. 242691, preserved by A. G. Whitney, is in the collection of the Biological Survey. It was taken by a native on Ice-house Lake, St. Paul, May 9, 1913. The following notes were made from the fresh specimen: Length, 17.7 inches; tip of upper mandible for one-half inch black, this color extending farther back on the edges; remainder of upper mandible slaty-blue,

lighter between nostrils; lower mandible black; feet and legs grayish, webs blackish. Parasites taken from this specimen proved to be *Trinoton luridum*, previously recorded from the same host.

Another, represented only by the head and feet, was taken by G. Dallas Hanna on St. Paul, May 1, 1918, and is now No. 255133 of the bird collection of the U. S. National Museum.

By the capture of this bird on the Pribilofs, the species was added to the North American fauna. It breeds in Eurasia from Scandinavia to Kamchatka, migrating southward in winter.

Eunetta falcata (Georgi). FALCATED TEAL.

The falcated teal, a beautiful crested species, was added to the avifauna of the Pribilofs by Hanna, who has recorded (1919a, p. 176, and 1920a, p. 250) a specimen secured by him on St. George Island, April 18, 1917. This specimen, which is a male in high plumage, is now No. 255131 of the bird collection of the U. S. National Museum. The species ranges normally in Asia east to Kamchatka, Korea, and Japan. The specimen mentioned is the first secured in North America.

Food.—The stomach of this rare straggler was about half filled with sea lettuce.

Nettion crecca (Linnaeus). EUROPEAN TEAL.

A male and female of the European teal, taken on St. Paul Island May 4, 1918, and recorded by G. Dallas Hanna (1919a, p. 176, and 1920a, p. 252), formed the first record for the Pribilofs. These are now Nos. 255127 and 255128 of the bird collection of the U. S. National Museum. Another specimen, a male, was taken on the same island September 20, 1919, and has also been put on record by Mr. Hanna (1920b, p. 174). It is in the collection of the California Academy of Sciences.

The species is of general distribution in northern Eurasia, and breeds regularly eastward to the eastern Aleutians, where it had been detected many years before its capture on the Pribilofs.

Nettion carolinense (Gmelin). GREEN-WINGED TEAL.

The exact status of the green-winged teal on the Pribilofs is uncertain owing to the great difficulty of distinguishing the female and young of this species from those of the European teal (*Nettion crecca*), even with the birds in hand. Teals were definitely ascertained to breed at Antone Lake, St. Paul Island, by Mr. Hanna and myself in the summer of 1914, and an adult female and her unfledged young one were taken. We failed to take or even see a male on this occasion, however, and the specimens we secured can not be certainly identified. Teals of one or both species also occur quite frequently in migration.

The present species was recorded from the Pribilofs by Palmer (1909, p. 380), who saw one on a pond on St. George Island, May 28, 1890. It was later killed by some one but was not secured for a specimen. The following notes on the occurrence of teal are given with the understanding that they may not be referable in all cases to the American species: St. Paul Island: May 15, 1905, seen on Polovina Lake (island log, note transcribed by Hahn); February 27, 1911, 1 killed on Lagoon Reef by a native, preserved by Hahn (now No. 270533, male, collection Biological Survey); May 21, 1911, 1 killed (reported to Hahn); July 29, 1914, 1 seen on Polovina Lake (Preble); August 22 (4), and 25 (1), 1914, (Preble and Hanna); October 17, 1914, 3 seen (Hanna); May 18, 1915, 1, Halfway Point (Hanna).

On St. George Island Hanna observed 3 teals on September 4, 1913, and 1 on May 19, 1914, and collected a fine male of the American form there on May 10, 1917. Another male was taken by him on St. Paul, May 26, 1919 (1920b, p. 174). These two last-mentioned specimens are in the collections of the U. S. National Museum, and of the California Academy of Sciences, respectively.

Food.—Two teals from Antone Lake, St. Paul (August 31, 1914, G. D. Hanna), identified as the green-winged, had been feeding on seeds and foliage of white water crowfoot (*Batrachium trichophyllum*) and a pondweed (*Potamogeton filiformis*), together with a few small Diptera.

Two other teals, not certainly identified as to species, collected at the same lake in the same month (August 22, 25, 1914) had taken the same things in somewhat different proportions, together with certain additional items. Water crowfoot made the bulk of the food of one of these birds, but a few seeds of pondweed and a sedge (*Carex* sp.) were present. The bird had eaten also beetles, flies, bivalved crustaceans (Ostracoda), and mollusks. The preponderant article of food of the second teal was rat-tailed larvae of a flower fly (Eristalinae), of which at least 16 had been taken. This bird had eaten also lesser quantities of beetles and Hymenoptera and of the seeds of sedge and water crowfoot.

Spatula clypeata (Linnaeus). SHOVELER.

The shoveler was added to the Pribilof list by Evermann (1913, p. 17), who recorded a male specimen taken by W. L. Hahn on St. Paul Island, May 24, 1911. The following notes are from Hahn's catalogue: Length, 19½ inches; extent, 30; legs and feet, pinkish-orange; bill, glossy black, except for slight yellow mottling below. This specimen is now in the Biological Survey collection.

The only other record seems to be that of a male bird observed by the writer near Northeast Point, St. Paul Island, June 27, 1914.

Dafila acuta tzitzihoa (Vieillot). PINTAIL.

Two male specimens of the pintail taken by M. C. Marsh on St. Paul Island, May 24, 1912, were recorded by Evermann (1913, p. 17). Marsh in his field catalogue gives the following notes from the fresh specimens: No. 178, male, length, $25\frac{1}{2}$ inches, extent, $35\frac{1}{2}$; iris, brown; bill, blue, with a broad black stripe down the middle and a narrow black stripe at base; upper mandible, black, edged forward; feet, gray above, webs darker. No. 179, male, length, $24\frac{1}{8}$ inches; extent, $34\frac{1}{4}$; colors of soft parts same as No. 178.

Hanna observed 9 individuals at Webster Lake, August 17, 1914, and obtained 1 (No. 237499, U. S. Nat. Mus.). He also noted 2 on St. Paul Island, May 27, and 2 on May 31, 1915. On St. George, in 1916, he noted it as still common on October 26. He considers that the bird is a common migrant.

Food.—The Pribilof Islands evidently do not afford the vegetable food which is most relished by the pintail in its continental range, for the six stomachs of this species collected there were filled entirely with animal food. Five of them contained only midge (*Chironomidae*) larvae and the other one caddis (*Trichoptera*) larvae and their cases. Mr. Hanna says that this species—

has never been seen feeding anywhere except in fresh-water ponds. They eat the larvae of blowflies from the seal carcasses extensively. These larvae wander from the decaying meat when the time comes for them to pupate and many of them are drowned in the fresh-water ponds.

Aristonetta valisineria (Wilson).⁵ CANVASBACK.

The famous canvasback was added to the Pribilof list by G. Dallas Hanna (1919a, p. 176, and 1920a, p. 252) on the strength of a fine adult male taken on St. George Island, May 18, 1917. It is now in the collection of the U. S. National Museum, No. 255149.

Food.—The stomach of this specimen contained only caddis larvae and cases.

Fulix marila (Linnaeus).⁶ SCAUP DUCK.

A male scaup duck taken by M. C. Marsh on St. Paul Island, April 27, 1912, was recorded by Evermann (1913, p. 17). Marsh in his field catalogue gives the following notes: Length, 18 inches; extent, $31\frac{3}{8}$; bill, pale blue; nail, black; iris, yellow. The species seems not to have been otherwise observed.

Fuligula fuligula (Linnaeus). TUFTED DUCK.

A female tufted duck collected on St. Paul Island, May 9, 1911, by W. L. Hahn, proved to be the first record for the Pribilofs, and

⁵ *Marila valisineria* of the A. O. U. check list, 1910.

⁶ *Marila marila* of the A. O. U. Check List, 1910.

also for North America. It was formally recorded by Evermann (1913, p. 17). The bird was accompanied by a male, which escaped. The species breeds regularly in northern Eurasia east to Kamchatka, and migrates to northern Africa, India, China, and Japan.

Food.—Evermann (l. c.) quotes from Hahn's field notes as follows: "the stomach was full of grass, cress (?), small seeds, and a few larvae."

Aithya ferina (Linnaeus). EUROPEAN POCHARD.

The European pochard was added to the avifauna of the Pribilofs and North America by Evermann (1913, p. 17), on the basis of a male specimen taken by M. C. Marsh on St. Paul Island, May 4, 1912. His catalogue records the following notes made from the fresh specimen: Length, 18 inches; extent, 30½; iris, yellowish-red; base of bill, brownish-black, middle pale bluish, terminal band of jet black sharply demarcated from the bluish; legs and toes, pale, with much grayish, webs black. The specimen is now No. 239123 of the collection of the Biological Survey. The pochard breeds in northern Eurasia east to Lake Baikal, and in migration and in winter wanders eastward to China and Japan.

Glaucionetta clangula clangula (Linnaeus). EUROPEAN GOLDENEYE.

A female goldeneye (No. 237500, U. S. Nat. Mus.), taken by G. Dallas Hanna on St. Paul Island November 27, 1914, from a flock of four, proved to be the typical form, and hence constitutes a new record for North America. It was so reported by Mr. Hanna (1916, p. 400). The specimen was determined by Dr. H. C. Oberholser. This form breeds generally throughout northern Eurasia.

Other goldeneyes, assumed to belong to the present form, were observed by Mr. Hanna on St. Paul Island, some in the possession of native hunters, as follows: October 12, 1914, 4; October 25, 4; April 12, 1915, 5.

Food.—Three stomachs from St. Paul (October 12, 1914) have been examined and their contents were amphipods, 55 per cent; fish remains, 10 per cent; marine worms (Nereidae), 3.3 per cent; and seeds of pondweed (*Potamogeton* sp.), 31.7 per cent.

Glaucionetta clangula americana (Bonaparte). AMERICAN GOLDENEYE.

During recent years this goldeneye has been taken on both St. Paul and St. George Islands by G. Dallas Hanna, who has put the captures on record. He took a male specimen on St. George Island, May 6, 1917, and a female on St. Paul, January 31, 1918 (1919a, p. 176, and 1910a, p. 252).

Food.—The stomach of the specimen last mentioned was practically empty; however, the slight remains of food represented three

distinct phyla of animals, namely, Mollusca (*Modiolaria verrucosa*), barnacles, and sea urchins.

Charitonetta albeola (Linnaeus). BUFFLEHEAD.

The beautiful little bufflehead was first taken on the Pribilofs by G. Dallas Hanna, and was recorded by him (1916, p. 401). He observed it first on St. George Island, taking male specimens November 19, 1913, and May 19, 1914. In the spring of 1915 he observed others on St. Paul Island as follows: May 19, 2 seen at Halfway Point; May 26, 1 Northeast Point; May 28, 8 (paired) on Webster Lake.

Food.—Only animal food was present in the two bufflehead gizzards collected by Mr. Hanna on St. Paul, May 19, 1914, and January 29, 1918. One of the stomachs held only caddis larvae and cases, while the other contained ground-up amphipods, 80 per cent; 7 or more small bivalves (*Modiolaria verrucosa*), 18 per cent; and a bit of barnacle, 2 per cent.

Clangula hyemalis (Linnaeus). OLD-SQUAW.

The old-squaw is resident about the Pribilofs, being, however, much more abundant in winter than in summer. It breeds only on St. Paul, nesting about most of the shallow fresh-water ponds which are scattered over the island. It was first recorded from the group by Elliott (1874, unpagged, and 1875, p. 191).

Since the species is abundant during the winter and spring, no dates of arrival can be cited; Hanna records the birds as pairing April 18, 1915, about which date they begin acquiring the summer plumage, and as being observed in pairs at various dates in May. Eggs were found June 12 and 17, 1890, by Palmer (1899, p. 378). The egg-laying period is long, since downy young not over two days old were taken August 17, 1897, by Snodgrass and Greely (Grinnell, 1901, p. 19), and the writer saw downy young on Antone Lake, August 25, 1914.

Many fall and winter dates are at hand, but in the case of so common a bird it seems unnecessary to give them in detail. They seem to indicate a gradual gain in numbers until the species is seen by hundreds or thousands during the winter and early spring.

A male, St. Paul Island, January 7, 1912, M. C. Marsh, measured: Length, $16\frac{1}{2}$ inches; extent, $28\frac{5}{8}$. Another male, St. Paul Island, February 5, 1912, M. C. Marsh: Length, 16 inches; extent, $28\frac{3}{4}$; iris brown; bill black with band of rose. Another male, St. Paul, March 27, 1912, M. C. Marsh: Length, 19 inches; extent, $28\frac{1}{2}$; iris brown, basal half of bill jet-black, rest rose-pink except black nail; lower mandible same relative colors; legs and feet pale bluish, webs black. A female specimen, St. Paul Island, February 5, 1912, M. C. Marsh,

measured: Length, $15\frac{1}{2}$ inches; extent, 27; iris brown; feet pale bluish, darkly reticulated. Another female, same place and collector, February 23, 1912, measured: Length, $15\frac{1}{2}$ inches; extent, $27\frac{3}{8}$; bill dusky bluish except black nail, and black bordering the feathers at base of upper mandible and the nostrils; iris light brown; legs and toes in front very pale-bluish, black behind; webs black.

Food.—Fifteen well-filled and fourteen nearly empty stomachs of the old-squaw are available to illustrate its food habits at the Pribilof Islands. From the nature of the food it is evident that most of it was obtained in salt water, and in this connection a note on the habits of the species by Mr. Hanna is of interest. He says the old-squaw is—

much more abundant in winter than in summer. It breeds in the lowland fresh-water lakes where several sets of eggs have been collected. Parent birds have been seen flying from the sea to the nesting site which might indicate that food is secured in salt water at all seasons. In winter they feed just outside the surf lines, in the open spaces between the ice cakes, and in the Salt Lagoon when this is open.

The food composing the 15 normal stomach contents studied consisted of amphipods, 74.1 per cent; hermit crabs, 11.2 per cent; caddis larvae (the only fresh-water animals in the lot), 6.4 per cent; mollusks, 3 per cent; vegetable matter, 1.6 per cent; and numerous items of lesser importance. In 12 cases amphipods constituted the bulk of the food and were represented by very numerous individuals. The species identified were *Anonyx nugax*, *Bathymedon* (?) *obtusifrons*, *Caprella kincaidi*, *Gammarus pribilofensis*, *Hippomedon* sp., *Orchomenella minuta*, *Pontoporeia affinis*, and *Tmetonyx* sp. Other crustaceans eaten were the hermit crabs *Dermaturus mandtii* and *Hapalogaster grebnitzkii*, remains of 8 or more of the former and 6 or more of the latter were found (together) in one stomach. Barnacles had been eaten by 9 of the well-fed birds, and compose 1.2 per cent of the total food; only one species, *Balanus balanus*, was identified. Mollusks composing 3 per cent of the diet included both bivalves and univalves. Of the former the common blue mussel (*Mytilus edulis*) was found in 6 stomachs, *Saxicava arctica* in 3, *Modiolaria verrucosa* in 2, and *Musculus* sp. in 1. The univalves identified were *Margarites helicina*, *Littorina atkana*, and *Borectrophon* sp. Remains of a sea slug (*Chiton*) occurred in one stomach. Among the other items of animal food were Foraminifera, hydroids (*Abietinaria* sp.), Bryozoa, nereid and tubicolous worms, sand dollars (*Echinarachnius parma*), and other sea urchins.

The vegetable food taken by these 15 old squaws comprised root-stocks and foliage of grass and sedge, seeds of sedge (*Carex* sp.) and lupine (*Lupinus nootkatensis*), and algae. The latter included kelp, plume algae (Ceramiaceae), and a filamentous alga (*Chaetomorpha melagonium*).

The 14 nearly empty stomachs contained chiefly the same items as the better-filled ones, those of most frequent occurrence being amphipods, barnacles, and mollusks. One additional item, namely starfish remains, was obtained from this series.

Histrionicus histrionicus pacificus Brooks. HARLEQUIN DUCK.

The harlequin is resident the entire year on the Pribilofs, being most common in spring and fall, fairly common in winter except when the pack ice is present, and found in small flocks throughout the summer. No absolute evidence of its breeding on the islands is at hand. It was first definitely recorded from the Pribilofs by Elliott (1874, unpagcd, and 1875, p. 199).

Being abundant during all or most of the winter, it can not be said to arrive in spring. Hanna gives many instances of occurrence in spring and summer, from which the following may be given: St. Paul Island, 1915—March 5, 25; March 18, 6; April 24, 200; April 27, 50; May 4, 40; May 28, 10; July 19, several individuals seen which were molting and could not fly; have been abundant all summer. While on the islands in 1914 the writer saw flocks on the surf-washed rocks almost daily, both on St. Paul and St. George. The notes most nearly giving evidence of breeding that I have been able to find are these of Palmer, who says (1899, p. 379): "I was told that some young were killed on St. George during the summer [of 1890]." Hahn observed two pairs mating on St. Paul Island, April 24, 1911; these, however, may have bred elsewhere.

Numbers of specimens of both sexes are in the collection of the U. S. National Museum. The following notes from selected specimens from St. Paul Island are from the collectors' field catalogues: Male, November 18, 1910, W. L. Hahn; length, 18 inches; extent, $25\frac{1}{2}$; bill plumbeous at base, tipped with pale horn color; feet dusky. Male, December 7, 1911, M. C. Marsh; length, $16\frac{1}{2}$ inches; extent $24\frac{1}{2}$; bill dark olive, lighter underneath; tip of lower mandible rosy; tarsus and toes pale greenish, joints dark, webs black, obscure streaks of rose along inner surface of tarsus and middle and inner toes; hallux lobe black on outer surface. Male, February 23, 1911, M. C. Marsh; length, 17 inches; extent, $27\frac{3}{4}$; iris dark brown; bill pale bluish, darkened at base; nail lighter, legs and feet dark brown, webs black. Male, March 8, 1912, Marsh: Length, $16\frac{1}{8}$ inches; extent, $26\frac{3}{8}$; iris brown, bill dark leaden, rami below pale blue, membrane between black; legs and feet with slight pale bluish cast, darker at joints, webs black. Female, October 20, 1911, Marsh: Length, $14\frac{9}{16}$ inches; extent, 23; iris brown; bill leaden, lighter underneath; tarsus very pale yellowish in front, dark behind; toes pale yellow, the joints dark, web brownish black.

Food.—Mr. Hanna notes that harlequin ducks feed in the kelp beds and rest on the surf-washed rocks the year round, and it is evident from the contents of the 11 well-filled and 8 nearly empty stomachs of the species collected about the Pribilofs that the birds take full advantage of the great variety of invertebrate life to be found in these rich marine pastures. The bulk of their food is amphipods (51.4 per cent of the total contents of 11 stomachs), hermit crabs 25.1 per cent, and mollusks 19 per cent. Other items, though numerous, in every case fall short of 1 per cent of the total food. Amphipods, the greatest staple, are taken in large numbers, and a variety of species are captured. Identifications are: *Anonyx nugax*, *Gammarus pribilofensis*, *Hyale* sp., *Jassa marmorata*, *Metopa* sp., and *Orchomenella minuta*. The hermit crabs in all cases were *Dermaturus mandtii*, and 16 of these were represented in the stomach of one duck. Isopod crustaceans were found in one gizzard and barnacles in five. The mollusks included widely diverse members of the group, as sea slugs (*Chiton* sp., *Schizoplax* sp.), limpets, sea snails, and mussels. The univalves identified were *Littorina atkana*, *Margarites helicina*, and *Trichotropis insignis*, and the bivalves *Modiolaria verrucosa*, *Mytilus edulis*, and *Saxicava arctica*.

Among the animal food items of lesser importance are Foraminifera, hydroids (*Abietinaria* sp.), tubicolous and other (nereid) marine worms, sea spiders or pycnogonids (*Ammothea pribilofensis*), sea urchins, and sand dollars (*Echinarachnius parma*). Vegetable matter composed less than 1 per cent of the food of the harlequins here reported upon and all of it may have been taken accidentally. It included kelp, plume algae (*Ptilota pectinata*, and *P. asplenoides*), and other algae (*Pterosiphonia bipinnata*).

Scraps of food in the 8 nearly empty stomachs of harlequins were chiefly of the same items mentioned above, amphipods and barnacles (in part *Balanus balanus*) being of most frequent occurrence. Additional foods from these stomachs were bryozoans, the amphipod *Pontoporeia affinis*, and fish. W. L. Hahn examined a bird that had fed more extensively on isopods than any of those here reported upon, there being 45 of these animals entire in the gullet and stomach besides many fragments.

Polysticta stelleri (Pallas). STELLER EIDER.

The beautiful Steller eider is apparently a regular migrant, and early summer visitor, though the records are somewhat scattered and meager. Elliott shot 2 in June, 1872, from the Village Hill on St. Paul, and speaks of others shot off East Point, St. George, in the same year (1874, unpagged, and 1875, p. 192). Palmer saw several in company with harlequin ducks, from the Village Hill, St. Paul, and on June 14 shot 3 males from a flock of 4 in St. Paul Harbor.

Later he saw many others. The species was next detected by Marsh, who prepared 2 males which were shot by P. R. E. Hatton on the Lagoon, St. Paul Island, on April 23, 1912, and took another on May 9. These are in the collection of the Biological Survey. Hanna was the next observer to record it, taking a female specimen on St. Paul, October 25, 1914, and a male on March 21, 1915. He also observed 4 on St. Paul, April 18, 1915.

Individuals of this species, represented by stomachs sent in for examination, were later taken as follows: St. George, February 4 and April 12, 1917; St. Paul, December 6, 1918. The specimen taken February 4 is now No. 255125 of the U. S. National Museum collection.

Notes from Marsh's field catalogue, taken from the fresh specimens, are as follows: Male, St. Paul Island, April 23, 1912, length, $18\frac{1}{8}$ inches; extent, $29\frac{9}{16}$; iris dark brown; bill pale blue; legs and feet grayish brown. Another male, same place and date, measured: Length, $17\frac{1}{8}$ inches; extent, 28. Notes on soft parts same as preceding. The specimen taken May 9, 1912, measured: Length, $17\frac{1}{4}$ inches; extent, $28\frac{3}{8}$.

Food.—The food of the Steller duck in the Pribilof region is known from the examination of two well-filled stomachs and one other. The content of the well-filled stomachs was some 60 per cent amphipods and the remainder chiefly mollusks. Amphipods identified were *Allorchestes* sp., and *Pontoporeia affinis*. The mollusks were chiefly univalves, *Neverita recluziana* (25 or more in one stomach), *Melanella* sp., and *Cardium ciliatum* being identified. Minor items of food were a bit of a bivalved mollusk, and remains of marine worms (Nereidae), barnacle, sea urchin, and algae.

Arctonetta fischeri (Brandt). SPECTACLED EIDER.

The spectacled eider was added to the Pribilof list by the capture of three female birds on January 13, 1918. These were taken by native hunters and secured by G. Dallas Hanna, who has put their capture on record (1919a, p. 176, and 1920a, p. 252). These specimens, two of which were preserved as skins and the other in formalin for anatomical study, are now in the collection of the U. S. National Museum.

Food.—Two stomach contents of the spectacled eider have been examined and were found to be composed of amphipods, about 90 per cent; mollusks, about 5 per cent; and various minor items. One species of amphipod was determined, namely, *Bathymedon obtusifrons*, and 4 of mollusks. The latter included the common blue mussel (*Mytilus edulis*); *Modiolaria verrucosa* and *Rochefortia* sp., bivalves; and *Lora* sp., univalve. Other articles of food in these two stomachs were: Foraminifera, Bryozoa, sea urchin, sand-dollar

(*Echinarachnius parma*), starfish, crab (*Erimacrus isenbeckii*), bones of a sculpin, and bits of kelp.

Somateria v-nigra Gray. PACIFIC EIDER.

The Pacific eider was first credited to the Pribilofs by Palmer (1899, p. 380), who gives it as a winter visitant, usually seen offshore. The first actual specimen seems to have been taken by Hahn (male, St. Paul Island, May 17, 1911). Marsh later collected female specimens at the same place on December 23, 1911, and January 8, 1912.

Hanna states that many are shot by the natives when the ice is around the islands. He notes eiders, probably the present species, on St. George Island, November 11, 1913, when 20 were seen about 100 feet offshore. Six others were seen at the same place March 28, 1914. Later notes, referring to birds certainly identified, are as follows: St. Paul Island, December 4, 1914, 10 observed; December 13, 10; January 10, about 100; February 18, about 5,000; March 5, about 300; April 15, 60; April 18, 20; April 24, 200; April 27, 50. H. P. Adams noted the species about St. George on February 10, 1916; and January 13, February 4, and March 25, 1917.

Notes from field catalogues follow: St. Paul Island, male, May 17, 1911, W. L. Hahn: Bill, deep orange; feet, orange. St. Paul Island, male, January 1, 1912, Marsh: Length, $24\frac{3}{4}$ inches; extent, $42\frac{3}{8}$; bill, orange, paler terminally; legs and feet, yellow. St. Paul Island, female, January 8, 1912, Marsh: Length, $23\frac{5}{8}$; extent, 39; iris, brown; basal portion of bill, gray; terminal, pale yellow; legs and feet, dusky yellowish; webs, darker.

Food.—Information obtained by examination of a collection of 44 well-filled and 3 other stomachs of the Pacific eider from the Pribilofs is sufficient to give a very good idea of the food of the species in that region during the months in which they were collected; namely, January, February, and March. A wide variety of organisms inhabiting the sea is represented in the food, ranging from algae and Foraminifera through the principal group of marine invertebrates to the Chordata, or backboneed animals, as ascidians and fishes. Many of the articles of diet are not fed upon to any great extent, and the favorites seem to be mollusks and crustaceans, according to the following schedule of the principal items: Mollusks, 41.2 per cent; crustaceans, 28.2 per cent; sea urchins, 9.45 per cent; starfishes, 7.34 per cent; and algae, 7.47 per cent. The mollusks included limpets, sea snails, mussels, and sea slugs. The kinds most frequently taken were common blue mussels (*Mytilus edulis*), found in 15 stomachs, and another species of bivalve (*Modiolaria verrucosa*), found in 11; in two cases hundreds of the latter shellfish had been eaten. Besides these, identifications made of mollusks of the

various groups were: *Acmaea* sp.; *Amphissa reticulata*, *Borco-trophon* (?) *multicostatus*, *Buccinum plectrum*, *Haloconcha* (?) *minor*, *H. reflexa*, *Littorina atkana*, *L. grandis*, *Margarites helicina*, *Natica clausa*, *Neverita recluziana*, *Nucella lima*, *Plicifusus spitzbergensis*, *Trichotropis insignis*, *Volutharpa ampullacea*, *Cardium ciliatum*, *Pecten islandicus*, *Saxicava arctica*, *Chiton marmoreus*, and *Chiton* sp.

The crustaceans eaten by Pacific eiders consisted of crabs, 13.06 per cent; amphipods, 12.4 per cent; shrimps, 1.5 per cent; and isopods, 1.3 per cent. The crabs captured were principally hermit crabs, and one species, *Dermaturus mandtii*, was found in 17 stomachs and to the number of 11 specimens in one of them. The other hermit crabs eaten were *Hapalogaster grebnitzkii*, *Pagurus dalli*, and *P. trigonocheirus*. Spider crabs (*Oregonia gracilis*) were found in two stomachs, and remains of crabs of the family Xanthidae, a group not hitherto reported from the region, in one. The amphipods identified belonged to a number of species, among which *Gammarus pribilofensis* occurred most frequently, namely 5 times. The other forms determined were: *Allorchestes malleolus*, *Allorchestes* sp., *Amphithoe rubricata*, *Anonyx nugax*, *Atylus* sp., Calliopiidae, *Caprella kincaidi*, *Ischyrocerus* sp., *Metopa* sp., *Nebalia* sp., *Neopleustes assimilis*, *Neopleustes* sp., and *Pleustes panoplus*. The isopods eaten by Pacific eiders belong to the family Idotheidae, of which *Idothea ochotensis* was specifically identified. Thirty shrimps (*Spirontocaris polaris*) were found in one stomach and a few minute bivalved crustaceans (Ostracoda) in another.

Among birds thus far studied as to food habits, preying upon sea urchins and starfishes is unusual, but Pacific eiders in the Pribilof region form an exception to the rule in that more than a sixth of their food is made up of these animals. The sea urchins most frequently taken were the sand-dollars (*Echniarachnius parma*), but spheroidal urchins (*Strongylocentrus drobachiensis*) of the more ordinary type were not neglected. Sea urchins (9.45 per cent) were found in 19 stomachs, and starfishes (7.34 per cent) in 14; the latter in 5 cases were identified as *Leptasterias* sp.

Other articles of animal food forming more than 1 per cent of the diet were barnacles and worms. The former had been eaten by 14 birds, and only one species (*Balanus balanus*) was identified; the worms were of the family Nereidae in 8 cases, and tubicolous forms in two. While amounting to less than 1 per cent, other animals eaten by the Pacific eiders are of considerable interest because they are preyed upon by so few birds. Such are the hydroids, bryozoans, sea spiders, and ascidians. Hydroids not further identified were found in 9 stomachs, *Abietinaria* sp. in 8, *Sertularella* sp. in 4, and

Thuiaria sp. in 1. Bryozoans not further determined were observed in 10 gizzards, *Crisia* sp. in 3, *Cellepora surcularis* in 2, and *Menipea pribilofi* in 1. All of the sea spiders, found in 3 stomachs, belonged to a single species, *Ammothea pribilofensis*, and the ascidians or sea squirts, found in two gizzards, were identical; they were found to be *Boltenia ovifera*. Foraminifera, the only representatives of the Protozoa, or simplest animals identified, were obtained from 5 gizzards.

The percentage (7.47) of marine algae in the stomach contents of Pacific eiders is so high as to suggest that these plants are in part sought for, not all incidentally taken, as some of them, growing on hermit crabs and their shelly homes, undoubtedly are. Algae chiefly with this latter habit were plume algae (Ceramiaceae), identified as *Ptilota pectinata* in 6 cases, *P. asplenoides* in 4, and *Ptilota* sp. in 12. Coralline algae were found in one stomach, and a single seed of the rye grass (*Elymus villosissimus*) in another.

Somateria spectabilis (Linnaeus). KING EIDER.

The beautiful king eider, although it appears to be of regular occurrence nearly throughout the year, and is usually more or less abundant in winter, has only recently been included in the list, having been recorded by Evermann (1913, p. 17) from specimens taken by M. C. Marsh on St. Paul Island on February 4, and March 9, 1912. The species is present in small numbers throughout the summer, but has not been known to breed. In 1914 it was observed by the writer on several occasions as follows: St. Paul Island, July 19, 10 seen at Northeast Point; August 17, 1 at Northeast Point; August 24, 1. St. George Island, August 4, 1 seen at Zapadni. Hanna sent in for examination the stomachs of three shot on St. George Island, May 3, 1917.

I have no dates of occurrence in early fall; Hanna's notes for St. Paul Island, fall of 1914, follow: November 27, 2 seen; December 4, 75; December 13, 50.

The species is sometimes, perhaps usually, common about the islands in winter, especially when pack ice is present. On March 29, 1911, Hahn noted that between 150 and 200 eiders, nearly all of which were male king eiders, were shot on St. Paul. In 1915, on St. Paul, Hanna recorded the bird as follows: January 10, 15 seen; February 18, abundant; March 5, about 100 in the ice pack; April 6, 1; April 15, 40; April 18, 6 (near shore); April 24, 15; May 10, 14. H. P. Adams, on St. George, noted the bird on January 13, February 4, and March 23, 1917.

There are numerous specimens from St. Paul Island in the collection of the Biological Survey, mainly taken by W. L. Hahn and M. C. Marsh. From their catalogues the following data have been cop-

ied: Male, March 30, 1911, Hahn: length, 22 inches; extent, 34; bill reddish at base, shading to pale horn color at tip; caruncle deep lemon; toes pale lemon, webs blackish. Male, January 7, 1912, Marsh: Length, $22\frac{1}{4}$ inches; extent, $38\frac{1}{2}$; iris dark brown, processes of bill yellow, shading into yellow-red of bill, which is pale at tip; legs and feet yellow, dark at joints, webs blackish. Immature male, February 4, 1912, Marsh: Length, $21\frac{5}{8}$ inches, extent, $36\frac{3}{4}$; iris dark brown, processes of bill light yellow; bill mostly drab, nail darker; feet dingy yellowish, webs dark. Female, February 1, 1912, Marsh: Length, $19\frac{3}{4}$ inches, extent, 36; iris dark brown; bill dusky, pale below and about nail; feet dusky reticulated, on yellowish ground. Female, February 4, 1912, Marsh: Iris dark brown; processes of bill black, pale band back of nail, above and below; feet yellowish, dusky reticulated.

Food.—To illustrate the food habits of the king eider in the Pribilof area we have had for examination about the same number of stomachs as of the Pacific eider, namely, 44 well-filled ones and 9 others. The nature of the food also proves to be very similar, the principal items and their proportions being: Mollusks, 34.36 per cent; crustaceans, 28.2 per cent; sea urchins, 9.54 per cent; starfishes, 2.59 per cent; and algae, 9.88 per cent. The king eider takes fewer mollusks and a much lower percentage of starfishes than the Pacific eider, but makes up for these in part by greater consumption of barnacles and fishes. Mr. Hanna notes that this species can descend to the bottom in 30 fathoms of water, as evidenced by the fact that a bird killed just after coming to the surface of water of this depth had freshly swallowed mollusks in its gullet.

Like its congener, this eider draws its shellfish fare from diverse branches of the molluscan kingdom. Of the bivalves eaten the favorite was the common blue mussel (*Mytilus edulis*), which occurred in 21 stomachs, and next in preference was *Modiolaria verrucosa*, taken by 12 birds. Other bivalves eaten included the scallop (*Pecten islandicus*) and *Cardium ciliatum*, *Musculus* sp., *Mya intermedia*, *Rochefortia* sp., and *Saxicava arctica*. A single limpet (*Acmaea mitra*) was identified in the food, as also were numerous sea snails, of which *Plicifusus spitzbergensis*, found in 7 stomachs, was of most frequent occurrence. The others identified are: *Astyris* sp., *Borcotrophon* (?) *multicostatus*, *Buccinum fischerianum*, *Buccinum* sp., *Cerithiopsis* sp., *Littorina atkana*, *L. grandis*, *L. grönlandica*, *Littorina* sp., *Machaeroplax cinereus*, *Margarites helicina*, *Natica clausa*, *N. operculina*, *Neverita recluziana*, *Nucella lima*, *Trichotropis insignis*, and *T. nucellatus*. Sea slugs, as the creeping mollusks with segmented dorsal mail may be called, also were taken by the king eiders, and the following forms were identified: *Chiton marmoreus*, *Chiton* sp., and *Schizoplax brandtii*.

The crustaceans eaten by the king eiders studied consisted rather more of crabs and less of amphipods than in the case of the Pacific eider. Crabs were slightly more than a fifth of the total food, most of them being hermits. One species of this group, *Dermaturus mandtii*, was found in no fewer than 33 of the stomachs, 7 individuals being counted in one of them. Other hermit crabs identified were *Hapalogaster grebnitzkii*, *Pagurus trigonocheirus*, and *Pagurus* sp. Other crabs eaten were the spider crab (*Hyas coarctatus*), the mud crab (*Telmessus cheiragonus*), and crabs of the family Xanthidae. Amphipods were much less prominent in number and variety in stomachs of the king eider than in those of its relative, and only 3 forms were identified, namely, *Gammarus pribilofensis*, *Hyale* sp., and *Orchomenella minuta*. A few isopods were eaten, among which one species, *Synidotea nebulosa*, was determined; and also a few shrimps (*Spirontocaris polaris*).

Sea urchins, in this species, as well as in the Pacific eider, are a prominent element of the food. The kinds eaten are the same and they occurred in the following numbers of stomachs: Sea urchins not further identified, 19; *Echinarachnius parma*, 9; and *Strongylocentrus drobachiensis*, 2. Starfishes, for some reason comparatively neglected by this eider, were found in 6 stomachs and only in one case were identified as to genus (*Leptasterias*).

Of the lesser items of animal food, fishes and barnacles are the most important. The only fish remains at all classifiable were some sculpin bones. Three batches of eggs, not absolutely known to be those of fishes, were added to the undoubted fish remains, and make a percentage of the total food of 3.84 per cent. Barnacles (2.34 per cent) are next in importance, being found in 18 stomachs; a single species, *Balanus rostratus*, was identified.

Both tubicolous and nereid marine worms were eaten, the latter occurring in 20 stomachs; the percentage of worms in the food was 1.7 per cent. While some of them occurred in numerous gizzards, the remaining articles of animal food in no case amounted to as much as 1 per cent of the total subsistence. Hydroids not further identified were found in 13 stomachs, and also the following genera of this group, in the number of gizzards indicated: *Abietinaria* 8, *Sertularella* 4, and *Thuiaria* 3. Bryozoa similarly not further named, occurred in 16 gizzards; those identified were *Cellepora surcularis* in 2, and *Menipea pribilofi* and *Myriozoum subgracile* in 1 each, Sea spiders (*Pycnogonida*), found in 2 stomachs, a sea squirt (*Boltenia ovifera*) in 1, and Foraminifera in 5, complete the list of animal foods.

The vegetable food (9.88 per cent) consisted exclusively of algae. That not further identified, chiefly kelp or laminar algae, was found

in 19 stomachs. Plume algae (*Ptilota pectinata* in 17 stomachs, *P. asplenoides* in 15, and *Ptilota* sp. in 8) were a prominent article of diet, and two kinds of coralline algae (*Corallina* probably *aculeata* and *Amphiroa cretacea*) were each found in a single stomach.

Oidemia deglandi dixonii Brooks. PACIFIC WHITE-WINGED SCOTER.

During the past few years the Pacific white-winged scoter has come to be recognized as a more or less regular migrant and winter visitor. G. Dallas Hanna has put the species on record (1919a, p. 176), and later (1920a, p. 252) writes as follows:

Four specimens of the western white-winged scoter have been taken on the Pribilofs during the last three years. All were females but this is merely an accidental circumstance because males have been seen. The first specimen was secured on October 30, 1916, at St. George Island by the writer. The next was taken on November 15, 1916, at the same island by Dr. H. P. Adams, formerly physician of the U. S. Bureau of Fisheries. Another was secured at St. George Island on February 4, 1917, and one at St. Paul Island, February 8, 1918, both by the writer.

Hanna also noted the bird as abundant at the margin of the ice pack off St. George on January 25, 1917.

The species is of regular occurrence about the islands in winter. It has been seen on several occasions before any specimens were secured but was not recorded because positive specific identification could not be made.

The specimens above mentioned are all in the collection of the U. S. National Museum.

Food.—The stomachs of 2 white-winged scoters, 1 collected on St. George Island, February 4, 1917, and the other on St. Paul, February 8, 1918, have been examined and the food proved to be about equally divided between amphipods and bivalves. None of the former were identified, and the mussels were *Saxicava arctica* principally, with a trace of *Mytilus edulis*. Other items of food sparingly represented were sea urchin, bryozoan, and hydroid.

Chen hyperborea hyperborea Pallas. SNOW GOOSE.

The snow goose was added to the Pribilof list by G. Dallas Hanna (1919a, p. 176, and 1920a, p. 251), who obtained an individual shot by a native at Northeast Point, St. Paul Island, September 16, 1916. "Another bird was killed the following year on the same island but since it belonged clearly to the same species and time did not permit of its preparation it was not preserved" (l. c., p. 251).

The specimen from Northeast Point is now in the collection of the U. S. National Museum, and the head of one shot on St. George by Mr. Hanna is in the Biological Survey collection.

Anser albifrons albifrons (Scopoli). WHITE-FRONTED GOOSE.

The white-fronted goose was first noted from the islands by Palmer, who saw 2 on a small pond near the village on St. Paul Island, June 11, 1890. Two others were seen by him later (1899, p. 380). The only other records seem to be those of G. Dallas Hanna, who saw 1 individual at Garden Cove, St. George Island, September 28, 1913, and 2 individuals at Halfway Point, St. Paul Island, on May 18, 1915.

Food.—The contents of two stomachs of the white-fronted goose collected on St. George Island in May have been studied and found to consist of leaves of grass, 99 per cent; and those of saxifrage and chickweed, 1 per cent.

Branta canadensis hutchinsi (Richardson). HUTCHINS GOOSE.

So far as known to the writer the Hutchins goose has been detected only once on the Pribilofs, by G. Dallas Hanna. He has reported the occurrence (1919a, p. 176, and 1920a, p. 251):

A female of this subspecies was shot and preserved on St. Paul Island, May 12, 1918. It is considerably larger than the cackling goose which ordinarily comes to the islands each spring and fall, and unlike the latter form there is no sharp demarcation in the coloration of the under parts (p. 251).

The specimen above mentioned is now No. 255152 of the bird collection of the U. S. National Museum.

Branta canadensis minima Ridgway. CACKLING GOOSE.

Elliott secured a specimen of the cackling goose (62526, male adult, U. S. Nat. Mus.) on St. Paul Island, May 14, 1872. This specimen was listed by Palmer, who also (1899, p. 381) records individuals observed on St. Paul on June 25 and June 28, 1890. Palmer (l. c.) and Hanna (1919b, p. 106) consider the bird a regular migrant.

Hahn reported geese of this type, assumed to be referable to the present race, on St. Paul Island, as follows: September 15, 1910, 5; September 24, 1; October 2, 8; May 30, 1911, 1. Hanna reported this race as follows: St. Paul, 1915: May 14, 8 flew over village; May 16, 4 observed; May 18, 6 in pairs, 2 killed, Halfway Point.

Branta nigricans (Lawrence). BLACK BRANT.

The black brant was first recorded from the Pribilofs by Dall (1874, p. 275), who says, in connection with the occurrence of the bird on the western Aleutians: "It has also been reported as a casual visitor at the Pribiloff Islands."

Specimens were first collected by Hanna, and recorded by him (1916, p. 401). His first one, a male, was taken at Bear Lake, St. George Island, September 28, 1913, and is now No. 242535 of the U. S. National Museum collection. Another individual was seen

at this time. He states (l. c.) that small flocks and single birds seem to occur each spring and fall, and he considers that this species is more common than any other goose excepting the emperor. During the following year, on St. Paul Island, Hanna observed the species, as follows: September 17, 5 seen, 1 secured; September 20, 2 seen; October 8, 2; October 25, 4 at Northeast Point.

Notes taken from the St. Paul Island log by W. L. Hahn, referring to black geese, undoubtedly relate to this species. These notes record 5 individuals shot from a flock on October 7, 1902; and 10 shot April 18, 1905.

Food.—The contents of a single stomach of the black brant collected at St. Paul Island on September 17, 1914, consisted exclusively of a filamentous alga (*Chaetomorpha canaban*).

Phalacte canagica (Sevastianoff). EMPEROR GOOSE.

The beautiful emperor goose seems to be of regular occurrence in spring and fall on both the larger islands. It was first recorded by Elliott, who witnessed the capture of an entire flock, which landed so exhausted that the natives were able to take them by hand (1874, unpagged, and 1875, p. 189).

Townsend (1887, p. 99) speaks of 3 or 4 seen on St. Paul Island in September [1885]; Palmer records 1 killed on St. George Island, July 16, 1890. Hahn found notes in the St. Paul log recording the shooting of 1 on November 29, 1904, and 2 on September 24, 1908; and Hahn himself reports 2 seen on St. Paul Island May 10, 1911.

Hanna has made the most extensive observations, as follows: St. George Island, 1913, December 21, 4 seen; 1914, April 8, 3 seen; April 22, 8; May 19, 8 seen, 2 shot, not skinned owing to scarcity of food among the natives, head and feet saved; 1917, May 10, 2 shot. St. Paul Island, 1914, September 14, 6; September 16, 20; September 20, 2; September 22, 2; October 31, 15; November 4, 1 (specimen); November 26, 3; 1915, March 20, 5; May 18 (2, in village cove); June 14, 7 pairs; June 16, 4 pairs. H. P. Adams, on St. George, noted the bird on September 22 and 26, 1915, and April 26 and 28, 1917.

Food.—H. W. Elliott has reported the food of the emperor goose to consist of *Mytilus edulis* and other shellfish (1874, unpagged, and 1875, p. 190). Such food habits would be a radical departure from the standard vegetarianism of geese in general, and there is no direct evidence that they exist. Reliable evidence points to the emperor goose sharing the plant-feeding proclivities of its allies as the entire food of 5 birds of this species collected on the Pribilofs was marine algae of the type known as sea lettuce, identified in one case as *Dilsea integra*.

Olor columbianus (Ord). WHISTLING SWAN.

The whistling swan was first recorded by Palmer, who says (1899, p. 381):

Several were seen on St. George in the fall of 1889 and three rested on the shore at Halfway Point, on St. Paul, during the same autumn.

Hahn took the following from the St. Paul Island log: October 9, 1888, 1 killed; May 15, 1903, 1 shot; October, 1909, 2 shot; weight, 8½ and 9 pounds, respectively. Hahn himself recorded 1 seen by a native, October 2, 1910; and 2 reported May 7, 1911.

Hanna (1916, p. 402) has recorded 1 shot by a native on a high hill on St. George Island, October 10, 1913. Its measurements, reduced to millimeters, were as follows: Length, 1,151 mm.; extent, 1,780 mm. The head and foot of this one were saved as a specimen. H. P. Adams records the bird on St. George as follows: October 16, 1915, noted; October 17, 1915, 1 killed.

Family GRUIDAE.

Megalornis canadensis (Linnaeus.)³ LITTLE BROWN CRANE.

The little brown crane, which has several times been observed in early summer, was added to the Pribilof list by Townsend (1887, p. 99). He says:

While at St. Paul Island [summer, 1885] some natives came to me and reported having seen a large long-legged bird wading in a shallow pond near the village, and gave me a large feather which the bird dropped in its flight.

Palmer's original notes follow:

Jake, a well-known Aleut sealer, told me on June 28 [1890], that he had seen 3 cranes that morning north of Kaminista Lake. Going there, I found 5, but they were very wild. They remained in the neighborhood until after August 1, as I saw them frequently picking up insects on the tundra. One was caught in a trap near the village in June, 1888 (1899, p. 398).

According to the St. Paul Island log (notes transcribed by Hahn), two "blue cranes" were seen on the tundra September 13 and 14, 1908. These birds were almost certainly the present species.

Hanna observed 3 cranes at Big Lake, St. Paul Island, on May 12, 1915, and 1 on the tundra near Rocky Point Lake on June 26. In May, 1919, he took the first specimens, which he recorded as follows (1920b, p. 174):

Two little brown cranes (*Grus canadensis*) were collected on St. Paul Island in May, 1919. This species occurs in small numbers regularly during migrations but the birds are rarely shot. The previous record was based on a single feather picked up on the tundra.

Food.—William Palmer stated (1899, p. 398) that he saw little brown cranes picking up insects on the tundra of the Pribilofs, and

³ *Grus canadensis* of the A. O. U. Check List, 1910.

G. Dallas Hanna notes that the two specimens collected by him on St. Paul Island had their crops filled almost to the bursting point with blowfly larvae from the seal-killing fields.

Family PHALAROPODIDAE.

Phalaropus fulicarius (Linnaeus). RED PHALAROPE.

The red phalarope is an abundant northward migrant in early summer and again appears on its return late in summer. It is occasionally seen in midsummer, but has not been found breeding on the islands.

The earliest spring dates are from specimens taken by M. C. Marsh on St. Paul Island, May 16 and 31, 1912, and by Hanna on St. George May 19 and 23, 1914, and the latter's note of May 26, 1915, when he saw large flocks crossing between St. Paul and Otter Islands. Palmer collected several about Polovina, St. Paul Island, between June 10 and July 17, 1890, but thought that they did not breed. Hanna observed 2 at Halfway Point, St. Paul, June 20, 1915, and a pair each on St. Paul and St. George throughout the summer of 1919, but found no evidence of nesting.

Fall migrants begin to appear in mid-July. Palmer noted the first fall arrivals on July 17, 1890, I saw the first one on St. George July 14, 1914, and on July 16 found hundreds on the water about Walrus Island. These were largely still in breeding plumage. From that date until we left the Pribilofs, the last of August, I frequently observed the birds, usually in small numbers but sometimes in large flocks.

During the autumn the birds continue to be observed until quite late. Hahn's notes for St. Paul for 1910 follow: August 30, about 100 seen; a few to September 7; September 8, about 1,000; September 9, about 200; September 11, about 200; September 12, about 50; September 15 to 19, a few; October 2, many seen on way to Walrus Island; October 15, 1; October 19, 3; October 20, 2. On January 18, 1911, Hahn saw one on the water off Tolstoi Point, St. Paul. Hanna on St. George records the following observations in 1913: September 5, 4; September 15, 25; October 9, about 100, some in surf but mostly in fresh-water ponds; October 18, 12. His notes for St. Paul, 1914, follow: September 20, 1; October 25, 1 taken at Webster Lake; November 4, 1 in surf at village landing. Specimens taken on St. Paul by Hahn and Marsh, in 1910, 1911, and 1912, measured in the flesh as follows: Males, length $7\frac{3}{4}$ to $8\frac{1}{2}$ inches; extent, $15\frac{3}{8}$ to $15\frac{7}{8}$. Females, length, 9 to $9\frac{1}{2}$; extent, $16\frac{1}{4}$ to 17.

Food.—The red phalarope, one of the swimming snipe, is represented in the present collection by 53 well-filled and 2 nearly empty stomachs. While the phalaropes habitually alight and feed in water, it is evident from analyses of the contents of these stomachs that they

feed also on land, where they must obtain most of the flies and beetles they eat. The principal food items found in the 53 stomachs were: Crustaceans, 38.29 per cent; flies, 21.69 per cent; fishes, 18.18 per cent; caddisflies, 10.15 per cent; and beetles, 9.86 per cent.

Of the crustaceans eaten, 30.45 per cent of the total of 38.29 per cent were identified as amphipods and probably part of the unidentified belonged to the same group. Amphipods were found in 22 stomachs, but could be determined to the species in only 2 cases, these being *Gammarus pribilofensis* and *Pontogeneia inermis*. Another group of crustaceans, while contributing only a trace to the food of the red phalarope, is of considerable interest as an item of avian diet, because its members are so small, bordering on microscopic size. These are the water fleas (Daphniidae), which, as ordinarily seen by human observers, appear like dancing motes in waters pierced by the sunbeams in which they love to gather. The contribution of these little animals to the food of the phalarope is their egg cases (ephippia), each a twin sac inclosing the two relatively large black eggs. These were found in 6 stomachs, no fewer than 50 of them being taken from one stomach, and in this single instance they amounted to 5 per cent of the contents.

Two-winged flies (Diptera) and their larvae and pupae were found in more than half of the gizzards examined and constituted 21.69 per cent of the total food. The kinds most frequently taken were members of the dung-fly family (Scatophagidae) and the adults and larvae of midges (Chironomidae). Seventy of these larvae were found in a single stomach. The determinations of flies, other than as just mentioned, were: Anthomyiidae, blowflies (Muscidae), dung-flies (*Scatophaga crinita*, *S. dasythrix*, and *Scatophaga* sp.), soldier-flies (Stratiomyidae), and crane-flies (Tipulidae).

Fishes were the next most important element of the food of the red phalarope, being found in 15 stomachs and composing 18.18 per cent of the total subsistence. All taken were small sculpins (Cottidae). Caddisflies and their larvae were taken by 14 birds and formed 10.15 per cent of the food. These live in fresh water and the larvae construct cases of a variety of materials in which they pass the immature stages.

The only remaining item of any importance in the diet of this species is beetles (9.86 per cent). Ground beetles of the genus *Pterostichus* were taken more frequently than any other kind, occurring in 11 stomachs. Another beetle (*Amara* sp.) of the same family was identified, and in addition the following: Rove beetles, including *Atheta* sp., *Hadrotus* sp., and *Olophrum fuscum*; diving water beetles, including *Ilybius angustior*; and *Aegialites californi-*

cus, a beetle of a peculiar family having a few species along our western coast.

Hymenoptera, mostly small parasitic wasps (*Plesignathus* sp.), the only other insects eaten, were found in 5 stomachs and spiders in 1. Mollusks were taken by two birds and marine worms (*Nereidae*) by one.

Vegetable matter constituted less than half of 1 per cent of the contents of the 53 stomachs of red phalaropes examined, and is to be considered as an accidental rather than genuine article of food. It consisted entirely of seeds, of which those of violet (*Viola* sp.) were found in 5 stomachs, sedge (*Carex* sp.) in 2, and the following in 1 each: Crowberry (*Empetrum nigrum*), lousewort (*Pedicularis* sp.), and bog bean (*Menyanthes trifoliata*).

Lobipes lobatus (Linnaeus). NORTHERN PHALAROPE.

The northern phalarope is apparently a fairly abundant migrant on the Pribilofs, although I have no definite information on this point. It breeds in small numbers on both St. George and St. Paul.

Elliott first recorded the bird (1874, unpagged, and 1875, p. 181) and took downy young on St. George in 1873. Palmer found the birds nesting near Rocky Point, St. Paul, July 2, 1890, also collecting newly hatched young. I observed several, apparently nesting, near the latter locality on June 27, 1914. Hanna saw four pairs near the same place on June 14, 1915. The earliest spring date is of a specimen taken by Hanna on St. George, May 23, 1914. The latest dates are also represented by specimens: August 15, 1914, St. Paul, Hanna; and August 17, 1897, St. Paul, Greely and Snodgrass.

A female specimen collected by Marsh on St. Paul Island, June 1, 1912, measured in the flesh: Length, $7\frac{3}{4}$ inches; extent, $14\frac{1}{8}$.

Family SCOLOPACIDAE.

Limnocyptes gallinula (Linnaeus). EUROPEAN JACKSNIFE.

The only record of the European jacksnipe as an inhabitant of the Pribilofs is based on a specimen taken by G. Dallas Hanna and recorded by him (1920b, p. 173) as follows:

Some time during the spring of 1919, probably in April, a native on St. Paul Island secured one of these birds and very kindly kept the skin for me until my arrival. The identification was made by Mr. Joseph Mailliard, of the California Academy of Sciences. This is a new record for the Pribilof Islands and for North America.

The specimen is deposited in the collection of the California Academy of Sciences. The species breeds generally in northern Eurasia east to the Kolyma River, and occurs in migration and in winter south to India and Burma, and occasionally to Japan and Formosa.

Limnodromus griseus scolopaceus (Say).⁹ LONG-BILLED DOWITCHER.

A female specimen of the long-billed dowitcher taken on St. Paul Island, September 18, 1919, by G. Dallas Hanna, and recorded by him (1920b, p. 173) constitutes the first record for the Pribilofs.

Later Mr. Hanna took 2 additional specimens, a male and a female, at Northeast Point, St. Paul Island, August 29, 1920. These are recorded by Mailliard and Hanna (1921, p. 95). All these specimens are in the collection of the California Academy of Sciences.

Food.—Two stomachs, of the two specimens last mentioned from St. Paul Island, have been examined and their contents were almost exclusively the larvae of midges (Chironomidae), of which there were more than 75 in one gizzard and more than 100 in the other. Vegetable debris, amounting to 3 per cent by bulk of the stomach contents, also was present, and it probably was picked up incidentally with the midge larvae. Included in the vegetable matter were seeds of bottle brush (*Hippuris vulgaris*), sedge (*Carex* sp.), and water chickweed (*Montia fontana*).

Arquatella maritima couesi Ridgway. ALEUTIAN SANDPIPER.

The Aleutian sandpiper, which breeds mainly on the Alaska Peninsula, visits the Pribilofs in the autumn and lingers in small parties about the icy shores until winter. It has also been observed early in spring, sometimes about the pack ice. It was first ascribed to the islands by Seale (1898, p. 139), from specimens taken on St. Paul Island in the late summer of 1897 by R. E. Snodgrass and A. W. Greely. There is reason to believe, however, that this record is based on mis-identified specimens. These are now supposed to be in the collection of Leland Stanford University. At the request of the writer, Dr. Walter K. Fisher kindly attempted to look up the pertinent specimens but was able to find only one which could reasonably be supposed to be in part the basis of the record. This specimen (No. 3498, an immature female, labeled *T. couesi*, taken July 25, 1897) he kindly forwarded for examination. This proved to be an undoubted example of the breeding species *A. m. ptilocnemis*, and is in the usual plumage of the immature bird at this season. It is possible that later research will bring to light other specimens of the Snodgrass-Greely collection which are actually referable to *A. m. couesi*, but the writer is rather inclined to the belief that they will all prove to be the breeding form, which gathers abundantly on the beaches in late summer, and includes many small specimens which, without close examination, might be considered to be the Aleutian form.

However this may be, the species has been definitely added to the list by Hanna, who took specimens on St. Paul Island in the autumn

⁹*Macrorhamphus g. scolopaceus* of the A. O. U. check list, 1910.

of 1914 and in the spring following. His notes of occurrence are as follows: 1914, September 16, 4 observed (1 taken now in the collection of the Biological Survey); October 17, 1 taken (female No. 237527, U. S. Nat. Mus.); October 25, 4 seen at Northeast Point; November 16, 8 seen; November 27, 4 seen at Lukanin beach, 2 taken (males, Nos. 237525 and 237526, U. S. Nat. Mus.). 1915, March 5, 1 seen in pack ice; April 24, 1 taken at Northeast Point (No. 237524, U. S. Nat. Mus.). This last specimen has begun to acquire the reddish summer feathering on the back and the sides of the breast.

Mailliard and Hanna (1921, p. 94) have recently recorded a specimen, not sexed, taken on St. George Island, February 12, 1917. This is in the collection of the California Academy of Sciences.

Arquatella maritima ptilocnemis (Coues). PRIBILOF SANDPIPER.

Tringa ptilocnemis Coues, in Elliott, Report Seal Islands, Alaska, 1874, unpagged; 1875, reprint, p. 182 (type from St. George Island).

The Pribilof sandpiper breeds in some numbers on both St. Paul and St. George. It is absent from the Pribilofs during the colder months, leaving in October, and returning in middle or late April.

Veniaminof in 1840 (Trans. by Elliott, 1874 unpagged, and 1875, p. 242) listed "a few kinds of *Tringa*" as occurring on the Pribilofs, and may reasonably be supposed to have observed the only species of the group which breeds; the species, however, was first definitely recorded by Dall, who obtained a specimen on St. George and listed it under the name *Tringa maritima* (1869, p. 291). Later both Dall and Coues listed the species as *Tringa crassirostris*, but Coues, assured of its novelty, in a footnote (in Elliott, 1874, not pagged, p. 182 of 1875 reprint) gave it the specific name it now bears. About the same time, Harting (1874, p. 243) bestowed upon it another name, *Tringa gracilis*.

Hanna in 1914 saw seven individuals at Zapadni, St. George Island, on April 14. His records of observations on St. Paul in the spring of 1915 are as follows: April 24, about 50 seen in flocks; a male taken on this date had nearly finished acquiring the breeding plumage, but still retained a few traces of the winter feathering; April 26, about 50 (in flocks); May 2, about 30 (pairing); May 4, 18 (about all paired); May 9, 20 (about all paired); May 18, 12 (in pairs); May 28, 8 (in pairs).

This sandpiper nests on the higher lichen-covered parts of both St. George and St. Paul, and as far as known, on only one other group—St. Matthew. The first eggs known, a set of 4, were taken by H. W. Elliott and G. R. Adams on St. George, June 19, 1873. Another set of 4 was taken by True and Prentiss on St. Paul, July 6, 1895. More recently a number of sets have been taken on St.

George Island by G. Dallas Hanna and others, and Mr. Hanna (1921a, pp. 50-57) has published a very full and interesting account of the nesting of the species, with description and measurements of the eggs, and the present place of depository of the 23 sets of which he has knowledge.

The experience of the writer is limited to a few observations made on the two main islands of the group in the summer of 1914. A few pairs attending young were found on the breeding grounds near the Polovina Lakes, St. Paul, on June 28, and adults and downy young were collected. Both sexes had been brooding as shown by the bare spots on the sides of the abdomen. They were still lingering about their breeding grounds here on July 20, and perhaps later. About August 9 the birds began to be common about the beaches, the flocks there apparently being in excess of the number breeding on the islands, and in all probability, therefore, comprised in part of migrants from other breeding stations. They continued to be abundant until my departure the last of August. A young female bird taken August 28 still retained some of the down of the juvenal plumage on the postauricular region. During our brief visits in mid-July and early August to St. George Island, where the bird breeds more abundantly, many were observed, on the former occasion near their breeding grounds, and in early August mainly about the beaches.

About the middle of July, when the earlier nesting birds are freed from family cares, they begin to resort to the beaches to feed, and at night gather in flocks to roost on some favorite rocky point. Later the young join the adults and the flocks increase in size through August.

The majority of the birds leave by mid-September. Hahn in 1910 observed a few on St. Paul during September and early October; his latest date is October 20. Hanna in 1913 noted the species on St. George as follows: August 30, 20 seen; September 4, 20; September 11, 500; September 15, about 75; September 28, 4. Hanna's notes for St. Paul, autumn of 1914, are as follows: September 14, large flocks going south; September 16, about 500 individuals seen, the majority have gone; September 20, about 200; September 22, about 30; October 4, 20; October 17, 10.

The species winters as far as known on the mainland of southeastern Alaska and has not been observed on the Pribilofs later than the dates above noted, being replaced at that season, in a measure, by the Aleutian sandpiper, as detailed in the account of that species.

Males taken by Hahn and Marsh measured in the flesh: Length, 8 to $9\frac{1}{8}$ inches; extent, 16 to $16\frac{3}{8}$; females, length, $9\frac{5}{8}$ to $10\frac{1}{2}$; extent, $16\frac{3}{4}$ to $17\frac{1}{2}$. A female taken on St. Paul, October 19, 1910, by Hahn,

had the bill horn color at base, dusky at tip; feet dusky greenish, tarsus horn color.

Food.—More stomachs of the Pribilof sandpiper have been available for examination than of any other species, the total being 198, of which 6 were nearly empty (and consequently excluded from computations, the results of which are here cited). The articles of food composing more than 1 per cent of the total were: Mollusks, 32.63 per cent; crustaceans, 29.15 per cent; flies (Diptera), 23.49 per cent; beetles, 10.29 per cent; marine worms, 1.27 per cent; and vegetable matter, chiefly algae, 1.21 per cent.

The molluscan food, although the largest single item, was little varied, consisting chiefly of univalves, and these mostly of the genus *Littorina*. Unidentified species of this genus were found in 33 stomachs, and *L. sitchana* in 53. Several stomachs held large numbers of this species, the maximum count being 205. One other univalve (*Neritina sitchana*) was determined among the food, and 3 kinds of bivalves, namely, *Pisidium hannai* in 1 stomach, blue mussels (*Mytilus edulis*) in 14, and *Modiolus modiolus* in 7. One of these stomachs yielded 40 of the last-named species.

Like the molluscan food of the Pribilof sandpiper, the crustacean also was very uniform, being almost entirely amphipods. Unidentified amphipods were found in 43 stomachs, *Gammarus pribilofensis* in 20, *Gammarus* sp. in 9, and *Orchestia* sp. in 1. Isopods, named as *Idothea* (?) *ochotensis*, occurred in 2 gizzards, and eggs of water fleas (Daphniidae) in 1.

The third item in rank among the food staples of this sandpiper, two-winged flies (Diptera, 23.49 per cent), includes larvae, pupae, and adults of a variety of forms. Crane-flies (Tipulidae, *Tipula* sp.), either the larvae or adults, the latter often with eggs, were most frequently identified, and various members of the dung-fly family (Scatophagidae) next. Flies of the latter group determined were: *Scatophaga crinita*, *S. furcata*, *Leria fraterna*, and *L. leucostoma*. Blowflies, so numerous on the Pribilofs when large numbers of rotting seal carcasses are present, were eaten by 12 of the birds. As many as 23 of one of these flies (*Calliphora vomitoria*) were found in a single stomach, and no fewer than 112 larvae of blowflies in another. Kelp-flies (*Coelopa eximia*, *Coelopa* sp., and *Fucellia* sp.) occurred in 10 stomachs.

Beetles, last of the major elements of the Pribilof sandpipers' food, 10.29 per cent in all, were a varied lot. Ground beetles were distinctly the favorites, those of the genus *Pterostichus* being found in 33 stomachs, and in numbers as great as 21, 25, and 31 in three instances. Larvae as well as adult beetles of this family were eaten, and the following forms in addition to the genus already mentioned

were determined: *Amara brunnipennis*, *Amara* sp., and *Patrobus septentrionis*. A small species of the burying beetle family (Silphidae), by name *Lyrosoma opaca*, was eaten by 3 birds, unidentified rove beetles (Staphylinidae) by 7, and others of the latter family as follows: *Atheta* sp., 1; *Tachinus apterus*, 1; *Tachinus* sp., 8; and *Olophrum fuscum*, 2. One of the moss beetles (*Byrrhus fasciatus*) was found in 3 stomachs, a click beetle (*Hypnoidus musculus*) in 2, a leaf beetle (*Chrysomela subsulcata*) in 2, the beach beetle (*Aegialites californicus*) in 3, and a weevil (*Lophalophus inquinatus*) in 3.

Of the remaining insects in the dietary of this bird, caddis larvae were found in 4 stomachs, a plant bug (*Irbisia sericans*) in 1, a moth in 1, caterpillars in 2, and Hymenoptera in several. Identified forms of the last group were all parasitic wasps, representing the following genera: *Gelis*, *Seleucus*, *Bathymetis*, *Stiboscopus*, *Phygadeuon*, and *Amblyteles*.

Mites were found in 1 stomach examined and spiders in 5. Marine worms, chiefly of the family Nereidae, composed 1.27 per cent of the food, and as many as 38 individuals were represented in a single stomach. A sculpin (*Myoxocephalus* sp.) was eaten by 1 of the birds studied. It is of interest to note that material, no doubt taken for grinding purposes, included in a few cases bits of bone, and in one instance a molar tooth of the lemming (*Lemmus nigripes*).

Vegetable matter, 1.21 per cent of the total food of the species, consisted chiefly of algae, including kelp and plume algae (*Ptilota* sp.). Bits of moss also were eaten and a few seeds of the following plants: Grass, lupine (*Lupinus nootkatensis*), violet (*Viola langsdorfi*, crowberry (*Empetrum nigrum*), and bottle brush (*Hippuris vulgaris*).

Pisobia acuminata (Horsfield). SHARP-TAILED SANDPIPER.

The sharp-tailed sandpiper was first recorded from the Pribilofs by Seale (1898, p. 139) on the basis of a specimen taken by R. E. Snodgrass and A. W. Greely on St. Paul Island August 19, 1897. (Grinnell (1901, p. 20) gives the date of what is apparently the same specimen as August 17.) Bishop, touching at St. George on October 3, 1899, saw about a dozen and took 3 (1900, p. 66). The bird has since been found to be a regular fall migrant and is sometimes abundant. Hahn recorded it in small numbers on September 7 and 24, October 11 and 20, and November 9, 1910. A male taken by Hahn on St. Paul on October 8 is in the collection of the Biological Survey.

Hanna, in 1913, took specimens on St. George on August 30, September 5 and 6, and October 18. In 1914, on St. Paul, he observed a few on August 29, September 14 and 20, and 1 on Octo-

ber 12. The same observer noted the species in large flocks, together with the pectoral sandpiper, on the seal-killing fields of St. Paul during the early autumn of 1919.

Two males taken by Marsh October 11, 1911, measured, respectively: Length, $9\frac{1}{8}$ and $8\frac{3}{4}$ inches; extent, $17\frac{1}{2}$ and 17. Females taken by Hahn measured as follows: Length, 8 inches; extent, $14\frac{3}{4}$ and $15\frac{1}{4}$.

Food.—Eight well-filled and 1 nearly empty stomach of the sharp-tailed sandpiper are available to illustrate the food habits. This number is too small to furnish reliable results, and too great dependence must not be placed in data as to the relative ranks of food items as here stated. The percentages found for the limited material, then, are flies (Diptera), 39.1 per cent; crustaceans, 18.1 per cent; mollusks, 14.2 per cent; caddisflies, 11.8 per cent; beetles, 8.8 per cent; Hymenoptera, 1.8 per cent; and vegetable matter, 3.9 per cent.

Mr. Hanna notes that flocks of this species frequent the seal-killing fields feeding on fly maggots, a statement receiving confirmation from stomach analysis. Blowflies (*Calliphora vomitoria*) were found in two stomachs and larvae of this or an allied species in another. Thirty-three rat-tailed larvae of flower flies (Syrphidae; Eristalinae), and those of crane flies (Tipulidae), and midges (Chironomidae) in 1 each.

Both caddis larvae and adults were eaten, and of the latter *Chilostigma praeteritum* was identified. Among the beetles, ground beetles are well represented by *Pterostichus* in 2 stomachs and the large gold and green beetle (*Carabus truncaticollis*) in 1. Other species of beetles eaten, each by 1 bird, except a weevil (*Lopholophus inquinatus*) by 2, were: A predacious diving beetle (*Hydroporus* sp.), rove beetle (*Tachinus* sp.), moss beetle (*Byrrhus fasciatus*), click beetle (*Hypnoidus musculus*), stores beetle (*Ptinus fur*), and a leaf beetle (*Chrysomela subsulcata*).

The few remaining insects found in stomachs of the sharp-tailed sandpiper were parasitic wasps (*Gelis* sp., and *Polyrhembia* sp.) and a plant bug (*Irbisia sericans*). Spiders were found in 1 stomach and amphipods in 2, these comprising the bulk of the crustaceans eaten. The vegetable matter in the stomachs consisted of plant fibers, further unidentified, which were probably taken accidentally.

Pisobia maculata (Vieillot). PECTORAL SANDPIPER.

The pectoral sandpiper is a migrant on the Pribilofs, evidently occurring mainly in early autumn, though the first record relates to June specimens. Palmer (1899, p. 404) obtained 2 specimens on St. Paul, June 12, 1890. The next instance of its capture seems to have been recorded by Bishop (1900, p. 66), who mentions a specimen shot on St. George Island by W. H. Osgood, October 3, 1899. Hahn took

specimens on St. Paul on September 11 and October 8, 1910; and Marsh collected the species on the same island on October 11, 1911, and May 30, 1912.

While on St. Paul Island in the summer of 1914 the writer first noted this species on August 17, when four were observed at Northeast Point; subsequent records, made near the village, follow: August 23, 7 observed; August 24, 30; August 25, 6; August 28, common; August 29, abundant. Following my departure on August 30, G. Dallas Hanna noted it: September 14, 18; September 16, 12; September 20, about 50.

Notes taken from the field catalogues follow: Male, St. Paul Island, October 8, 1910, W. L. Hahn: length, $8\frac{3}{4}$ inches; extent, $16\frac{1}{4}$; bill, horn color at base, dusky on terminal half; feet, greenish-yellow. Female, St. Paul Island, September 11, 1910, Hahn: length, $8\frac{5}{8}$ inches; extent, 17. Male, St. Paul, May 30, 1912, M. C. Marsh: length, $9\frac{3}{8}$ inches; extent, $17\frac{5}{8}$; legs and feet, yellowish-red; bill, black.

Food.—Included in the present study are 23 stomachs of this species, of which 2 collected long ago were imperfectly examined and are not available for reexamination. The food proportions here given, therefore, are based on the contents of 21 well-filled gizzards. The principal elements of the food are: Flies (Diptera), 54.5 per cent; amphipods, 22.3 per cent; vegetable matter, chiefly algae, 10.5 per cent; beetles, 8 per cent; Hymenoptera, 2.1 per cent; and bugs (Hemiptera), 1.3 per cent.

The Diptera eaten were almost exclusively larvae of crane-flies (Tipulidae; *Tipula* sp.), of which no fewer than 123 were in a single stomach among the 16 in which such larvae occurred. Kelp-flies (*Coelopa* sp.) were found in 2 stomachs. The beetles eaten were mostly ground beetles and their larvae, of which the following kinds were identified: *Amara brunnipennis*, *A. glacialis*, *Amara* sp., and *Pterostichus* sp. Other beetles eaten included a predacious diving beetle (*Hydroporus* sp.), rove beetles (*Quedius hyperboreus*, and *Hadrotus* sp.), and weevils (*Lophalophus inquinatus*). The Hymenoptera consumed were small parasitic wasps (*Amblyteles* sp. and *Campoplex* sp.), and the Hemiptera, the plant bug (*Irbisia sericans*). The only other insects eaten were caddis larvae. Mites and spiders were found in 3 stomachs each, and amphipods, the only crustaceans eaten, in 5.

The vegetable food, while largely algae, included also a few seeds of grass, lupine (*Lupinus nootkatensis*), and violet (*Viola langsdorfi*).

Pisobia bairdi (Coues). BAIRD SANDPIPER.

The Baird sandpiper was added to the Pribilof list by Hanna (1916, p. 401), who took 3 specimens at Kaminista Lake, St. Paul

Island, August 31, 1914. Mailliard and Hanna (1921, p. 95) have recently put on record 2 specimens taken at Northeast Point, St. Paul Island, August 12, 1920.

Food.—The food secured by Baird sandpipers on the Pribilofs is known only from the contents of three stomachs taken August 31, 1914. They contained amphipods (partly *Gammarus* sp.), 73.6 per cent; algae, 11.6 per cent; beetles, 10.3 per cent; and a fly larva, 1 per cent. The beetles were ground beetles (*Pterostichus* sp. and *Patrobis septentrionis*), and a weevil (*Lophalophus inquinatus*).

Pisobia minutilla (Vieillot). LEAST SANDPIPER.

The first specimen of the least sandpiper known to have been taken on the Pribilofs was a female shot by Wilfred H. Osgood, at Kaminista Lake, St. Paul Island, August 29, 1914. It is now in the collection of the Biological Survey, and has been recorded by G. Dallas Hanna (1916, p. 401). Hanna also observed 2 on September 14 of the same year, and 1 on July 13, 1915, also on St. Paul. A second specimen, taken by Hanna at Northeast Point on St. Paul Island, August 27, 1920, has been recorded by Mailliard and Hanna (1921, p. 95).

Food.—The stomachs of the 2 specimens above mentioned were examined. One of them contained amphipods exclusively, and the other the following items: 23 seeds of bottle brush (*Hippuris vulgaris*), 50 per cent; bits of hydroid stems, 40 per cent; and chitin from the blue mussel (*Mytilus edulis*), 10 per cent.

Pisobia subminuta (Middendorff).¹⁰ LONG-TOED STINT.

The specimen of the long-toed stint taken by Townsend in 1885, which added a new species to the North American list, still remains the only record for the Pribilofs. The occurrence was first put on record by Ridgway (1886, p. 275). Concerning the taking of the bird, Townsend says (1887, p. 100):

By the capture of this Asiatic bird on Otter Island, Alaska, where I shot an adult female, in breeding plumage, on June 8, 1885, a species is added to the fauna of North America. It was feeding in a shallow salt-water pond, with other *Tringa*, which I supposed to be *Actodromas*.

The long-toed stint breeds in Kamchatka and other parts of eastern Siberia, including the Commander and Kurile Islands. In winter it occurs as far south as Australia and the Philippines.

Pelidna alpina sakhalina (Vieillot). RED-BACKED SANDPIPER.

The American dunlin was first observed on the Pribilofs by L. B. Bishop October 3, 1899, when during a short visit to St. George Island he observed a few (1900, p. 67). The first specimen, a male,

¹⁰ *Pisobia damacensis* of the A. O. U. Check List, 1910.

was taken by Hahn October 30, 1910, and recorded by Evermann (1913, p. 17). It measured: Length, $7\frac{1}{2}$ inches; extent, 14. It is now in the collection of the Biological Survey.

A second specimen, shot by Doctor Hunter on St. Paul Island, September 3, 1914, was preserved by Hanna, and is now in the U. S. National Museum collection. The reddish brown of the scapulars and tertials is nearly replaced by the gray of the winter plumage; sides of breast with small rounded black blotches. Another individual was observed at the same time.

Food.—The single available stomach of the red-backed sandpiper (St. Paul, September 3, 1914) was entirely filled with amphipods.

Ereunetes pusillus (Linnaeus). SEMIPALMATED SANDPIPER.

A female semipalmated sandpiper taken by Palmer on St. Paul Island, June 12, 1890, remains the only record for the Pribilofs. This specimen, which was recorded by Palmer (1899, p. 405), was in company with two pectoral sandpipers, evidently just arrived from the south.

Food.—The stomach of this specimen was found to contain remains of the beach beetle (*Aegialites californicus*), 10 per cent; fragments of small flies (Diptera), 85 per cent; and two seeds (not identified), 5 per cent.

Limosa lapponica baueri (Naumann). PACIFIC GODWIT.

The Pacific godwit seems to be of regular occurrence in spring and fall. It was first recorded by Elliott who observed it in flocks of a dozen to 50 (1874 unpagged, and 1875, p. 187). Subsequent records of occurrence are few. Palmer took specimens on Walrus Island, June 13, and on St. Paul, July 7, 1890. Marsh collected a male on St. Paul, June 12, 1912; it measured: Length, $15\frac{1}{2}$ inches; extent, $27\frac{3}{4}$. Hanna collected an adult female on St. George, September 7, 1913. In 1915, on St. Paul, he observed the bird as follows: May 20, 4 seen, 1 taken; May 26, 14; May 27, 30; May 28, 50 seen at Northeast Point.

Food.—Six stomachs of Pacific godwits collected on St. Paul and Walrus Islands by William Palmer in 1890 have been reexamined. Dr. S. D. Judd's analysis of their contents was published by Palmer (1899, pp. 405, 406), but the present report is an improvement in some respects over the original. The items of the food in rank by bulk, are flies (Diptera), 76.6 per cent; beetles, 17 per cent; mollusks, 3.6 per cent; marine worms (Nereidae), 1.3 per cent; and vegetable matter, 1 per cent. The fly remains were very largely midge (chironomid) larvae, but included also a few dung-flies (*Scatophaga* sp.). The beetles included as the principal item 450 or more beach beetles (*Aegialites californicus*), which made up 85 per cent of the contents of one stomach; and as lesser items, ground beetles

(*Pterostichus* sp. and *Amara brunnipennis*), rove beetle (*Tachinus* sp.), and a weevil (*Lophalophus inquinatus*). A caddisfly was the only other insect eaten. The mention of tiger beetles by Judd must be set down as a misidentification, based no doubt on the jaws of marine worms (Nereidae) which one of the stomachs contained. All of the mollusks eaten by the godwits were of a single species of univalve, *Littorina sitchana*.

The vegetable matter consisted of unidentified fibers and a few leguminous seeds, probably accidentally taken.

Totanus melanoleucus (Gmelin). GREATER YELLOW-LEGS.

A greater yellow-legs taken at Kaminista Lake, St. Paul Island, in 1897, by R. E. Snodgrass and A. W. Greely, was at last accounts in the collection of Leland Stanford University. Alvin Seale, who first recorded it (1898, p. 139), gives the date as August 23. Grinnell, reporting on the same collection (1901, p. 20), gives the date as August 17. However, Walter K. Fisher, in response to my request, kindly looked up the specimen and tells me that the label bears the date August 29, 1897. These details are given lest it be supposed that there are several specimens; there is apparently only one involved.

Hanna reports seeing one at close range on St. George on May 28, 1917, and another on St. Paul, June 10, 1919.

Totanus flavipes (Gmelin). LESSER YELLOW-LEGS.

Palmer saw a lesser yellow-legs among a flock of godwits, June 11, 1890, but failed to secure it (1899, p. 407). Hanna took a female specimen, now in the collection of the U. S. National Museum, on St. George Island, October 18, 1913, and has recorded it (1916, p. 402). These seem to be the only records.

Rhyacophilus glareola (Linnaeus). WOOD SANDPIPER.

A specimen of the wood sandpiper was taken on St. George Island May 19, 1914, by G. Dallas Hanna. This specimen, which was partially demolished by a blue fox and now consists only of the wings and one foot, is now in the collection of the Biological Survey, and has been recorded by Mr. Hanna (1916, p. 401).

The wood sandpiper breeds in northern Eurasia east to Kamchatka and Bering Island, and winters in northern Africa, southern Asia, Japan, and the Philippines. It had been taken once in Alaska previous to its capture on the Pribilofs.

Heteroscelus incanus incanus (Gmelin).¹¹ WANDERING TATTLER.

The wandering tattler is a rather common migrant in early and late summer, the outward spring and return fall movements being

¹¹ *Heteractitis incanus* of the A. O. U. Check List, 1910.

separated by only a short interval. The species was first recorded from the islands by Elliott (1874, unpagged, and 1875, p. 187). The available dates of occurrence, divided as nearly as may be into spring and fall records, are as follows: St. Paul Island, May 27, 1872, specimen (Elliott). Otter Island, June 8, 1885, specimen (Townsend). St. Paul Island, May 22, 1911, 1 seen; May 29, 1 seen; May 30, 2 seen (Hahn). St. Paul Island, May 31, 1915, 1 seen (Hanna). The earliest record marking the return movement is that of Hanna, who saw one on St. Paul Island, July 7, 1915. Palmer observed it on St. Paul July 10, 1890, and took specimens there on July 29 and 31. Hahn did not begin his observations on St. Paul in 1910 until about the 1st of September; his notes on this species are as follows: September 2, 2; September 4, 2; September 7, 3; September 8, 6; September 9, 3; September 11, 10; September 18, 3; October 4, 1. Hanna, on St. George, observed 4 singly on August 24, 1913, and collected 1.

During the late summer of 1914 the writer did not observe this species until July 27, when one was seen on Otter Island. On St. Paul a few were seen between Northeast Point and the village on July 29, and subsequently as follows: August 15, 1; August 16, 1; August 23, 2; August 25, 1; August 28, 4; August 29, 3. One was also observed on St. George on August 5. Following my departure from the Pribilofs G. Dallas Hanna recorded the species on St. Paul on the following dates: September 14, 8; September 16, 10; September 20, 3; September 22, 2. Hanna informs me he took specimens on St. Paul Island on August 18 and 27, 1920.

Food.—The six stomachs of wandering tattlers examined yielded quite a variety of food items of which those in excess of 1 per cent of the total, are: Flies (Diptera), 46.1 per cent; caddisflies, 30.6 per cent; amphipods, 16 per cent; mollusks, 3.6 per cent; and beetles, 1.1 per cent. One stomach was filled with blowflies (*Calliphora vomitoria*), another nearly so with dung-flies (*Scatophaga crinita*), and a third in like measure with kelp-flies (*Coelopa frigida*), and crane-fly larvae. Two of the stomachs were nearly full of caddisfly larvae. Amphipods (including *Gammarus* sp.) occurred in three of the gizzards but in quantity only in one. The mollusks eaten by two birds were univalves of the genus *Littorina*, 23 in one of the stomachs being *L. sitchana*. The only beetle was the large gold and green ground beetle (*Carabus truncaticollis*) and the only other insects were small parasitic wasps (*Polyrhembia* sp.). Concluding the enumeration of food items, one stomach contained a few bones of a small fish and another a little vegetable débris.

Heteroscelus incanus brevipes (Vieillot). POLYNESIAN TATTLER.

The Polynesian tattler has been taken on three occasions on the Pribilofs, the only North American locality. G. Dallas Hanna

first recorded it (1919a, p. 176, and 1920a, p. 250) and (l. c., p. 250) elaborates the circumstances as follows:

The history of the Polynesian tattler in North America dates back to October 4, 1911, when a female was secured on St. Paul Island by Mr. M. C. Marsh, then the naturalist of the fur-seal service. The specimen was placed in the National Museum collection without being detected as differing from the wandering tattler. It was discovered by Dr. H. C. Oberholser while he was verifying the identification of a second specimen of the same species, a female collected on St. Paul Island, September 2, 1917, by the writer. Owing to the difficulty of distinguishing the tattlers it may be that the Asiatic form comes across Bering Sea more frequently than the records would indicate.

A third specimen was taken later by Mr. Hanna, and is referred to as follows (1920b, p. 174):

A female Polynesian tattler (*Heteractitis brevipes*) was secured on St. Paul Island on September 17, 1919, near Kitovi Rookery. It makes the third specimen taken in North America. I had an opportunity to observe this bird for a while with two wandering tattlers in view at the time. The actions of the two species were practically the same. They feed very close to the sea on rocky shores and when disturbed fly lazily rarely more than 100 yards. The wandering tattlers on this occasion appeared perceptibly larger than the Polynesian, and the notes of the two were different. The latter uttered an irregular screech not of the same intensity or pitch, whereas the former gave its usual call, a series of 6 to 10 individual notes uttered in the same pitch and rapid succession but each of shortening duration.

The Polynesian tattler breeds in eastern Siberia, including Kamchatka, and moves southward in winter to China, Japan, the Malay Peninsula, and Australia. It has also been taken on Bering Island in the spring migration.

Philomachus pugnax (Linnaeus).¹² RUFF.

An immature female ruff taken by W. L. Hahn on St. Paul Island, September 7, 1910, formed the basis for Evermann's account, crediting the species to the Pribilofs (1913, p. 18). This specimen, which is now No. 239169 of the collection of the Biological Survey, is the first one taken on the western coast of North America. Hahn's field catalogue shows that it measured in the flesh: Length, 11 $\frac{3}{4}$ inches; extent, 23 $\frac{1}{4}$.

The ruff is of wide distribution in central Eurasia, occurring eastward rarely to Japan and China, and in winter moving southward to Africa and India.

Numenius hudsonicus Latham. HUDSONIAN CURLEW.

The Hudsonian curlew has been recorded a few times from the islands on what appears to be excellent authority, but no specimens have been taken. It was first added to the list by Palmer, who recorded one seen at close range on St. Paul Island by F. A. Lucas,

¹² *Machetes pugnax* of the A. O. U. Check List, 1910.

July 16, 1897. The St. Paul Island log, under date of May 27, 1903, refers to "curlew" as having been "here last few days" (notes taken by Hahn). Hahn himself noted the bird as follows: August 29, 1910, 1 seen; September 2, 1 seen flying over pond; September 25, 1 seen flying over lagoon.

While on St. Paul Island in 1914 the writer saw 2 curlews, which seemed to be of this species, flying over the shallow ponds near the village of St. Paul. On May 18, 1915, G. Dallas Hanna observed 6 individuals on St. Paul.

Numenius borealis (J. R. Forster). ESKIMO CURLEW.

The Eskimo curlew was first recorded by Coues (in Elliott, 1874, unpagged; 1875, p. 189). He says:

A single specimen only of the Esquimaux curlew was taken by Mr. Elliott on St. Paul's Island, June, 1872. None other than this one was seen by him.

Palmer lists the specimen as No. 62448, adult male, May 26, 1872. This specimen is still, and will probably remain, the only record for the Pribilofs.

Numenius tahitiensis (Gmelin). BRISTLE-THIGHED CURLEW.

The bristle-thighed curlew, which had previously been taken on the mainland of northern Alaska, was added to the Pribilof list by G. Dallas Hanna, a specimen having been taken by him on St. George Island, May 26, 1917, and recorded by the collector (1919a, p. 176, and 1920a, p. 252). This specimen is now No. 255154 of the bird collection of the U. S. National Museum. The species winters on Hawaii and other islands of the south Pacific.

Family CHARADRIIDAE.

Pluvialis dominica fulva (Gmelin).¹² PACIFIC GOLDEN PLOVER.

The western race of the golden plover visits the Pribilofs regularly in spring and fall, still in fair numbers, although it is probably much less common than formerly. It was first recorded from the group by Coinde (1860, p. 400), who considered it identical with European specimens. Elliott (1874, unpagged, and 1875, p. 180) observed it as a spring and fall migrant, and the single specimen preserved by him was identified by Coues as *Charadrius fulvus*.

Coinde's specimens taken by Warneck seem to have been unusually early visitors; they were taken on St. Paul April 18 and 20, 1852. Elliott's specimen was collected on St. Paul May 1, 1873. Palmer (1899, p. 408) took a single specimen, the only one he saw, on St. Paul June 12, 1890. Hahn took 1 on May 7, 1911. Hanna's earliest date for 1915 is May 9, when the natives reported seeing 12 at Half-way Point, St. Paul; he noted 8 on May 17, and 1 on May 28. These are all the spring dates available to the writer.

¹² *Charadrius dominicus fulvus* of the A. O. U. Check List, 1910.

Dates of arrival in the autumn are more common. From the St. Paul Island log Hahn extracted the following notes: October 10, 1897, several killed; October 19, 1901, many came. Hahn himself, in 1910, observed the species on St. Paul as follows: September 3, 6; September 4, 1; September 7, 3; September 11, 5; October 3, 1; October 11, 4; October 18, 2; October 19, 6; October 20, 6; October 23, 2; October 24, 2. Hanna, on St. George, noted the species in the autumn of 1913 as follows: September 4, 2 seen; September 7, 15 seen on high tundra, 1 taken; September 28, 4; October 9, 4; October 18, 8 on uplands. He also noted 4 on St. George on November 5, 1916.

My own dates for St. Paul Island in 1914 seem to be the earliest fall records available: August 7, 1 observed; August 10, small flock; August 15, 3; August 17, 4 at Northeast Point; August 24, 2. Continuing observations after my departure, Hanna noted the bird as follows: September 3, 4 seen, 1 with black belly; September 14, 6; September 20, 30; October 4, 3; October 25, 2 at Northeast Point.

Food.—Elliott and Hanna both note that Pacific golden plovers frequent the seal-killing grounds on the Pribilofs and feed extensively upon the blowfly maggots there. However, in the two stomachs available for examination (St. Paul, June 12, 1890, Palmer; and September 3, 1914, Hanna) none of these larvae were found, their food contents consisting of beetles, 72.5 per cent; flies, 22.5 per cent; Hymenoptera, 4 per cent; and seeds of crowberry (*Empetrum nigrum*), 1 per cent. The beetles were chiefly ground beetles (*Pterostichus* sp., *Amara* sp., and *Carabus truncaticollis*), but rove beetles (Staphylinidae) and leaf beetles (*Chrysomela subsulcata*) also were eaten. The flies devoured were chiefly crane-fly larvae (Tipulidae), and the Hymenoptera were partly a new species of parasitic wasp (*Amblyteles alpestriformis*) and partly unidentified. Hahn noted several chrysomelid beetles and some dry grass blades in a stomach examined by him.

Charadrius semipalmatus Bonaparte. SEMIPALMATED PLOVER.

The semipalmated plover is known only from a specimen taken from a small flock at Northeast Point, St. Paul Island, July 6, 1895, by D. W. Prentiss, jr., and first published by Palmer (1889, p. 408). Prentiss later (1902, p. 102) gives the following details regarding its capture:

Saw a number on the sands at Northeast Point, on July 6, and as I only had my beanshooter, I failed to get more than one, which was a poor specimen. This is an addition to the avifauna of the Islands.

The specimen is now No. 153543, adult female, of the bird collection of the U. S. National Museum.

Arenaria interpres interpres (Linnaeus). PACIFIC TURNSTONE.

The Pacific race of the turnstone, first recorded from the Pribilofs by Coinde (1860, p. 400), occurs only as a migrant, mainly in fall, when it stops for rest and food before starting on its long journey to its wintering grounds.

I have only two dates of occurrence which may be classed as spring migration. Hahn took a specimen May 24, 1911. It measured in the flesh: Length, $9\frac{1}{2}$ inches; extent, $19\frac{1}{4}$. The other, taken by M. C. Marsh May 30, 1912, measured: Length, $9\frac{1}{8}$ inches; extent, $18\frac{3}{16}$; the legs and feet were orange red. These specimens are in the collection of the Biological Survey.

The first fall arrivals come some time in July; the earliest date I find is July 2, 1895 (Prentiss, 1902, p. 102). Hahn, reaching St. Paul in late August, 1910, found the bird abundant. His notes for the remainder of the autumn follow: September 1 to 15, still common, flock seen leaving September 10; September 15 to 30, less common, flock seen on September 24; October 2, some on Walrus Island; October 3, 7; October 4, 9; October 5, 3; October 6, 2; October 18, 5; October 19, 1; October 20, 2 (single ones). Hanna, making observations on St. George in 1913, noted the species as follows: August 30, 4 seen; September 4, 2; September 5, 4; September 15, 15.

My notes for St. Paul in 1914, are the most complete available; they follow: July 11, first observed, abundant, and remained so until the 17th; common July 18, 19, 20, 21, 24, 25; abundant July 28 to 30; common August 3, 4, 7; abundant August 9, and from August 21 to 30. Continuing observations after my departure, Hanna noted the bird as follows: September 14, large flocks; September 16, about 500 observed; September 20, about 50; September 22, 5; October 12, 2; October 4, 6; October 17, 8; October 25, 3 at Northeast Point; October 24, 6 (all with sore feet).

Food.—As in the case of the Pacific golden plover, Elliott and Hanna both assert that turnstones feed almost exclusively on maggots in the seal-killing fields during their stay on the Pribilof Islands.¹⁴ The 12 well-filled stomachs of the bird from the islands do not bear out such far-reaching statements, but these larvae did compose most of the contents of one stomach. The food items of the 12 birds collected were found to be two-winged flies (Diptera), 50.83 per cent; caddis larvae, 16.25 per cent; beetles, 12.5 per cent; amphipods, 11.66 per cent; mollusks, 8.33 per cent; and seeds of crowberry (*Empetrum nigrum*), a few in one stomach, amounting to less than 1 per cent of the total food. Besides the blowfly larvae

¹⁴ Mr. Hanna attributes (1921, p. 57) the same habit to phalaropes, and pectoral and sharp-tailed sandpipers also.

previously mentioned, the dipterous food included larvae of crane flies (numbering 82 and 110 in two instances), remains of dung flies (Scatophagidae), and other fly larvae and pupae. The beetles consumed were chiefly ground beetles, those identified being *Pterostichus* sp., *Amara brunnipennis*, *Amara* sp., and *Carabus truncatipennis*. A rove beetle (*Tachinus* sp.) and a click beetle also were found in the stomachs. The remains of mollusks in the diet were especially interesting, consisting of more than 400 operculi of univalves, apparently of a single species, which completely filled one gizzard. These objects, each of which forms a door closely fitting the aperture of the shell when the snail withdraws into its retreat, were chitinous in the present instance, and evidently had strongly resisted digestion; it is probable they would have been ejected in mass had the bird lived. Alvin G. Whitney in a field note states that turnstones searched over the whole mud bottom of a large pond for the ruby-red midge (chironomid) larvae, which were abundant there.

Family HAEMATOPODIDAE.

Haematopus bachmani Audubon. BLACK OYSTER-CATCHER.

A specimen of the black oyster-catcher was taken on St. George Island January 12, 1917, and was preserved and recorded by G. Dallas Hanna (1919a, p. 176, and 1920a, p. 253). It constitutes the first record for the Pribilofs and is now No. 255153 of the bird collection of the Biological Survey. Hanna comments as follows:

There is good reason to suspect that this species has been shot on St. George Island before. One native told me he had given a bird like it to a Doctor Mills several years earlier but that it had spoiled before being prepared as a specimen (l. c., p. 253).

However, a specimen (No. 241645) taken by H. C. Mills on St. George Island, in the spring of 1913, is in the Biological Survey collection.

Family ACCIPITRIDAE.

Archibuteo lagopus sancti-johannis (Gmelin). AMERICAN ROUGH-LEGGED HAWK.

The American race of the rough-legged hawk was added to the Pribilof list by G. Dallas Hanna (1919a, p. 176, and 1920a, p. 253). His account (l. c., p. 253), in part, follows:

One specimen, unsexed, was secured on St. George Island in the fall of 1917 by Mr. C. E. Crompton, of the U. S. Bureau of Fisheries. He has kindly consented to the record being included in this list.

This specimen is now No. 255159 of the bird collection of the U. S. National Museum.

Thalassoaetus pelagicus (Pallas). KAMCHATKAN SEA EAGLE.

G. Dallas Hanna has put on record the capture of a Kamchatkan sea eagle on St. Paul, thereby adding it to the Pribilof and to the North American list (1919a, p. 176, and 1920a, p. 250). His account (l. c., p. 250), in part, follows:

A bird of this species was shot and wounded on St. Paul Island, December 15, 1917, but fell into the sea. Five days later it was picked up on the beach in badly decomposed condition. Enough of the specimen could be saved, however, to enable the identification to be made in the National Museum.

The incomplete skeleton is in the collection of the above institution. The species breeds in Kamchatka, and has been taken on Bering Island.

Haliaeetus leucocephalus alascanus C. H. Townsend. NORTHERN BALD EAGLE.

The status of the bald eagle in the Pribilof avifauna is somewhat doubtful, since no specimens have been taken. Palmer first recorded it, having exhibited an Unalaska specimen, which was recognized by the St. Paul natives as being occasionally seen about the islands.

According to the St. Paul Island log (notes extracted by Hahn) eagles were seen on April 29, 1907, and October 16, 1908. A large bird, evidently an eagle, was reported to Hanna as having been seen on St. George, December 21, 1913. These notes probably, though of course not certainly, refer to the common Alaska species.

Family FALCONIDAE.

Hierofalco rusticolus sacer (J. R. Forster). AMERICAN GYRFALCON.

The gyrfalcon is a more or less regular visitor to the Pribilofs. It was first credited to the group by Coues (in Elliott, 1874, unpagged, and 1875, p. 179) from a specimen in the collection from St. Paul Island, taken in March, 1873. The same specimen was referred to by Elliott in his subsequent accounts of the ornithology of the group. On September 24, 1880, a female specimen was taken while trying to alight on a Coast Survey vessel in Bering Sea, 60 miles east south-east of St. George Island. This was recorded by Bean (1882, p. 161). The two specimens above noted formed the sole basis for Palmer's account of the bird on the Pribilofs (1899, p. 418).

No other gyrfalcons seem to have been taken on the Pribilofs until the autumn of 1913, when G. Dallas Hanna took a female specimen on St. George Island, November 29. It had been noted on the cliffs along the shore for about a month. During the autumn of 1914, on St. Paul, he observed a few others, as follows: September 14, 1; September 20, 1; October 14, 1 (taken); October 25, 3; November 20, 1. Another individual was shot on St. George Island during the winter of 1915-16. During the following winter, 1916-17, St. George

Island was visited by so many gyrfalcons that the local wren (*Nannus alascensis*) and the rosy finch (*Leucosticte griseoucha*) were nearly extirpated. On November 30, 6 were seen, 3 of which were killed.

By offering a reward Hanna was able to secure a series of 13 specimens altogether. Six of these, taken during December, 1916, and January and February, 1917, are in the U. S. National Museum. These are mainly immature birds, but at least one in adult plumage is included in the series. Mr. Hanna was told that the birds were also unusually common on St. Paul Island during the same winter, but their destructive habits seem not to have resulted so disastrously to the smaller resident birds of St. Paul as was the case on St. George. Although all the available Pribilof specimens have been examined by the writer, his studies have not progressed far enough to permit a decision as to the form represented there. These birds are all, of course, migrants from some other region, but whether from North America or from Asia can not be determined without a more exhaustive study than is justified in the present connection. The subspecific designation above used is therefore employed only tentatively. It is believed, however, that only one form inhabits northwestern North America, to which the name *Falco sacer* (Forster, Phil. Trans., vol. 62, pp. 383, 423, 1772) appears to be applicable.

Food.—G. Dallas Hanna states in field notes that the stomach of the bird killed on St. George Island, November 29, 1913, contained feathers of a rosy finch (*Leucosticte griseonucha*), and that three birds shot there on November 30, 1916, had eaten snow buntings and rosy finches.

Falco peregrinus anatum Bonaparte. DUCK HAWK.

Palmer added the duck hawk to the Pribilof list (1899, p. 419). In the summer of 1890, on St. Paul, he "dug the remains of one from a sand dune; it had been killed the previous December." Hahn found a note on this species in the St. Paul Island log under date of December 14, 1904: "One shot but lost." The writer saw a duck hawk about the cliffs on Tolstoi, St. Paul, June 26, 1914; it was not identifiable subspecifically.

Falco peregrinus pealei Ridgway. PEALE FALCON.

This form of the duck hawk was added to the Pribilof list by Hanna, who took a female specimen on St. George Island, March 12, 1914, and has put the capture on record (1916, p. 401). The specimen is now No. 242571 of the Biological Survey collection. According to a manuscript report in the Biological Survey, H. P. Adams noted one on St. George Island, January 13, 1917.

Family STRIGIDAE.

Asio flammeus Pontoppidan. SHORT-EARED OWL.

The short-eared owl was added to the Pribilof list by Palmer (1899, p. 419) on the basis of one seen by him near the village of St. Paul, June 17, 1890. The natives reported seeing the species every winter.

W. L. Hahn took a specimen on St. Paul Island, November 8, 1910, which is now in the collection of the Biological Survey. It measured in the flesh: Length, 14 inches; extent, 39 $\frac{3}{4}$. A second specimen, also in the Survey collection, was taken by Hanna on St. George, February 28, 1914.

Food.—William Palmer noted that the bird under observation by him "often visited the same place during the night or early in the morning to feed upon the least auklets which were breeding in the vicinity" and, he adds:

I often found on the moss a round patch of feathers which showed the fate of a Choochkie. A few are seen every winter by the natives, but they all agree that hawks and owls are more abundant on St. George, owing to the presence of numerous lemmings, which are entirely absent from St. Paul.

W. L. Hahn reports that the stomach of the specimen collected by him contained three shrews (*Sorex pribilofensis*).

Cryptoglaux funerea magna Buturlin. BUTURLIN HAWK OWL.

A female hawk owl taken by W. L. Hahn, on St. Paul Island, January 26, 1911, was recorded by Evermann (1913, p. 18) under the name *Cryptoglaux funerea funerea* and was considered a new record for the Pribilofs and for North America. The specimen, which is in the collection of the Biological Survey, has recently been examined by Dr. H. C. Oberholser, in the light of additional material, and found to be referable to *C. f. magna*, described by Buturlin from the Kolyma River, Siberia, and has been recorded by him (1922, p. 73). *C. f. magna* thus replaces *C. f. funerea* as a Pribilof and a North American bird.

According to Hahn's field catalogue this specimen measured in the flesh: Length, 10 $\frac{1}{4}$ inches; extent, 23 $\frac{1}{2}$. Its stomach was empty save for a few hairs.

Cryptoglaux funerea richardsoni Bonaparte. RICHARDSON OWL.

Evermann added the Richardson owl to the Pribilof list on the basis of a male specimen taken by M. C. Marsh on St. Paul Island, February 2, 1912 (1913, p. 18). The field catalogues give the following notes taken from the fresh specimen: Length, 9 $\frac{3}{4}$ inches; extent, 22; iris, yellow; cere, blackish behind, pale forwards; bill, pale along culmen and gonys, the rest black; soles, light yellowish; claws, black.

Notes taken from the St. Paul Island log by Hahn record the capture of an owl, which from the detailed description could be no other than this species, on March 20, 1905; another was shot on May 22, and one was seen on May 23, of the same year.

Food.—The stomach of the specimen collected by Marsh, February 2, 1912, contained bones and fur of the house mouse.

Nyctea nyctea (Linnaeus). SNOWY OWL.

The boreal snowy owl is rather frequently observed on both St. Paul and St. George during the fall and winter months. On a few occasions it has been observed in summer, but it has never been found to breed. It was first recorded from the Pribilofs by Elliott (1881, p. 136), who states that it was occasionally taken on either island, but that he saw none.

The following are the definite records of occurrence that have come to the attention of the writer: Palmer took 1 on St. Paul on June 13, 1890, and states that 1 was shot on St. George on June 10 of the same year. He is also authority for the statement that 7 individuals were shot by one of the Treasury agents during the winter of 1884-85 (island not stated), and that F. A. Lucas saw 3 during the summer of 1896. W. L. Hahn found records in the St. Paul Island log to the effect that 2 were seen December 4, 1904, and that 1 was shot March 5, 1905. Hahn himself noted the species on St. Paul as follows: November 5, 1910, 1 taken near Cove salthouse; November 8, 1 seen near Polovina; November 9, 2 seen, 1 shot; January 18, 1911, 1 seen at Black Bluffs. M. C. Marsh took specimens on the same island on November 20 and December 10, 1911. Hanna, collecting on St. George in the fall of 1913, noted the birds as follows: September 4, 1 seen; September 28, 1 seen at Garden Cove; October 9, 1 seen; December 21, 1 seen; he saw another on St. George, July 20, 1914. On St. Paul, in 1915, Hanna took a specimen, now in the U. S. National Museum, on February 7, and later observed the species as follows: April 4, 1; April 16, 1 (pursuing crested auklets); May 18, 2 seen on Hutchinson Hill. On St. George, he saw 1 on November 5, 1916.

The field catalogues show the following measurements of specimens taken on St. Paul: Female, November 5, 1910, Hahn, length, 25 inches, extent, 63½; male, November 20, 1911, Marsh, length, 23, extent, 57; male, December 10, 1911, length, 21½; extent, 55¼.

Food.—G. Dallas Hanna states in a field note that an owl of this species has been known to snatch from the water an old-squaw duck which had been shot by a hunter. Usually, however, these owls remain on the highlands and apparently feed on the birds found there. No evidence has been seen that they feed on the St. George lem-

mings. Two stomachs of the snowy owl, both from St. Paul (June 13, 1890, Palmer; and February 7, 1915, Hanna) have been examined, one of which contained remains of the least auklet (*Aethia pusilla*) and the other a Pribilof shrew (*Sorex pribilofensis*).

W. L. Hahn examined one stomach which contained feathers of the burgomaster gull; and Marsh, two, each of which held three house mice (*Mus musculus*).

Family CUCULIDAE.

Cuculus canorus telephonus Heine. KAMCHATKAN CUCKOO.

A Kamchatkan cuckoo taken by William Palmer at Northeast Point, St. Paul Island, July 4, 1890, the capture of which is detailed by him (1899, p. 419), was the first taken in North America and remains the only record for the Pribilofs. It breeds in Kamchatka, Manchuria, Japan, and China.

Food.—Palmer states (l. c. p. 420) that the stomach of this bird, which was examined by Dr. S. D. Judd, contained more than 100 crane flies, many of them females full of eggs.

Family PICIDAE.

Colaptes auratus luteus Bangs. NORTHERN FLICKER.

A specimen of the northern flicker, obtained by James Judge on St. George Island in the autumn of 1904 (a short time previous to October 5), was sent to the United States National Museum. It was recorded by A. H. Clark (1910, p. 60) and is catalogued as No. 191769 of the bird collection.

Family MICROPODIDAE.

Micropus pacificus (Latham). JAPANESE SWIFT.

A female specimen of the Japanese swift was taken by G. Dallas Hanna on St. George Island August 1, 1920. It was flying about over the tundra and along the cliffs. The occurrence has been recorded by Mailliard and Hanna (1921, p. 93), and the specimen is deposited in the Museum of the California Academy of Sciences.

The Japanese swift breeds over a considerable part of eastern Asia, including Kamchatka, Japan, and northern China and has been reported from the Commander Islands.

Food.—The stomach of this bird contained remains of numerous dung flies (*Scatophaga crinita*) and of a few other Diptera.

Family CORVIDAE.

Corvus corax principalis Ridgway. NORTHERN RAVEN.

The raven has only recently been observed in its natural state on the Pribilofs. Elliott (1874, unpagcd, and 1875, p. 178) is authority

for the statement that the species was several times introduced by the Russians, but that none of the birds remained.

Dall, in an account of the birds of the western Aleutians (1874, p. 274), states that a few young ones were taken to St. Paul in the spring [of 1873] in the hope that they might be of use in devouring the remains of seals killed there, "which cause a very offensive odor during the hunting season."

G. Dallas Hanna has recently recorded (1920b, p. 174) the occurrence of the species on St. Paul as follows:

During January, 1919, heavy ice surrounded St. Paul Island, but the natives were able to get out from shore in their boats in the open leads for the excellent duck shooting. On one of these occasions three ravens were seen near Sea Lion Rock. One was shot and wounded but could not be secured. * * * identification could hardly be mistaken. The occurrence was confirmed by several reliable men to whom the species was well known when they were in Unalaska. So in this case it seems worth while to make the record without the specimen.

Family ICTERIDAE.

Euphagus carolinus (Müller). RUSTY BLACKBIRD.

A specimen of the rusty blackbird taken near the lake at Northeast Point, St. Paul Island, October 20, 1911, by M. C. Marsh, proved to be the first noted from the Pribilofs, and was recorded by Evermann (1913, p. 18.) According to field catalogue this bird measured in the flesh: Length, $9\frac{2}{16}$ inches; extent, $14\frac{1}{2}$.

A second specimen, taken on St. Paul in the autumn of 1915 and presented by George Haley to Hanna, was sent to the Biological Survey. It is now catalogued as No. 242573.

Family FRINGILLIDAE.

Coccothraustes coccothraustes japonicus (Temminck and Schlegel). JAPANESE HAWFINCH.

Evermann's account (1913, p. 18) of a male specimen of the Japanese hawfinch taken by M. C. Marsh near the village, St. Paul Island, November 1, 1911, added this species to the Pribilof and to the North American lists. The following notes, taken from Marsh's field catalogue, were made from the fresh specimen: Iris pale; lower mandible pale, the upper rather bronzed, its base paler; culmen black near tip; tarsus and feet uniform pale; claws darker.

The species has a range in eastern Asia including Japan, Korea, Northern China, and eastern Siberia.

Fringilla montifringilla Linnaeus. BRAMBLING.

A male brambling, the first known to have been taken in North America, was captured in the watch house at Northeast Point, St. Paul Island, on October 25, 1914. It is now in the collection of the

U. S. National Museum and has been recorded by G. Dallas Hanna, who preserved the specimen (1916, p. 400).

The brambling has a very extensive range in northern Eurasia, breeding regularly east to Kamchatka and wintering mainly in southern Asia.

Food.—The stomach of the bird collected contained bits of seeds of bunchberry (*Cornus suecica*), 90 per cent; and fragments of bugs (Hemiptera) and flies (Diptera), 10 per cent.

Pinicola leucura kamtschathensis Dybowski. KAMCHATKAN PINE GROSBEAK.

A fine adult male specimen of the Kamchatkan pine grosbeak, taken on the tundra on St. George Island in October, 1915, and preserved by A. H. Proctor, has been recorded by J. H. Riley (1917, p. 210). It forms the first record for the Pribilofs and for North America. It was sent to the U. S. National Museum, where it is now catalogued as No. 253121 of the bird collection. As indicated by its name, it is the breeding form of Kamchatka.

Loxia leucoptera leucoptera Gmelin. WHITE-WINGED CROSSBILL.

A female white-winged crossbill was taken by G. Dallas Hanna near Halfway Point, St. Paul Island, August 9, 1920, and has been recorded by Mailliard and Hanna (1921, p. 93). When shot the bird was apparently feeding on the unripe seeds of wild parsnip. It is now in the collection of the California Academy of Sciences.

Food.—The stomach of this bird was entirely filled with remains of blowflies (*Calliphora vomitoria*). This is a remarkable meal for a crossbill and no doubt reflects the predominance of blowflies among food items available to the bird at the time.

Leucosticte griseonucha (Bradt). ALEUTIAN ROSY FINCH.

The beautiful Aleutian rosy finch is a rather common breeder on the Pribilofs, nesting on the three larger islands, St. George, St. Paul, and Otter, and remaining in small numbers throughout the winter. It is the most familiar species on the islands, especially on St. George, where it is most common. It was first added to the Pribilof fauna by Dall, who took specimens on St. George in 1868 (Dall and Bannister, 1869, p. 282).

Although a few may be present in winter the bulk of the summer residents arrive in early spring. Hahn recorded them as numerous on St. Paul April 4, 1911, when they were heard singing for the first time, and as evidently pairing on April 5. Hanna, making observations on St. George in 1914, noted the birds as very common, singing and apparently mating, on March 28 and April 8, and estimated the number seen on the latter date as 500. On April 22 he considered them much more abundant than in winter, and on May 6 estimated a total of 2,000 birds seen.

On St. Paul, where the bird is less abundant, Hanna's notes for the spring of 1915 follow: March 31, 30 seen, first heard singing; April 6, 30 seen, singing general; April 18, 60 seen, paired; April 24, about 300 seen.

A nest and a set of 5 eggs were taken by Lutz on Otter Island, June 16, 1884 (1889. p. 31). Several sets of fresh eggs were collected by Hanna on St. George, June 15, 1914; on June 16 a set of 6 about one-half incubated was found. A female bird taken July 15, 1914, was nearly ready to lay what was presumably her second set of eggs. The previous year, also on St. George, Hanna saw one young bird not able to fly on September 15, and a brood just flying on September 18. H. P. Adams took eggs on St. George on June 4, 1916.

During the summer of 1914 the writer found the bird common on St. Paul Island. On June 22 a nearly completed nest was found on a narrow shelf beneath an arched rock about 15 feet from the ground. On July 4 this nest contained its complement of 5 eggs. Another nest found the same day in a small cavity on the face of a cliff contained 5 eggs which were obviously on the point of hatching. The first young out of the nest were seen on July 2. The bird continued to be abundant up to the time of my departure the last of August. The nests are quite bulky and are built of grasses and the dry stalks of various herbaceous plants, with a lining of fine grass and feathers. Hanna found a nest on St. George in 1914 which had a lining of reindeer hair. The eggs, usually 5 or 6, are white with a faint gloss.

Hahn, on St. Paul, noted the birds as common during September, October, and November, 1910; December 3, 20 seen; December 8, a flock; December 16, numerous; December 21, a few; January 2, 1911, 2 seen; February 1, 1; February 2, 1; February 27, 3; March 2, 30 or 40.

Hanna, making observations on St. George in 1913, saw upwards of 1,000 at Garden Cove, on September 28; many were seen at various times during the fall and winter. In 1914, on St. Paul, he observed approximately the following numbers: September 14, 16, 20, and October 12, about 150 birds each day; October 17, 20; October 25, 150; November 27, 200; December 4, 200. 1915, January 10, 25; February 18, 50; March 5, 30.

Ten male specimens collected and measured in the flesh by M. C. Marsh on St. Paul in the fall and winter of 1911-12, ranged in length from $7\frac{5}{8}$ inches to $8\frac{3}{8}$, and in extent of wing from $12\frac{1}{2}$ inches to $14\frac{1}{2}$. A male bird taken by Hanna on St. George, December 19, 1913, is recorded as having eyes, brown; feet, black; and bill, yellow, black at tip.

In the winter of 1916-17, owing to an unusual visitation of gyrfalcons, the rosy finches living on the Pribilofs were nearly all destroyed.

During a trip made around St. George in May, 1917, Hanna saw not over 4 pairs. Since that time, however, probably through migration, the birds have nearly or quite reached their former numbers.

Food.—William Palmer says of the Aleutian rosy finch on the Pribilofs (1899, p. 426):

I have picked from the mouth of a freshly killed bird the most minute insects, and have watched them feeding on the drying carcass of a seal hanging outside of the house of an Aleut, and they do not scorn the possibilities afforded by the decaying seal carcasses on the killing ground.

The birds visited the latter situations, no doubt, for the insects attracted there, not with any intent of eating flesh or offal. Indeed, they take a surprisingly low proportion of animal food, if we may rely on the results from the collection of 22 stomachs examined for the present report.

The food in these stomachs was found to be vegetable, 75.5 per cent; and animal, 24.5 per cent. The plant diet was chiefly seeds, but in a few cases bits of leaves and fruiting capsules were eaten. Seeds of crowberry (*Empetrum nigrum*) were found more frequently than any other (i. e., in 6 gizzards) and from 20 to 40 seeds were present in certain of these stomachs. The largest numbers of seeds eaten by any of these rosy finches were 250 and 450, in two instances, of those of brook saxifrage (*Chryso-splenium beringianum*). In one case also 160 seeds of sea parsley (*Ligusticum scoticum*) were contained in a single stomach. Other seeds eaten included those of grass, rush (*Juncus* sp.), sedge (*Carex* sp.), chickweed (*Alsine borealis*), buttercup (*Ranunculus* sp.), water chickweed (*Montia fontana*), cinquefoil (*Potentilla* sp.), and bluebell (*Campanula* sp.).

Of the animal food, approximately 21 per cent of a total of 24.5 per cent consisted of two-winged flies, 2 per cent of beetles, and 1 per cent of springtails. The flies consumed were chiefly crane flies (Tipulidae), and the beetles included ground beetles (*Pterostichus* sp. and others), leaf beetles (*Chrysomela subsulcata*), beach beetles (*Aegialites californicus*), and weevils. Caterpillars occurred in 2 stomachs and springtails (Aptera: Collembola) in 1. The latter insects were identified as *Isotoma violacea* var. *mucronata*, and the record is the first of the occurrence of this species on American territory.

Mr. Hahn noted the rosy finch feeding on seeds of poochka, or wild parsnip (*Coelopleurum gmelini*), and of rye grass, and Mr. Hanna observed that in winter they appeared to feed almost exclusively on the seeds of poochka.

Acanthis hornemannii exilipes (COUES). HOARY REDPOLL.

G. Dallas Hanna has added the hoary redpoll to the Pribilof list by recording a female specimen taken at the village, St. Paul Island,

April 21, 1915 (1916, p. 401). Later notes taken on St. Paul by the same observer include the following: April 20, 1915, 1 seen; August 22, 6 seen in company with a small flock of *A. linaria*.

Food.—The single stomach of this bird available for examination (St. Paul, April 20, 1915) contained seeds of a plant of the pink family (*Lychnis apetala*), of a chickweed (*Alsine* sp.), of a grass, and of an unidentified kind.

Acanthis linaria linaria (Linnaeus). REDPOLL.

The common redpoll was added to the Pribilof fauna by H. W. Elliott, who took specimens on St. Paul, June 21, 1872. These he preserved in alcohol, but they were in some way lost (1881, p. 136); he had previously mentioned (1874, unpagged, and 1875, p. 172) having seen a small flock of redpolls on St. Paul in late October, 1872. No others appear to have been seen until 1910, when Hahn, on St. Paul, observed redpolls, probably of this species, as follows: October 5, about 50 seen; October 19, about 15; October 20, 3 at Northeast Point. No specimens were taken on these occasions. In 1913, Hanna, collecting on St. George, observed 5 birds on September 7, and collected 3. On October 18, 9 others, 1 of which was taken, were seen. These specimens are in the collection of the Biological Survey. On St. Paul, in 1914, Hanna observed the species as follows: September 14, 2; October 14, 1; October 25, 3; 1915: February 18, 1; April 18, 1; August 22, 8 seen and 1 collected at Northeast Point. The bird is thus, in all probability, a more or less regular migrant.

Food.—G. D. Hanna reports a small flock observed feeding on wild parsnip on St. George Island, September 7, 1913. This plant is *Coelopleurum gmelini*.

Spinus pinus pinus (Wilson). PINE SISKIN.

The pine siskin was added to the list of Pribilof visitors by G. Dallas Hanna, who recorded the capture (1919a, p. 177, and 1920a, p. 254). He comments (l. c., p. 254) as follows:

A male pine siskin was secured from a flock of 12 found among the Northeast Point sand dunes, St. Paul Island, on September 24, 1917. The birds seemed to be perfectly satisfied to feed on the seeds of the few ground plants which grow there.

This specimen was deposited in the bird collection of the U. S. National Museum, and catalogued as No. 255168.

Plectrophenax nivalis nivalis (Linnaeus). SNOW BUNTING.

A male specimen of typical *nivalis* taken by M. C. Marsh on St. Paul Island, March 31, 1912, was recorded by Evermann (1913, p. 18), being thus added to the Pribilof list. A snowflake taken on

St. George Island, October 3, 1899, by Wilfred H. Osgood also proves to be of the mainland race. It is now No. 165738 of the U. S. National Museum, Biological Survey collection.

Plectrophenax nivalis townsendi Ridgway. PRIBILOF SNOW BUNTING.

Plectrophenax nivalis townsendi Ridgway, Manual North Amer. Birds, p. 403, 1887 (type from Otter Island).

The breeding snow bunting was first definitely recorded from the Pribilofs by Dall (in Dall and Bannister, 1869, p. 283), under the name *Plectrophanes nivalis*; it is altogether probable, however, that Veniaminof in 1840 (Translation by Elliott, 1874, unpagged, and 1875, p. 242) referred to the present species under the name "snowfinch." The Pribilof bird was described as a race of the circumpolar species by Ridgway from a series of specimens which included No. 106695 (U. S. Nat. Mus., Otter Island, June 8, 1885, C. H. Townsend), indicated as the type specimen. It is a year-long resident of the islands.

The species nests on St. George, St. Paul, and Otter Islands. Palmer (1899, p. 425) has described the nest and eggs. He took sets on June 4 and 24, 1890; these eggs and a set taken on Otter Island, June 15, 1884 (Lutz, 1889, p. 31), furnish the only definite nesting dates available.

During the breeding season, the snow buntings keep rather closely to the more elevated parts of the islands and are seldom seen about the village or the beaches. Hahn noted the bird on St. Paul as follows: Numerous during fall of 1910; occasional in December; not found in village during mild weather; numerous in village December 21 and 27; also observed there on January 2, 4, 23, and 28, 1911; February 4 to 10, appear in the village daily; first heard singing March 18, singing full song March 31. By April 16 the birds had lost the buffy tinge and were pure black and white.

Hanna, making observations on St. George in 1913, noted the species frequently during the autumn and winter, stating that the birds left the higher parts of the island about the end of September. They were singing and mating on May 6, 1914. H. P. Adams noted the species on St. George, January 13, 1917.

On St. Paul in the autumn of 1914 Hanna noted the bird as follows: October 4, common in village; October 17, 2; October 25, 200; November 27, 20; December 13, 50. 1915: January 10, 50; February 18, 50; March 20, 10; April 6, 4 (singing); April 18, 30; April 24, 30; May 6, 4.

My own experience with the species is limited, being confined to the observation and collection of a few specimens on both St. Paul and St. George in 1914, when the birds, sometimes accompanied by their young, were found to be fairly common on their breeding grounds.

There are numerous specimens in the collection of the Biological Survey and the U. S. National Museum. Specimens from St. Paul measured in the flesh by Hahn and Marsh varied as follows: Length, 7 to $7\frac{3}{4}$ inches; extent, $12\frac{1}{4}$ to $13\frac{3}{4}$.

Food.—The stomachs of Pribilof snow buntings collected by William Palmer have been reexamined, but the writer is unable to reconcile great discrepancies between the findings of Dr. Judd and those of the present investigation. He contents himself, therefore, with a simple statement as to what was identified in the stomachs available, a total of 21, including two for which percentages were not estimated and which, therefore, are not included in the calculations of food proportions. The articles of food composing more than 1 per cent of the total contents of the 19 well-filled stomachs were: Vegetable matter, chiefly seeds, 50.5 per cent; two-winged flies (Diptera), 32.52 per cent; beetles, 5.3 per cent, and caterpillars and moths, 1.5 per cent. The seeds eaten included those of sedge (*Carex* sp.), rush (*Juncus* sp.), water chickweed (*Montia fontana*), buttercup (*Ranunculus* sp.), cinquefoil (*Potentilla* sp.), crowberry (*Empetrum nigrum*), and lousewort (*Pedicularis* sp.). From 47 to 81 seeds of the latter were found in the stomachs of the four birds eating them.

The Diptera eaten by the snowflakes were largely crane flies (Tipulidae), but dung flies (Scatophagidae) were eaten as well as larvae of a snipe fly (*Spania edeta*). Among the beetles, the leaf beetle (*Chrysomela subsulcata*) was identified more frequently (in 5 stomachs) than any other species, among which were ground beetles (*Amara* sp. and *Pterostichus* sp.), rove beetles (*Tachinus* sp.), and beach beetles (*Aegialites californicus*). Hymenoptera (*Amblyteles* sp. and a sawfly) were found in two stomachs, and a spider in one.

Plectrophenax hyperboreus (Ridgway). MCKAY SNOW BUNTING.

G. Dallas Hanna has added the McKay snow bunting to the Pribilof list (1919a, p. 176), and later commented as follows (1920a, p. 254):

Since this species is known to wander from its only breeding place, St. Matthew Island group, to the mainland of Alaska, it has been expected and searched for on the Pribilofs for several years. But it was not definitely known to come until March 30, 1918, when a male in full winter plumage was secured on St. Paul Island. It and a female, which escaped, were found on the top of Rush Hill, the highest point of the island.

This specimen is now catalogued as No. 255167 of the collection of the U. S. National Museum.

Food.—The stomach of the specimen above mentioned contained the following food: Remains of more than 160 seeds, apparently of a sandwort (*Arenaria* sp.), 57 per cent; 14 or more rove beetles (Staphylinidae), 8 per cent; 1 larva of a leaf beetle (*Chrysomela*

subsulcata), 4 per cent; 3 sawfly cocoons, 15 per cent; 1 moth cocoon, 15 per cent; 4 fly pupae, and 1 adult long-footed fly (*Hydrophorus innotatus*), 1 per cent.

Calcarius lapponicus alascensis Ridgway. ALASKA LONGSPUR.

Calcarius lapponicus alascensis Ridgway, *The Auk*, vol. 15, p. 320, Oct. 1898 (type from St. Paul Island).

The longspur, one of the few small land birds breeding on the Pribilofs, is an abundant summer resident. It is in some respects the most pleasing of the bird population, owing to its habit of delivering its beautiful song on the wing, while it slowly flutters earthward. It usually arrives in early May, and departs by the end of October. It was first recorded by Elliott (1874, unpagged, and 1875, p. 178).

Hahn noted the bird as common and singing on St. Paul, May 13, 1911, and as singing on the wing on May 29. Hanna observed it on St. Paul in 1915 as follows: May 6, 6 seen; May 9, 15; May 16, 40; May 28, abundant. On St. George, in 1917, he notes that the birds arrived in a body, already paired, on May 8.

It nests in late June and July, and fresh eggs may be found even as late as early August. Elliott took fresh eggs on St. George on July 7 [1873] (1874, unpagged, and 1875, p. 178). Palmer, in 1890, found nests on St. Paul as follows: June 20, 5 eggs; June 21, 5 eggs; June 21, 3 eggs, 2 young; July 2, 6 young, well feathered; July 5, 5 young just from the nest. Prentiss, in 1895, found the species nesting as follows: St. Paul, July 1, 5 young partly fledged; July 2, 6 eggs, well incubated; July 3, 6 eggs, fresh; July 6, 3 eggs, fresh; St. George, July 21, 3 eggs, fresh; July 22, 1 young, very small (1902, p. 102). The nest is usually placed on a sloping place, sometimes in the shelter of a tuft of grass or a tall plant.

During my own visit to the Pribilofs in 1914 I found the bird rather common and quite generally distributed on St. Paul, St. George, and Otter Islands, throughout my stay from June 21 to the end of August. A nest containing 4 fresh eggs was found on St. George on August 4, at which time the birds were still giving their pleasant aerial song. During the same autumn, after my departure, G. Dallas Hanna observed large numbers of the birds during September. On October 4 he saw 10, and on October 12 noted that all had departed. In the autumn of 1913, on St. George, Hanna had observed the bird last on September 28, when he saw about 20. On St. George, in 1916, he noted that it was still abundant on October 26.

Hahn in 1910 saw the species frequently during September on St. Paul Island, and during early October noted it as follows: October 3, 10; October 4, 5, and 6, about 50 each day; October 8, less common: October 10, observed; October 11 (the last observation recorded) 10.

Specimens taken on St. Paul by Hahn and Marsh in 1910 and 1912 measured in the flesh as follows: Length, $5\frac{5}{16}$ to $6\frac{5}{8}$ inches; extent, $9\frac{1}{2}$ to $11\frac{1}{8}$.

Food.—The collection of stomachs of Alaska longspurs from the Pribilof Islands consists of the six collected by Palmer and examined by Judd, which are said (1899, p. 423) to have contained only insect cuticle and grinding material; and 18 others, of which one contained food so finely ground that percentages for its constituents could not be estimated. The principal items of diet of the remaining 17 were: Seeds of various plants, 26.5 per cent; two-winged flies, 38.3 per cent; beetles, 15.8 per cent; caterpillars and moths, 10 per cent; bugs, 6 per cent; spiders, 1.4 per cent; and parasitic wasps, 1.2 per cent.

The seeds eaten by these longspurs were from a variety of plants, of which sedge (*Carex* sp.), cinquefoil (*Potentilla* sp.), and violet (*Viola langsdorffi*) were most frequently taken. Others identified were grass, water chickweed (*Montia fontana*), poppy (*Papaver macounii*), brook saxifrage (*Chrysosplenium beringianum*), crowberry (*Empetrum nigrum*), and gentian (*Gentiana* sp.).

Flies contributing to the diet of the Alaska longspur were chiefly crane flies (*Tipula* sp.), but blowflies (*Cynomyia hirta* and *Calliphora vomitoria*), dung flies (*Scatophaga crinita*), and kelp flies (*Fucellia* sp.) also were consumed. The beetles were about evenly divided between ground beetles (Carabidae), weevils (*Lophalophus inquinatus*), and leaf beetles (*Chrysomela subsulcata*). None of the moths and caterpillars eaten were more closely identified, but among the Hymenoptera, small parasitic wasps were named as follows: *Amblyteles*, *Campoplex* (?), and *Tryphon* (?); and among the spiders, the single species *Tegenaria derhami*.

Passerculus sandwichensis sandwichensis Gmelin. ALEUTIAN SAVANNAH SPARROW.

Palmer added the Savannah sparrow to the Pribilof list on the basis of one seen June 3, 1890, near Lukanin Beach, St. Paul Island (1899, p. 422).

Since it seems more likely that Savannah sparrows occurring on the Pribilofs should be referable to the race breeding in that region, I include under this heading those seen by Hanna on St. George Island, August 18, 1913, when he noted 10 individuals. He mentions, also, without giving details (1920a, p. 249), having collected a specimen on St. Paul Island, probably referring to a specimen, now No. 255169, female, of the collection of the U. S. National Museum, taken by him on St. Paul, September 24, 1917.

Passerculus sandwichensis alaudinus Bonaparte. WESTERN SAVANNAH SPARROW.

A female specimen of the western Savannah sparrow taken on St. George Island, September 1, 1913, by G. Dallas Hanna has been identified as this form and has been formally recorded by the collector (1916, p. 402). It was the only one seen at the time.

Zonotrichia gambeli Nuttall. GAMBEL SPARROW.

Evermann (1913, p. 18) recorded a male Gambel sparrow taken by M. C. Marsh on St. Paul Island, May 24, 1912, the only record for the Pribilofs. It measured: Length, 7 inches; extent, $9\frac{1}{8}$.

Junco hyemalis hyemalis (Linnaeus). SLATE-COLORED JUNCO.

On the same day that he added the pine siskin to the Pribilof list, G. Dallas Hanna took specimens of the slate-colored junco, before unknown on the group. He has recorded the occurrence (1919a, p. 177) and later (1920a, p. 254) published particulars, as follows:

The female juncos were secured from a flock of 6 at Northeast Point, St. Paul Island, on September 24, 1917. They were feeding about the buildings there, apparently as contented as if they were in the midst of civilization.

These skins are now in the collection of the U. S. National Museum, being catalogued as Nos. 255170 and 255171.

Melospiza melodia sanaka McGregor. ALEUTIAN SONG SPARROW.

Among the numerous species which have been added to the Pribilof Island bird list by G. Dallas Hanna is the Aleutian song sparrow. He has recorded its occurrence as follows (1916, p. 401):

Two specimens were collected on St. George Island, a male, October 28, 1913, at the village; and a female, December 21, 1913, at Garden Cove. Both birds were feeding on the beaches.

Passerella iliaca sinuosa Grinnell. VALDEZ FOX SPARROW.

This race of fox sparrow was added to the Pribilof list by Evermann, under the name *P. i. insularis*, on the basis of a male specimen collected on St. Paul Island, near the village, September 7, 1910, by W. L. Hahn. It measured in the flesh: Length, $7\frac{3}{8}$ inches; extent, $10\frac{3}{8}$. Dr. H. C. Oberholser, from a recent critical comparison of this specimen, identifies it as *P. i. sinuosa*.

Hahn's notes regarding this and other individuals observed follow:

September 7, 1910, 1 shot among the rocks near Gorbach Rookery. High northeasterly winds had prevailed for several days. October 4, 1 seen near where the first was killed. Another seen among the rocks back of Reef Rookery later the same afternoon. October 15, 1 seen among the rocks at Kaminista.

Passerella iliaca unalascensis (Gmelin). SHUMAGIN FOX SPARROW.

This race, the Shumagin fox sparrow, was added to the Pribilof list by G. Dallas Hanna, who thus records the specimen (1920b, p. 173): "On May 20, 1919, a female fox sparrow was found at Northeast Point, St. Paul Island, feeding among the piles of drift wood. Mr. Mailliard is responsible for the identification." This specimen is deposited in the collection of the California Academy of Sciences.

Family HIRUNDINIDAE.

Petrochelidon lunifrons lunifrons (Say). CLIFF SWALLOW.

The cliff swallow was added to the list of Pribilof birds by G. Dallas Hanna, who thus records the specimen taken (1919a, p. 177, and 1920a, p. 254): "A cliff swallow was shot and skinned on St. Paul Island about June 10, 1918, by a native from whom the specimen was secured. This makes the second species of swallow to be collected on the island." (l. c., p. 254.) The specimen is now No. 255172 of the bird collection of the U. S. National Museum.

Hirundo rustica erythrogastra Boddaert. BARN SWALLOW.

The barn swallow was given a place in the Pribilof list by Palmer on the basis of a bird observed by him near the village of St. George, May 28, 1890. The same bird remained about the village for nearly two weeks. Another was seen near Black Bluffs, St. Paul Island, June 4, of the same year. The species has not been since observed.

Iridoprocne bicolor (Vieillot). TREE SWALLOW.

A male specimen taken by John Hanson, a native, at Northeast Point, St. Paul Island, May 25, 1922, and recorded by Mailliard (1923, p. 31), adds this species to the Pribilof list. The specimen is deposited in the California Academy of Sciences.

Tachycineta thalassina lepida Mearns. VIOLET-GREEN SWALLOW.

On August 22, 1914, while G. Dallas Hanna and myself were traversing St. Paul Island toward Zapadni Rookery, we saw three swallows flying about the cliffs near the head of the lagoon, and Mr. Hanna secured two of them. They were at once identified as this species, thus first detected on the Pribilofs. Mr. Hanna has since (1916, p. 401) recorded the occurrence. He also observed a single bird about some high bluffs on St. Paul, June 22, 1919.

Food.—The two stomachs of violet-green swallows available taken on St. Paul, August 22, 1914, were examined by the late Prof. F. E. L. Beal, who recorded that they were filled with finely ground Diptera.

Family COMPSOTHTLYPIDAE.

Wilsonia pusilla pileolata Pallas. PILEOLATED WARBLER.

Two mummified specimens of the pileolated warbler, a male and a female, preserved by A. G. Whitney on St. Paul Island, August 25, 1913, are the first known from the Pribilofs. These specimens, as well as an individual observed on St. George Island, August 20, 1913, by G. Dallas Hanna, were recorded by Hanna (1916, p. 402).

Family MOTACILLIDAE.

Anthus spinoletta rubescens (Tunstall). PIPIT.

The pipit seems to have been first recorded from the Pribilofs by Nelson (1887, p. 208), who states that the species was taken on St.

George Island on August 15. He evidently refers to a specimen taken by W. H. Dall on St. George, August 15, 1868. This was recorded by Palmer (1899, p. 421) as being then in the collection of the U. S. National Museum, and formed the sole basis for the inclusion of the bird in his list.

In the course of Mr. Hanna's work on the Pribilofs he has found this bird to be a rather regular migrant in fall, and has taken it once in spring.

In the fall of 1913, on St. George Island, Hanna observed about 20 pipits on September 1, taking 2 specimens, and saw 10 on September 4. In 1914, on St. Paul, he noted the birds as follows: August 31, 2 seen, 1 collected; September 20, 1 taken; October 12, 1. The specimens taken by him are in the collection of the Biological Survey.

The only spring record is of a specimen taken by Hanna on St. Paul May 25, 1919, and recorded by him.

Food.—This species is reported by Hanna to feed during its stay on the islands in fall migration almost exclusively on maggots on the killing fields. However, the contents of two stomachs, collected August 31, 1914, and September 20, 1916, contained no trace of such maggots. The food in these gizzards consisted of 10 per cent vegetable matter (seeds of a violet, *Viola langsdorfi*) and 90 per cent animal matter. The components of the animal food were beetles (ground beetles, *Pterostichus* sp.; and weevils *Lophalophus inquinatus*), 37 per cent; caterpillars, 33.5 per cent; plant bugs (*Irbisia sericans*), 8 per cent; spiders, 7.5 per cent; flies, 2.5 per cent; and Hymenoptera, 1.5 per cent.

Anthus spinoletta japonicus (Temminck and Schlegel). JAPANESE PIPIT.

G. Dallas Hanna collected a Japanese pipit on St. Paul Island on August 29, 1916, thereby adding the species to the list of Pribilof visitors. The specimen, which is now No. 255173 of the bird collection of the U. S. National Museum, was recorded by him (1919a, p. 177, and 1920a, p. 251).

Family TROGLODYTIDAE.

Nannus troglodytes alascensis (Baird). ALASKA WREN.

Troglodytes alascensis Baird, Trans. Chicago Acad. Sci., vol. 1, 315, 1869 (type from St. George Island).

This interesting resident wren, the "Limmershin" (i. e., chew of tobacco) of the natives, was first recorded from the group by W. H. Dall (in Dall and Bannister, 1869, p. 280) and was formally characterized as a new species by Baird in a later article (1869, p. 315) of the same volume. The basis of these accounts, and the type specimen, was a bird taken by Dall on St. George Island on August 17, 1868.

The species is a year-long resident and varies greatly in abundance in different years, becoming scarce because of especially severe winters or an unusual visitation of predatory birds, but soon recovering its numbers evidently owing entirely to its rapid rate of increase. Thus Elliott (1875, p. 173) found it rather rare on St. George in 1873, but quite numerous in 1874. Palmer observed a few on St. George in 1890, and secured specimens. Hanna took a series of specimens on St. George in the autumn of 1913 and the following winter, and his notes show that the birds were common, since on one occasion, near Garden Cove on September 28, he estimated that he saw 200 individuals. I saw many and took a few on St. George in mid-July and early August, 1914.

Up to 1914 no naturalist had ever seen one of the birds on any island of the group excepting St. George, and the natives declared that it was absent elsewhere. It was, therefore, a great surprise when Mr. Hanna, on October 29, 1914, took 2 specimens along the shore between East Landing and Reef Rockery, St. Paul Island. On May 16, 1915, Hanna collected another specimen near Lukanin Rookery, and the natives reported seeing 2 near Rock Point. During the same summer, according to notes kindly furnished me by Mr. Hanna, Mr. George Haley saw 11 individuals on Otter Island, this being the first record for that place. The birds since seem to have become well established there, as Hanna (1920b, p. 175) states that it bred there in 1916, 1917, and 1918. He states also (1920a, p. 250) that a wren, probably from Otter Island, was seen on St. Paul in the summer of 1918. It seems likely, therefore, unless the species meets with a reverse on Otter Island from some cause, that it will in time become regularly established as a breeder on St. Paul, and that, therefore, the likelihood of the species surviving will be strengthened.

During the winter of 1916-17 St. George was visited by an unusual number of gyrfalcons, which preyed on the wrens and rosy finches to such an extent that they were almost extirpated. G. Dallas Hanna states that in May, 1917, he found not over six pairs of wrens during a trip made entirely around the island. Since then, however, as elsewhere detailed, the species has become at least fairly common again and has even spread to the other main islands, previously unoccupied. For many years after the discovery of this species its nest and breeding habits were almost unknown. A nest and incomplete set of eggs taken by a native in June, 1876, were forwarded with other specimens to the Museum of Comparative Zoology and were described by Dr. J. A. Allen (1877, p. 82). The attempts of various naturalists, who visited the islands subsequently, to find the nest of this abundant but elusive species failed entirely until 1918, when Dr. Harold Heath, in May and June, by studying the habits of the birds was able to discover upward of 16 nests. The number of eggs was generally 7, and

this seemed to be the maximum number. In the case of a nest found by Mr. C. E. Crompton on St. George later the same summer, a second set of eggs was deposited within a week after the first brood of young left the nest. The habit of raising two broods is almost unique among the birds of this far northern station.

The nests found by Heath were all situated in the faces of cliffs at elevations ranging from 8 to 100 feet. They usually occupied a crevice between shattered rocks, or blowholes in the lava, or cavities beneath mossy banks. In several cases the sites had been occupied in previous years. The nests were usually globular with the entrance at the side and were composed of a meshwork of grass and roots, often roofed with moss. The lining was usually composed of fine rootlets and lichen, mixed with feathers and fox hair, and in some cases reindeer hair. A very full and extremely interesting account of the nesting habits and homes of this species, from which the above notes are gleaned, was published by Doctor Heath (1920, p. 49-55).

Food.—Of the 11 stomachs of Alaska wrens available 9 were examined some time ago by less discriminating methods than those at present in use, and it is only possible, therefore, to indicate the nature of the food in very general terms. The sustenance was entirely animal and included the following groups: Amphipods, 24.1 per cent; two-winged flies (partly Borboridae), 24.1 per cent; beetles (including ground and rove beetles), 14.3 per cent; bugs (Hemiptera), 13.2 per cent; caterpillars, 12.9 per cent; and Hymenoptera, 11.4 per cent.

A recently examined stomach contained the following items: Six beetles of the sexton-beetle family (*Lyrosoma opaca*), 12 per cent; rove beetles (*Olophrum fuscum* and 2 *Liparocephalus brevipennis*), 3 per cent; 3 small parasitic wasps (including *Phygadeuon* sp. and *Plesignathus* sp.), 1 per cent; remains of dung flies (*Scatophaga* sp.) and perhaps other flies, 74 per cent; one mite of an undescribed genus of the family Gamasidae, trace; and amphipod remains, 10 per cent.

Another stomach, lately examined, taken October 29, 1914, contained remains of 24 or more rove beetles (Staphylinidae), 70 per cent; 4 beach beetles (*Aegialites debilis*), 19 per cent; 1 other beetle, 1 per cent; and a few flies, 10 per cent.

Family TURDIDAE.

Hylocichla minima aliciae (Baird). GRAY-CHEEKED THRUSH.

A chance specimen of the gray-cheeked thrush has been taken by G. Dallas Hanna, who recorded the incident as follows (1920a, p. 254): "A female gray-cheeked thrush was collected on St. Paul

Island September 9, 1917. It was found feeding on spaded-up ground about the Naval Radio Station." The specimen is deposited in the collection of the U. S. National Museum and is catalogued as No. 255175.

Food.—The contents of the stomach of this bird were 3 blowflies (*Calliphora vomitoria*) and 2 dung flies (Scatophagidae), 60 per cent; 4 ground beetles (*Pterostichus* sp.), 1 rove beetle (Staphylinidae), and 1 weevil (*Lophalophus inquinatus*), 40 per cent.

Planesticus migratorius propinquus Ridgway. WESTERN ROBIN.

Elliott observed a robin on the hill back of the village of St. Paul on October 15, 1872. The same bird was seen for several days, but the statement is made that he did not shoot the bird (1874, unpagged, and 1875, pp. 170, 172). In his later account of the occurrence Elliott states (perhaps through an error) that a specimen was secured in October, 1872. The bird seen by Elliott remained the only record until 1910, when Hahn recorded 1 found at the watch house at Northeast Point on October 19. The bird had been shot by a native two weeks previously. Among the specimens which had accumulated at St. Paul Island and which were brought in to Washington in 1914 were the head and feet of a robin, unlabeled, but probably the remains of this individual.

The above notes referring to birds not identified subspecifically are placed under the present heading, since a specimen taken by G. Dallas Hanna on St. Paul Island September 15, 1919, and recorded by him (1920b, p. 175) proves to belong to this race. This specimen was deposited in the collection of the California Academy of Sciences.

Oenanthe oenanthe oenanthe (Linnaeus).¹⁵ WHEATEAR.

A specimen of the wheatear, taken by R. E. Snodgrass and A. W. Greely on St. Paul Island, August 29, 1897, was first recorded by Seale (1898, p. 139), and thus added to the list of Pribilof birds. Grinnell, reporting on the collection of which this specimen formed a part, comments on this bird as follows (1901, p. 20):

An immature bird (No. 3486, Coll. L. S. Jr. U.), taken on St. Paul Island August 29, forms the first record for the Pribilofs and fills in another gap in the known range of this remarkably widespread species.

A second specimen was taken by G. Dallas Hanna on St. Paul Island, September 1, 1917, and has been recorded by Mailliard and Hanna (1921, p. 94). This is now No. 255174, male, of the collection of the U. S. National Museum.

¹⁵ *Saxicola oenanthe oenanthe* of the A. O. U. Check list, 1910.

MAMMALS OF THE PRIBILOF ISLANDS.

By EDWARD A. PREBLE.

While the birds of the Pribilofs are of great popular interest, the mammals, though fewer in number of species, are of even greater importance. The herd of fur seals is one of the most interesting and valuable aggregations of mammals in the world, and their presence is, of course, responsible for the settlement of the islands and the consequent comparatively intensive study of its fauna and flora. The foxes afford one of the best examples known of the selective breeding of a wild animal carried on under practically natural conditions. In the present treatment the accounts of these species are by no means commensurate in volume with their importance. Since, however, they have been the subject of many special reports, it has seemed unnecessary to treat them more than briefly here.

For convenience in citing references, the titles referring to mammals are given together with those relating to birds in the Bibliography (pp. 121-128).

Family SORICIDAE.

Sorex pribilofensis Merriam. PRIBILOF SHREW.

The Pribilof shrew, which is confined to St. Paul Island, was first discovered by William Palmer, in 1890, and a series of 16 specimens was collected. Other specimens were taken by Dr. C. Hart Merriam in the summer of 1891. The species was not named, however, until Doctor Merriam wrote his *Synopsis of American Shrews* in 1895, when he formally characterized it (1895b, p. 87). A. G. Whitney collected one in full winter pelage, and a small series in the summer of 1914. The writer also took a few in the summer of 1914, and during the next year or two G. Dallas Hanna collected a large series. Altogether, about 135 specimens have been collected, nearly all of which are in the U. S. National Museum. Most of these specimens were taken in a partially marshy tract, grown up to rank grasses, bordering a shallow pond between the village and East Landing. A few have been collected at Northeast Point.

Ten specimens, measured in the flesh by the writer, average in measurements: Total length, 103.1 mm.; tail vertebrae, 35.8; hind foot, 13.2. This series showed remarkable uniformity in size, the total length ranging only from 100 to 106 mm., and the tail vertebrae only from 34 to 37.

Family URSIDAE.

Thalarectos maritimus (Phipps). POLAR BEAR.

Polar bears have been transported to the Pribilofs on drift ice and have landed on a number of occasions. True (1899, p. 354) merely mentions the fact but gives no details.

W. L. Hahn found in the St. Paul Island log, under date of September 20, 1874, an entry stating that a party visited the cave on Bogoslof and brought back a bear skull known to have been there since the time of the first occupation of the island. Other notes from the same source record a white bear seen at Halfway Point March 28 and 30, 1880, and at Northeast Point, March 13, 1884. Frederic A. Lucas (1898, p. 718) has recorded the skull of a polar bear from the Pribilofs, but whether this is the Bogoslof specimen above noted is not known. I have been unable to find any Pribilof specimen in the U. S. National Museum collection.

The following account of a bear observed on St. George Island, by G. Dallas Hanna (1914, p. 218) summarizes the evidence relating to that place:

On February 14, 1914, a polar bear was seen and shot at by an Aleut at Zapadni Rookery, St. George Island. The tracks were seen on shore in the snow by the writer and others. This animal was formerly an abundant inhabitant of the northern part of Bering Sea, but rarely came south of St. Matthew Island. If native reports are to be believed, it has been seen on St. Paul Island on at least three different occasions, but this was many years ago. From the same source of information comes the only previous record of the animal on St. George. This was about 1820, when a bear came ashore from the ice pack at the village and went westward to a small pond where it spent some time on the ice. Thereafter this has been known as Bear Lake. The numerous tracks along the beach in the snow show that the bear seen at Zapadni had been ashore also. During the winter no drift ice had been sighted from the island. But this could not have been seen unless it had come within 10 miles.

Family CANIDAE.

Alopex pribilofensis (Merriam). PRIBILOF ARCTIC FOX; BLUE FOX.

Pl. VII, fig. 3.

The foxes of the Pribilof Islands have been described as a separate race, the long period of isolation evidently having resulted in their differentiation from the mainland stock. On the Pribilofs the blue phase of coloration, which is really an abnormal type and which occurs more or less rarely throughout the range of the Arctic foxes, at least in America, has become predominant. The white fox is merely the winter condition of the normal animal, which in summer has tawny sides and brown back and shoulders. The so-called blue fox is brownish or sooty in its summer coat and lighter in winter.

The animals usually mate in March or early April, and new-born young have been found from May 17 to June 6. Among 22 litters

examined, the smallest contained 5 and the largest 11 pups. A newly born pup weighed $2\frac{1}{4}$ ounces. The adults vary greatly in weight, according to sex and condition. Males taken in midwinter may range from $5\frac{1}{2}$ to $17\frac{1}{2}$ pounds, and have reached as high as $20\frac{1}{4}$ pounds. Females are recorded weighing from 4 to 15 pounds, and in one case $21\frac{3}{4}$ pounds. (Chichester, 1908, p. 51.)

Foxes have been found on both St. Paul and St. George Islands ever since they were first discovered, and it seems that the blue phase of coloration has always been predominant there. Indeed, the early accounts of the islands aver that at the time of their discovery only the blue foxes were found, but that white ones came (presumably on the ice) a few years later. But since white foxes are still known to come from time to time in the same way, it is likely that some of this color were always found there. From the first efforts have been made to keep down the number of the less valuable white foxes. On St. Paul, where only steel traps are used, these efforts have been only partially successful, and, judging from the catches of the past few years, about 17 per cent of the foxes there are white. On St. George, however, where food is much less abundant, the foxes can be attracted to certain places and then taken in large cage traps. By this means, a good proportion of all the foxes of the island being annually handled, no white ones are allowed to live, and a supply of the best blue ones are annually liberated as breeders. The natural result of this selective method has been to improve the blue ones and to restrict the normal phase to a minimum. Thus the catch of white foxes on St. George, in spite of the fact that all white ones taken are killed, has averaged during the past few years considerably less than 1 per cent of the total.

We know little about the numbers of foxes found on the islands in earliest times. During the period from 1842 to 1860, inclusive, the Russian-American Co. made on the Pribilofs an average annual catch of 1,829 foxes, more than two-thirds of which came from St. George. Figures from 1861 to 1876 are not available. Between 1871 and 1890, 24,792 skins were taken; 20,412 came from St. George. From 1890, the foxes diminished rapidly, owing, no doubt, to the lessened number of seals killed, the bodies of which had formed their chief food. Special feeding was then resorted to, but in spite of this, and of some close seasons, only 11,250 were taken from the seasons 1890-91, to 1913-14, inclusive, a yearly average of only 469. During recent years the numbers taken are again increasing as shown by the table given below.

Most of the improvements in methods of dealing with the foxes on the Pribilofs are the results of the painstaking work of James Judge, who studied the problem carefully on St. George for many years and published two papers on the subject. (See Bibliography.) From

these papers and from his manuscript notes are taken much of the data on which the present account, as well as the one referred to later, are based.

The history of the fox industry on the Pribilofs was discussed in a fairly comprehensive manner by the writer (in Osgood et al., 1915, pp. 105-116). In a table there given the numbers taken between 1890 and 1914 are set forth in detail. In order to bring the subject up to date the following table, compiled from figures published by the Bureau of Fisheries, and so arranged as to be readily comparable with the table referred to, has been prepared.

Number of foxes taken on Pribilof Islands, 1914-1921.

Year.	St. Paul.			St. George.			Total, Pribilof Islands.		
	Blue.	White.	Total.	Blue.	White.	Total.	Blue.	White.	Total.
1914-15.....	173	39	212	63	1	64	236	40	276
1915-16.....	211	18	229	209	2	211	420	20	440
1916-17.....	150	37	187	417	2	419	567	39	606
1917-18.....	90	14	104	602	5	607	692	19	711
1918-19.....	119	25	144	548	5	553	667	30	697
1919-20.....	156	32	188	746	4	750	902	35	938
1920-21.....	123	13	136	1,002	1	1,003	1,125	14	1,139
1921-22.....	138	21	159	574	574	712	21	733

Formerly even the best fox skins from the Pribilofs were worth only a few dollars, but during the period of inflated prices following the World War, due partly to the growing scarcity of furs, large sums have been realized. Thus 665 blue foxes sold at St. Louis September 10, 1919, brought an average price of \$195.90. On February 21, 1921, 901 blue foxes brought an average of \$88.12, and 37 white foxes brought \$35 per skin. On September 28, 1921, 1,125 blue foxes were sold at an average price of \$96.83.

Vulpes alascensis Merriam. ALASKA RED FOX.

Red foxes are said to be sometimes brought to the Pribilofs on the pack ice, but I have no definite data. True (1899, p. 354) states that Mr. Palmer reported in 1890 that not more than six or seven had been taken in twenty years.

Family MUSTELIDAE.

Latax lutris Linnaeus. SEA OTTER.

At the time of the discovery of the Pribilof Islands sea otters were found in great numbers, but the cupidity of the Russian fur hunters soon caused their extirpation. According to Elliott (1874, unpagged, and 1875, p. 54) as many as 5,000 were killed on St. Paul Island during the first year of its occupation (1787); after this the decline was rapid. Veniaminof, quoted by Elliott (l. c., p. 242),

states that the animals became scarce there in 1811, and extinct within the next 30 years. Elliott himself, in 1872 and 1873, seems not to have observed any, nor to have added anything to the history of the species on the islands.

W. L. Hahn found in the St. Paul Island log entries to the following effect: A sea otter was seen by fishermen September 23, 1889, the first for several years. On June 1, 1896, one which had been crushed by the ice was found at Rocky Point. On December 1 (apparently of the same year) one was reported close inshore at Southwest Bay. True (1899, p. 353) mentions a skull found on St. Paul by C. H. Townsend in 1892, and the Rocky Point find, above noted. There are two skulls in the collection of the U. S. National Museum, received years ago from the Bureau of Fisheries, which may be these specimens. The Biological Survey collection contains two large skulls collected by A. G. Whitney on St. Paul Island, a very much weathered one picked up on lagoon beach on October 9, 1913, soon after a violent storm, and one which seems much more recent found at Rocky Point on June 21, 1914.

Hanna notes that the St. George Island log for July 24, 1892, records the finding of a dead sea otter by a native at Zapadni Rookery. The skin of this animal was sold for about \$100.

Family ODOBENIDAE.

Odobenus divergens (Illiger). PACIFIC WALRUS.

The walrus formerly resorted to the two main islands of the Pribilofs in some numbers judging from the reports of early historians and by the remains which are still found there. There is no indication, however, that the animal ever bred in the vicinity, and most of the visitors apparently were males. They must have occurred most commonly in the vicinity of Cross Hill, near Northeast Point, at that somewhat remote time when the encroaching sand was closing up the passage between the main island and that portion, topped by Hutchinson Hill, which now constitutes Northeast Point, and concerning which both tradition and topographic features indicate former separation. Considerable quantities of bones and teeth have been dug out of the sand dunes there, and remains are still sometimes found. The last stand as a regular hauling place, however, was Walrus Island, where upwards of 150 individuals were observed by Elliott in 1872. These were all males, but he was afterwards informed that on one occasion a single female was seen there. The animals continued to resort there as late as 1890, when, according to True (1899, p. 354), William Palmer observed 8, "but killed none, and they were reported all killed the following season."

The following notes, taken from the St. Paul Island log by W. L. Hahn, afford some indication of the number killed, and the diminishing frequency of their appearance in recent years:

Walrus Island: June 10, 1872, many seen; June 29, 1873, a few; August 21, 1873, 3 killed; May 22, 1874, very few; May 23, 1877, 1 taken; June 2, 1876, 3 shot; February 26, 1881, 1 seen; May 21, 1881, 60 seen near the island; June 8, 1881, 1 killed; June 14, 1881, 3 seen; June 22, 1890, 3 killed; August 24, 1890, 1 shot; June 10, 1893, 1 seen. St. Paul Island: February 26, 1875, 3 found dead at Northeast Point; May 26, 1875, 1 found dead at Gorbach Rookery; December 25, 1877, 1 killed on Reef Rookery; March 23, 1899, 1 found dead near Rocky Point; April 22, 1899, 1 found dead at Northeast Point; March 17, 1900, 1 found dead at Northeast Point; August 4, 1904, 2 found dead at Rocky Point; November 4, 1904, 1 seen in water near East Landing; June 23, 1907, 1 found dead at Northeast Point.

During my visit to the Pribilofs, in 1914, I saw a few skulls near Northeast Point, one on Otter Island, and a number among the rocks on Walrus Island. Later in the same year Hanna (1914, p. 218) published the following note:

During the month of March, 1914, walrus were sighted three different times swimming along just offshore. They were at no very remote time abundant on St. George, as the skulls may yet be seen about the beaches. Five dead ones floated in at Garden Cove about 1907.

In July, 1918, Hanna observed a young male walrus asleep on a surf-washed rock at North Rookery, St. George. The animal was not at all wary, and Hanna was able to photograph it at a distance of a few feet, and to retire without disturbing it.

Family OTARIIDAE.

Eumetopias jubata (Schreber). STELLER SEA LION.

Only a few hundred sea lions, found in two small breeding colonies, are all that now remain of the many thousands which until comparatively recent years inhabited the islands. Elliott (1875, p. 153) estimated that in 1872 there were from 20,000 to 25,000 about St. Paul Island, and 7,000 or 8,000 on St. George. They then occupied a considerable area at Northeast Point, St. Paul, and several locations on St. George.

Elliott (l. c., p. 71) states that a few formerly bred on Walrus Island, but apparently this colony no longer exists, although a few of the animals sometimes haul out on rocks there, as well as at many points on all the islands. According to True (1899, p. 351) at least one harem persisted on Walrus Island as late as 1890. He states that on St. George the principal stations were near Tolstoi Point and East Rookery. Sea lions are believed to breed still at these places, and also at Garden Cove.

Their breeding habits are similar, in general, to those of the fur seal. The harems are smaller, usually numbering only 10 or 12 cows

to a bull. The young are born about the middle of June. The animals are much more timid than the seals, and therefore their intimate habits are more difficult of observation. The bulls fight among themselves with great ferocity. With the exception of a few old bulls all the sea lions are said to leave the islands in winter. They return in March, April, and May, the old bulls first.

Like the fur seal, the difference in size of the male and female sea lion is very great. The breeding males have been estimated to weigh from 1,500 to 2,000 pounds, while a cow may weigh up to 500 or 600. I have no data on the weight of the new-born young. Young approximately 3 weeks old, observed by the writer at the breeding rookery at Northeast Point, on June 27, 1914, were estimated to weigh about 35 pounds.

The animals were formerly of great economic importance to the natives, being used as food, clothing, and in the construction of their skin boats. They were formerly killed in large numbers, not only for use on the Pribilofs but for exportation to Unalaska, Kodiak, and other points. Between 1870 and 1890 from 30 to 500 were killed annually. The animals were formerly gathered in small herds, called pods, by a party of natives stealing at night between a sleeping herd and the water, and by suddenly rising with a clamor of shouting and firing of pistols, getting as many as possible of the startled animals to start inland instead of toward the water. When once headed away from the sea they were easy of control, and when, by a number of such sorties, a sufficient number had been collected, they were started to the village. This was to save the labor of transporting the skins and meat by teams. The journey of 11 or 12 miles took from 5 days to 3 weeks according to the weather, for the huge beasts could travel but slowly, and could not be forced in warm weather without great mortality. On arrival at the village the entire herd were killed with guns and lances. Since about 1882 the lessened number of the animals has made driving impracticable, and the killing has been done at Northeast Point. The topographic conditions on St. George are such that driving has never been practicable there.

During recent years they are seldom killed except for their skins, which are still used to cover the framework of the large bidarras, used principally to land the cargoes from the supply steamers, which must anchor some distance from the wharves. For this purpose the young bulls only are killed, as the hides of the old bulls are unsuitable. The skins of 12 animals are needed for covering one boat and this cover lasts four or five years.

Callorhinus alascanus Jordan and Clark. PRIBILOF FUR SEAL.

The fur seal, which seems to have been directly responsible for the discovery of the Pribilof Islands, and which has been the dominant



FIG. 1.—BULL SEALS IN SPRING, ON THEIR ROOKERY STATIONS.

The males arrive early in spring and select a home site, where they are joined later by the females.
Photograph by A. Christoffersen, on Reef Rookery, St. Paul Island.



FIG. 2.—BULL SEALS IN AUGUST, ON THE GRASSY LEVELS.

The old males, which arrive in spring fat and full of energy, are much reduced in flesh and spirits after three months of fasting. Photograph by G. Dallas Hanna, St. Paul Island.



FIG. 3.—BLUE FOX (*ALOPEX PRIBILOFENSIS*).

The blue phase of coloration practically attains perfection as regards quality of fur and freedom from inferior strains on St. George Island. Photograph by G. Dallas Hanna, November, 1916.



factor in its subsequent history, is one of the most interesting animals known. It resorts to these islands only during the breeding season, and spends the remainder of the year at sea, not being known to land at any other place. Its migration carries it as far south as the latitude of southern California, the females going farthest and the old bulls wintering mainly south of the Aleutians or in the Gulf of Alaska.

On the approach of the breeding season the old bulls return to the islands, the earliest arriving about the first of May, and each one takes a position on the rookery ground, often in the spot occupied the previous year. (Pl. VII, fig. 1.) From the time he lands until the end of the breeding season, late in July or early in August, the bull never leaves his station and consequently takes no food. Shortly after the first of June the females begin to arrive, each one impelled by her pregnant condition to seek a place to bring forth her pup. On arrival the females land and join some male which is gathering a harem. (See frontispiece.) Before many days, sometimes almost at once, the female is delivered of her pup, and within a few days is again impregnated. She is then allowed to depart in her quest for food, which she must have in abundance in order to nourish her pup. She feeds at sea, going from 50 to 100 miles, and after gorging on fish remains in the water until digestion has taken place. She then returns to the land, picks out her own pup from among the thousands that swarm over the rookeries, and nurses it until she is impelled to repeat her trip for food.

The harems, comprising from a few to as many as 100 cows and each attended by a single bull, are crowded together until practically all the rookery ground is occupied. As the young grow larger they wander farther afield during the absence of their mothers, but the female always finds her own pup, and will nurse no other.

By early August practically all the cows have given birth, and the old bulls, exhausted by their long fast and their protracted harem service, after a few days' rest, go to sea to feed and recuperate (Pl. VII, Fig. 2). The females, however, continue to nurse their young, which learn to swim during the late summer, until November, when they, too, leave the islands.

The sexes differ greatly in size, the breeding bulls weighing from 400 to 500 pounds, while the breeding cows vary from 50 to 60 to about 100 pounds, according to age and condition. The pups when born weigh from 10 to 12 pounds. Just before leaving the islands in November the pups have been found to weigh from about 25 to 50 pounds; when they return, in the following August, or when a little over a year old, they weigh from 33 to 40 pounds, having become

longer but much less fat since being weaned and living the life of the adults.

During the early years of the occupancy of the group, the slaughter of the animals for their valuable skins was pursued in a very wasteful manner, both males and females being killed in such numbers as to exceed the hunters' resources for the proper preservation of the catch, and to glut the market. The imperfect records of these early days indicate that more than 1,800,000 seals were killed between 1786 and 1834, and the herd was seriously depleted. From 1835 to 1867 the females were spared, and the killing was otherwise restricted so that the herd gradually increased. At the time of the purchase of Alaska by the United States in 1867 various estimates placed the number of fur seals between 2,000,000 and 5,000,000 animals.

In 1870 the privilege of sealing on the islands was leased to the Alaska Commercial Co. for a term of 20 years. During this period 1,977,377 skins were taken on the islands. At the expiration of this lease the North American Commercial Co. was awarded the sealing privilege for a further period of 20 years, and 342,651 skins were taken.

About 1890 the effect of killing seals at sea, a large percentage being females, the death of which caused the loss of unborn or young pups, began to be recognized as an intolerable waste of valuable life. As a result, by agreement between the countries interested, pelagic sealing was curtailed, and finally, in 1911, by a treaty between the United States, Great Britain, Russia, and Japan, it was abolished for a period of 15 years. Under its provisions the United States and Russia, as guardians of the seal herds, agreed to pay Great Britain and Japan a percentage of the value of the seals taken on land.

In 1912, owing to the fear that the seal herd had become depleted to the danger point, all killing was forbidden by law for a period of five years, excepting such numbers as were needed by the natives for food purposes. At this time, more intensive studies of the herd were inaugurated, and as a result it became possible to estimate the numbers of the animals with more accuracy than had before been possible. One of the important features was the counting each year of the newly born pups, which afforded an index to the increase of the herd. This, and related matters, was rather fully discussed by Osgood, Parker, and Preble (1915, pp. 39, 44, etc.), the data being brought up to 1914.

Since 1914 a summer survey of the breeding herd has been made annually. The following table, giving the number of pups born since 1912, and the estimated size of the entire herd, will serve to

show the steady increase in numbers. The figures have been taken from publications issued by the Bureau of Fisheries. Those for the pups up to 1916, inclusive, are actual counts; while from 1917 on they are based on counts for some of the rookeries, the others being estimated by counting the harems and applying the figures representing the average harem.

Count of seal pups, and estimated numbers of entire herd.

Year.	Pups.	Seals of all ages.	Year.	Pups.	Seals of all ages.
1912.....	81,984	215,738	1917.....	128,024	468,692
1913.....	92,266	268,305	1918.....	143,005	496,600
1914.....	93,250	294,687	1919.....	157,572	524,235
1915.....	103,527	363,872	1920.....	167,527	552,718
1916.....	116,977	417,281	1921.....	176,665	581,457

Family PHOCIDAE.

Phoca richardii pribilofensis Allen. PRIBILOF HARBOR SEAL.

The hair seal of the Pribilofs, which has been separated as a race of *Phoca richardii*, the harbor seal of the northwest coast, is found in comparatively small numbers mainly on the larger islands. The animals have their young on the bare sea-washed rocks, breeding on St. Paul mainly or entirely on the unfrequented north shore, though they frequently haul out on the rocks at various other places. I have no definite data on the breeding of the species about St. George, but the animal is frequently seen there, and probably breeds about the less accessible parts of the shore. The young, which are said by Elliott (1884, p. 28) to weigh from 3 to 7 pounds when born, are white in color, but change in a few months to the color of the old ones, which is usually steel gray, blotched and mottled with dark brown.

Hahn collected notes from the St. Paul Island log, showing that hair seals were taken nearly every year by the natives. Under date of May 30, 1910, about 50 are stated to have been seen on Otter Island. On the only occasion when we visited that place in 1914, on June 27, we saw about a dozen at the edge of the surf near the landing place.

The flesh of this seal is very much relished by the natives, and the few that are taken are shot mainly for this reason.

True (1899, p. 351) noted a few solitary examples at various points about St. Paul in 1895 and states that three young ones were brought to the village.

Phoca fasciata Zimmermann. RIBBON SEAL.

This species was recorded by True (1899, p. 351) as follows:

A young female of this species was taken by one of the sealers 84 miles west of St. Paul in August, 1896, so that it may be regarded as a probable occasional visitant to the Pribilofs.

Erignathus barbatus nauticus (Pallas). PACIFIC BEARDED SEAL.

The bearded seal has only recently been added to the list of Pribilof mammals. G. Dallas Hanna (1921b, p. 126) records a specimen taken at St. George Island in the winter of 1917-18 by C. E. Crompton.

In a recent note Hanna gives more data regarding this species. The specimen referred to was shot at East Rookery by a native, on January 29, 1918. The animal was in advanced age, judging by the fact that it had lost all its teeth; it was fat, however, indicating that it had been able to capture sufficient food. Its sex was not recorded. Among the detailed measurements made from the fresh specimen the following may be noted: Total length (nose to tip of tail), 93 inches; tail, 7 inches; hind foot, $17\frac{1}{2}$; girth behind fore flippers, 60.

The seals referred to by a reliable St. George native, who reported to Hanna that several very large hair seals, 8 to 10 feet long, were found on the beaches in 1900, a record year for pack ice, were most probably of this species.

Family MURIDAE.

Lemmus nigripes True. PRIBILOF LEMMING.

The Pribilof lemming, which is found only on St. George Island, was first reported by Elliott (1874, unpagged; 1875, p. 72), under the name *Myodes obensis*, but Merriam in 1891 seems to have been the first naturalist to collect specimens. In 1892 or 1893 two specimens were taken by C. H. Townsend. One of these, No. 59152, U. S. National Museum, male, was made the type of the species, which was formally characterized by Frederick W. True (1894, p. 2).

In recent years Hanna has taken a series, and in the summer of 1914 the writer collected a few. Two adult males then taken measured, respectively: Total length, 152 mm.; tail vertebrae, 21; hind foot, 20; and 154, 19, 23. Two adult, though not fully grown, females measured 140, 18, 21, and 136, 18, 21. A female measuring 128, 17, 21, collected on July 23, contained three small embryos.

As in other regions, the lemmings of St. George suffer considerable fluctuations in numbers. Elliott reported them very abundant in 1873; Palmer in 1890, and True in 1895, 1896, and 1897, reported them scarce. They were rather common in 1913 and 1914. Their periodical scarcity has been attributed to the foxes, but G. Dallas Hanna states that he has found no evidence that these animals prey on the lemmings. It would be very remarkable, however, if a fox did not occasionally snap up such a tender morsel.

True (1899, p. 346), on information furnished by Palmer, stated that a few had been introduced on St. Paul from St. George, and in 1911 Hahn was assured by a native chief that this had taken place on two occasions, the last time about 15 years before, but that he did not know of any having been seen afterwards.

Fiber zibethicus zalophus Hollister. ALASKA PENINSULA MUSKRAT.

The introduction of muskrats on the Pribilofs was advocated some years ago, and has once been attempted, but was not successful. Seven individuals were captured near Nushagak in the summer of 1913 by G. Dallas Hanna for planting on St. George Island. During transit to the islands the animals preyed on each other until only the strongest was left. This was liberated in a pond near the village, but is not known to have survived the winter.

With a view to introducing these animals most of the ponds on St. Paul Island were surveyed by W. L. Hahn, but were found to be too shallow. Among the ponds not critically examined, one in particular, Antone Lake, seems to the writer to be suitable, at least as far as its physical characteristics are concerned. The introduction of the animals, however, is not advocated by the writer, since it is not believed that they would be of any importance as food for the foxes, and it is unlikely that the comparatively small number that could live in the one or two ponds of possible suitability would prove economically profitable.

Mus musculus Linnaeus. HOUSE MOUSE.

Elliott, from observations made in 1872-73, says that mice had been brought to the islands in ships' cargoes long before and were a great pest (1875, p. 73). True, from observations made in 1895, states that the animal was extremely abundant about the village of St. Paul, and had been noted by various observers on St. George (1899, p. 348). G. Dallas Hanna thinks that there are now none on St. George, but there seems to be no good reason for this condition, unless the pests are kept from increasing there by the greater number of foxes. On St. Paul, however, they were abundant in 1914, not only about the village, but were taken in my traps set for shrews at some distance from the buildings, and were found even about the salt house at Northeast Point.

Rattus norvegicus (Erxleben). NORWAY RAT.

Elliott (1875, p. 73) states that at the time of his observations the islands were free from rats. True (1899, p. 348) reports as follows:

I saw nothing of rats while on the islands in 1895, but observe that Mr. Palmer has noted [1890] that they arrive occasionally in ships, but do not breed.

While on the islands in 1914 I saw no evidence of rats.

Family SCIURIDAE.

Citellus plesius ablusus Osgood. NUSHAGAK GROUND SQUIRREL.

Ground squirrels have been liberated on the Pribilofs with a view to furnishing an additional source of food for the foxes. Preble (in Osgood et al., 1915, p. 129) has summarized the matter as follows:

The introduction of ground squirrels has been attempted on two occasions, but neither has proven a success. In 1899 some were brought from Unalaska

and liberated on St. Paul, near the village. Their disappearance has been attributed to cats, but whether they were eaten by cats or foxes is immaterial.

In the summer of 1913 the assignment of G. Dallas Hanna for work on St. George Island afforded an opportunity to make another attempt, and 22 ground squirrels, including both sexes and different ages, were captured at Nushagak. Of these, four died from natural causes before their journey was begun. Various circumstances made it impracticable to provide small cages for the animals, and they were shipped in a single large crate. Although plentifully supplied with green food, they preyed on each other, and while this tendency was overcome to some extent by supplying them with meat, the stock of 18 had been reduced to 5 before they reached their destination. These 5, an adult female and 4 young, including both sexes, were liberated near the village on St. George Island in August. At least two survived the winter, and were seen on several occasions in early May, 1914. They were not known to have been observed later; during our visit in early August none were seen, and a careful search disclosed no positive evidence of their presence. It is doubtful if any survived the summer, and in view of the fact that numbers of foxes continually ranged in the vicinity of the spot where they had been observed, the destruction of the squirrels would seem to be inevitable.

Family CERVIDAE.

Rangifer tarandus (Linnaeus). REINDEER.

Reindeer were introduced on the Pribilofs in the summer of 1911, when a herd of 40 animals was brought from Unalakleet. Twenty-one cows and four bulls were landed on St. Paul; one of the bulls was injured in landing, and died soon after. Of the 15 landed on St. George, 3 were males, 1 adult and 2 yearlings; the adult bull met with some accident a few days later and disappeared. During the following summer 18 fawns were born on St. Paul, and 11 on St. George. The herds have since continued to increase, and now number over 400 animals. Annually since 1917 a number of the surplus bulls have been killed for food, and have furnished a welcome and substantial addition to the tables of officials and natives.

Upon their introduction, the animals sought out the least frequented and most favorable parts of the islands, over which they roam at will. The lichens on which they mainly subsist in winter grow over considerable tracts, and a recent survey of the situation shows that large areas still remain practically untouched, so that even considering the comparatively slow growth of these plants, no apprehension need be felt at present that the herd is becoming too large for its natural food supply.

On each island a corral has been built into which the respective herds have been driven from time to time for examination. As the herds have increased and the commercial taking of seal skins has been resumed, less attention could be devoted to the reindeer, because of the increased demand on the time of the able-bodied natives, and in consequence the animals have become somewhat wild and unmanageable. Since, however, they are steadily increasing, cost

nothing for maintenance, and are more and more valuable as a source of food, the experiment may be considered highly successful.

The rate of growth of the two herds since their introduction, under practically natural conditions and without special care, is of interest.

Growth of reindeer herd on Pribilof Islands.

Year.	St. Paul.	St. George.	Total.
1911.....	25	15	40
1912.....	40	25	65
1913.....	¹ 55	40	95
1914.....	75	58	133
1915.....	92	62	154
1916.....	111	85	196
1917.....	144	² 93	237
1918.....	³ 158	⁴ 114	272
1919.....	⁵ 164	⁶ 123	287
1920.....	⁶ 192	⁷ 125	317
1921.....	⁸ 250	⁸ 160	410

¹ Approximate.

² Excluding 3 killed.

³ Excluding 2 killed.

⁴ Excluding 18 killed.

⁵ Excluding 14 killed.

⁶ Excluding 22 killed.

⁷ Excluding 31 killed.

⁸ Excluding 32 killed.

⁸ Excluding 19 killed.

Family BALAENIDAE.

Balaena mysticetus Linnaeus. BOWHEAD WHALE.

In a number of instances whales have drifted ashore on the Pribilofs, and in some cases they have been identified. St. Paul has apparently received the larger share, a natural result of its longer and more easily observed coast line. Hahn collected notes from the St. Paul Island log detailing some of these occurrences. On January 1, 1890, a large right whale was discovered at East Landing, St. Paul. The head was gone; the body was more than 60 feet long. Another carcass came ashore at Zoltoi, near the village, on August 31 of the same year. From the same source Hahn learned that other whales (species not stated) were stranded as follows: October 18, 1886, a whale 56 feet long, bearing a harpoon, drifted into English Bay. Others were recorded as coming ashore on September 13, 1892; March 27, 1903; and August 9, 1906.

Dr. Frederick W. True, himself a student of this group, examined the bones of a number of individuals of this species, and made measurements of the right mandible of one found on the beach north of Lukanin (1899, p. 352). He mentions also a bowhead whale which came ashore on St. George in 1889, from which the natives secured about 1,500 pounds of whalebone. The remains of others found by True near East Landing and at Zoltoi were probably those of individuals above mentioned, records of which were found by Hahn.

Scammon says (1874, p. 68): "The last seen of them in high latitudes, by whalers, is on their return from the Arctic Ocean, when they are found in the vicinity of St. Paul's Island, Behring Sea, in the month of October, and these are usually very large."

Family BALAENOPTERIDAE.

Balaenoptera velifera (Cope). LARGE FINBACK WHALE.

True summarized the result of his observations on the large finback whale as follows (1899, p. 352):

The hind part of a skull of a large finback, which may be this species, was found by Mr. Prentiss and myself on the shore of the lagoon in 1895. The greatest breadth across the temporals was 6.35 feet. The height of the occipital from the upper margin of the foramen magnum to the nasals was 3.15 feet.

I saw nothing of these whales about the Pribilof Islands in the summer of 1895, but when returning homeward observed them in large numbers on September 3 along the south coast of Kadiak. Mr. Palmer remarked in 1890: "Not common about the islands in summer, but a number were seen after leaving St. George for the south on August 11. A dead one was stripped of its 'bone' on St. Paul last winter."

Hahn found in the St. Paul Island log a record of a large finback which drifted ashore at the north end of St. Paul Island on February 13, 1884.

Balaenoptera davidsoni Scammon. DAVIDSON LESSER RORQUAL.

True (1899, p. 352) gives the following brief account of the rorqual, which comprises all the data available:

The bones of a small finback, belonging without doubt to the species, were found at Rocky Point, St. Paul. There were 27 in all—the seventh cervical, 11 dorsals, and 15 lumbar and caudals.

Megaptera versabilis Cope. PACIFIC HUMPBACED WHALE.

According to a note taken by Hahn from the St. Paul Island log, a female humpback, about two-thirds grown, came ashore at Zoltoi beach on September 27, 1876.

Family PHYSETERIDAE.

Physeter macrocephalus Linnaeus. SPERM WHALE.

The only record of the sperm whale on the Pribilofs seems to be that of G. Dallas Hanna (1914, p. 218), who thus details the occurrence:

A sperm whale or cachelot came ashore at Zapadni Rookery April 14, 1914. It was a male 47 feet long and had probably been dead a week. About 5 tons of blubber were saved for fox food when the head and carcass floated away. Although other species of whales are abundant about the island, the cachelot had never been seen before by any of the Aleuts.

In a recent note Hanna mentions a female sperm whale which came ashore in an advanced stage of decomposition near Kitovi Rookery, St. Paul Island, in the summer of 1919.

Family ZIPHIIDAE.

Berardius bairdii Stejneger. PACIFIC BEAKED WHALE.

The first notice of the occurrence of this species is apparently that of True, who recorded it as follows:

Two large beaked whales were found on the coast of St. George Island, Pribilof Group, Alaska, in June, 1903, by Mr. James Judge, the resident treasury agent. One of these, a female, was reported by Mr. Judge as being 40 feet 2 inches long. * * * The other specimen, a male, was 25 feet 5 inches long.

These were skeletonized and sent to the U. S. National Museum, and were later exhaustively discussed and figured by True, together with a third individual reported by Ezra W. Clark as occurring at the same place on August 21, 1909, but which, apparently, was not preserved (1910, pp. 2, 60 et. seq.).

Family DELPHINIDAE.

Orcinus rectipinna Cope. KILLER WHALE.

Killer whales are often seen about the Pribilofs and are known to prey on seals and sea lions, both young and adults. True (1899, p. 353) reported as follows:

The skull of a killer was brought from St. Paul Island in 1895 by Mr. Charles H. Townsend, obtained from a specimen which came ashore to the south of Hutchinsons Hill. Many nominal species of killers have been established, but it has not yet been demonstrated whether there are really several or only one.

I saw two killers on one occasion quite close inshore at St. Paul in 1895. In 1890 Mr. Palmer wrote: "A few seen about the islands in May and early in summer. They return in August. We saw quite a number on August 12 between St. George and Unalaska."

Most of the natives have seen killers chasing sea lions, and have seen both sea lions and killers strand on the rocky shore. The majority of the killers seen had a large whitish blotch on each side of the back, immediately behind the dorsal. In no case was this blotch pure white, though the center and upper part of it was always lighter than the sides. The tip of the dorsal in no case turned over.

Preble (in Osgood, et al., 1915, p. 72) has summarized the relations of this species to the fur seal, as follows:

While the young pups are still about the islands in autumn many are destroyed by killer whales (*Orca gladiator*), which are frequently observed singly or in small schools cruising about in front of the rookeries and are known to prey especially on the pups. The following actual records of killer whales observed about St. Paul Island in autumn, selected from a large number of observations taken from the island log by the late Doctor Hahn, indicate to some degree the part played by them in the destruction of young seals. A large school of killers was seen near East Landing on October 21, 1875, and 5 near the same place on September 21, 1891; 1 seen off Reef Rookery on December 2, 1902, was playing havoc with a band of seals; fragments of both

cows and pups, the work of killer whales, were found strewn along the beach at Northeast Point on November 6, 1904. In the autumn of 1907 killers were reported on numerous occasions, and native watchmen at Northeast Point and Polovina reported considerable destruction. A killer 24 feet long was stranded at Northeast Point on December 16, 1908. On November 1, 1913, G. Dallas Hanna observed three killers close to the reef near the village of St. George preying on the seal pups. Two of these came so close to the bluffs that he was able to hit them with a rifle and killed at least one.

These records indicate that killer whales are by no means uncommon about the Pribilofs. The stomachs of two killers examined by Captain Bryant contained, respectively, 18 and 24 seal pups [Rept. Fur-Seal Investigations, 1896-97, pt. 3, p. 93, 1899], and it is certain that the total number of young seals killed by them must be very great.

As possibly having some bearing on the seasonal movements of killer whales, the dates on which they have been noted in the St. Paul Island log, as extracted by Hahn, may be given: October 21, 1875; June 6, 1877; May 21, 1881; June 8, 1881 (Walrus Island); June, 1882; May 15, 1884; May 21, 1884; May 19, 1886; May 28, 1888; May 31, 1889; September 21, 1889; June 1, 1894; May 26, 1895; May 22, 23, 24, and 26, 1900; July 18, 1902 (school); December 2, 1902; May 5, 1903; November 8, 1904; October 12, November 16, 1907; December 16, 1908; December 6, 1909; June 6, 1910; June 21, 1910; May 31, 1911 (Hahn).

G. Dallas Hanna, in notes kindly forwarded recently, gives some data regarding the occurrence of killer whales about the islands within the past few years. A part of his account may be quoted:

In the fall schools of them cruise round and round the beaches in close formation and actually devour seals by the hundreds. The official journals which are kept on the islands contain many accounts by eyewitnesses of their depredations. I once saw two killers take three seals in five minutes.

The fall visit of the animals coincides with the period when the young seal pups are learning to swim, and it is upon them that the greatest damage is wrought. At times, however, they have been seen to capture older animals. In the spring of 1917 a school of them maintained a stand between St. Paul Island and Sealion Rock, and for more than a week succeeded in capturing or driving away practically every seal which approached the great breeding grounds in the vicinity.

Phocaena phocaena (Linnaeus). HARBOR PORPOISE.

True (1899, p. 353) sums up the evidence regarding the occurrence of this species in Bering Sea as follows:

A few bones of a small porpoise, apparently of this species, were picked up at St. Paul June 3, 1890, and two small schools were seen in the harbor at Unalaska May 20 and 21, the same year. A specimen of this species was obtained by Mr. Charles H. Townsend at Captains Harbor, Unalaska, August 17, 1895.

I find in the collection of the U. S. National Museum the skull and skeleton, No. 49428, taken by True and Prentiss at St. Paul, in the summer of 1895. Another skull and skeleton No. 217912, male, was taken at Northeast Point, St. Paul, by G. D. Hanna, on July 19, 1916.

On February 12, 1917, a school of porpoises was forced ashore by the heavy ice in the Village Cove at St. George Island. Thirteen were thus trapped, 12 of which were carefully measured and skeletonized. Eleven of these, 10 complete skeletons and 1 skull, are now in the collection of the U. S. National Museum.

Family ELEPHANTIDAE.

Elephas primigenius Blumenbach. MAMMOTH.

Remains of the mammoth have been found on several occasions. The earliest specimen seems to have been a tooth found on St. George in 1836. Dall (in Dall and Harris, 1892, p. 266) refers to this in part as follows: "[The discovery of] a mammoth tooth on the island of St. George of the Pribilof group, in 1836, vouched for by Veniaminoff (Unal., I, p. 106)." A native chief, Gromoff, informed Dr. W. L. Hahn that he had found two mammoth tusks on St. Paul, one on the north shore and the other at Northeast Point. The latter is probably the one referred to by Stanley-Brown (1892, p. 499), who says:

There are two fragments of paleontologic evidence connected with the islands which, as they have been used by writers, demand a cautionary word. The tusk of a mammoth was found in the sands of Northeast Point on St. Paul Island, and the tooth of one is reported as coming from the shores of St. George. As there is not a foot of earth on either island, save that which has resulted from the decomposition of the native rock and the decay of vegetation, the value of such testimony is questionable.

Whether Stanley-Brown doubts that the specimens were actually taken on the islands, or questions the deductions which had been drawn from their presence by previous writers on the geology of the North, is not clear.

George M. Dawson (1894, p. 4), in the course of a somewhat extended discussion of the subject of mammoth remains in north-western America, refers to these finds and to Stanley-Brown's comment, and professes not to understand "the precise intention of the cautionary remark just quoted." His conclusion is that the presence of these remains on the Pribilofs indicates a former connection with the mainland.

Frederic A. Lucas (1898, p. 718) has put on record two teeth of the mammoth obtained by R. E. Snodgrass from the cave on Bogoslof Hill, St. Paul Island, in 1897. Lucas (l. c., p. 718) is also of the

opinion that the presence of the remains of the mammoth on the group argues for former land connection. Maddren (1905, p. 21), in discussing this and other finds, has described at some length the circumstances attending the collection of these teeth from the testimony of Bristow Adams, who was a member of the party which made the collection.

G. Dallas Hanna, in a recent paper on the geology of the Pribilofs (1919c, p. 222), makes the following statement:

It should be stated here that the reports of the finding of bones of fossil elephants on the Pribilof Islands are probably attributable to practical jokes which have been played on credulous naturalists in the past. No such bones have thus far been found that were not planted by man, according to reports of eyewitnesses to some of the pranks.

This statement can hardly be considered as applicable to the finding of the teeth and tusks above mentioned, since their authenticity seems to be as well established as is usual in such cases. It would seem to the writer, however, that these remains were most probably accidentally transported to the islands, most likely on floating ice, and that, therefore, their occurrence there has no special geological significance.

BIBLIOGRAPHY.

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The following list of titles relate mainly to the birds and mammals of the Pribilof Islands, and, while known to be incomplete, is believed to include all the more important works. It is designed mainly to furnish complete citations of works referred to in the preparation of the present lists of birds and mammals, and especially the articles drawn upon for information. Most of the voluminous literature relating to fur seals is listed in *Fur Seals and Other Life of the Pribilof Islands*, by Osgood, Preble, and Parker, published in 1915, and no attempt has been made to include such titles in the present list.

ALLEN, JOEL ASAPH.

1877. Nest and eggs of the Alaskan wren: *Bull. Nuttall Ornith. Club*, vol. 2, no. 3, p. 82, July.

Descriptions of first nest and eggs known, taken on St. George Island, in June, 1876.

1902. The hair seals (family Phocidae) of the North Pacific Ocean and Bering Sea: *Bull. Amer. Mus. Nat. Hist.*, vol. 16, art. 34, pp. 459-499, December 12.

Original description of *Phoca richardii pribilofensis* (p. 495).

Mention of ribbon seal (*Histiophoca fasciata*) from vicinity of Pribilofs.

BAIRD, SPENCER FULLERTON.

1869. On additions to the bird-fauna of North America, made by the scientific corps of the Russo-American Telegraph Company: *Trans. Chicago Acad. Sci.*, vol. 1, pt. 2, art. 10, pp. 311-325.

Contains discussion of several species first noted from the islands by Dall and Bannister, including original description of *Troglodytes alascensis* from St. George Island.

BAIRD, S. F., T. M. BREWER, and ROBERT RIDGWAY.

1884. The water birds of North America, vol. 2.

Original description of *Rissa tridactyla pollicaris* (p. 202).

BEAN, TABLETON HOFFMAN.

1882. Notes on birds collected during the summer of 1880 in Alaska and Siberia: *Proc. U. S. Nat. Mus.*, vol. 5, pp. 144-173, July 8, 1882.

Notes on a few species from the Pribilofs or vicinity.

BENT, ARTHUR CLEVELAND.

1919. Life histories of North American diving birds, order Pygopodes: *Bull. 107, U. S. Nat. Mus.* 245 p.

Contains many references to habits of birds on the Pribilof Islands.

BENT, ARTHUR CLEVELAND—Continued.

1921. Life histories of North American gulls and terns, order Longipennes: Bull. 113, U. S. Nat. Mus. 345 p.

Contains many references to habits of birds on the Pribilof Islands.

1922. Life histories of North American petrels and pelicans and their allies: Bull. 121, U. S. Nat. Mus. 343 p.

Contains references to habits of a few species on the Pribilofs.

BISHOP, LOUIS BENNETT.

1900. Birds of the Yukon Region, with notes on other species: North Amer. Fauna No. 19, pp. 47-96.

Notes on a few species taken on St. George Island in October, 1899.

CHICHESTER, HARRY D.

1908. [Report on condition of affairs on St. George Island, August 14, 1905, to June 1, 1906]. In Reports Relating to Alaska Seal Fisheries, by W. I. Lembkey and others; Senate Doc. 376, 60th Cong., 1st sess., pp. 47-58.

Records, in discussion of food of foxes, the occurrence of vast numbers of "sea quail" (*Simorhynchus cristatellus*).

CLARK, AUSTIN HOBART.

1910. The birds collected and observed during the cruise of the United States Fisheries steamer *Albatross* in the North Pacific Ocean, and in the Bering, Okhotsk, Japan, and Eastern Seas from April to December, 1906: Proc. U. S. Nat. Mus., vol. 38, pp. 25-74, April 30.

Records specimen of *Colaptes auratus luteus* from St. George Island, the first record for the Pribilofs.

COINDE, J. P.

1860. Notice sur la faune ornithologique de l'île de Saint-Paul, suivie de l'énumération de quelques espèces d'insectes (Coléoptères) des Aléoutiennes et du Kamtschatka: Rev. et Mag. de Zool., vol. 12, 2^e sér., pp. 396-405.

Earliest account of a collection of birds from the Pribilofs, nine species taken by Doctor Warneck in 1842.

DALL, WILLIAM HEALEY.

1873. Notes on the avifauna of the Aleutian Islands from Unalaska eastward: Proc. Calif. Acad. Sci., vol. 5, 1873-74, pp. 25-35, February 8.

Includes notes on the occurrence of a few species on the Pribilofs.

1874. Notes on the avifauna of the Aleutian Islands, especially those west of Unalaska: Proc. Calif. Acad. Sci., vol. 5, 1873-74, pp. 270-281, Mar. 14.

Includes notes on the occurrence of a few species on the Pribilofs.

DALL, W. H., and H. M. BANNISTER.

1869. List of the birds of Alaska, with biographical notes: Trans. Chicago Acad. of Sci., vol. 1, pp. 267-360.

Contains first recorded instance of occurrence of several species on the Pribilofs.

DALL, W. H., and GILBERT D. HARRIS.

1892. Correlation papers: Neocene: Bull. 84, U. S. Geol. Surv. 349 p., 3 pls., 43 figs.

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DAWSON, GEORGE MERCER.

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Includes discussion of probable origin of mammoth remains found on the Pribilofs.

DWIGHT, JONATHAN, JR.

1918. A new species of loon (*Gavia viridigularis*) from northeastern Siberia: The Auk, vol. 35, no. 2, pp. 196-199, April.

The only loon of this type from the Pribilofs appears to be referable to this species.

ELLIOTT, HENRY WOOD, and ELLIOTT COUES.

1874. Report on the Pribilof Group or Seal Islands of Alaska, by Henry W. Elliott, assistant agent, Treasury Department. Pub. by Treas. Dept.; 129 p. (not numbered), 2 maps, 45 pls.; in appendix is an article entitled "Ornithology of the Pribilof Islands, by Dr. Elliott Coues, U. S. A. (based on Mr. H. W. Elliott's manuscripts and collections)."

Forty species are treated under specific headings and two or three others are referred to by Elliott in the introduction to the formal list. Original description of *Tringa ptilocnemis* given in a footnote. Bears date of 1873 on title page, and 1875 on cover, but was issued early in 1874.

1875. A report upon the condition of affairs in the Territory of Alaska, by Henry W. Elliott, special agent, Treasury Department. Pub. by Treas. Dept.; 277 p., many illus.; chap. IX, "Ornithology of the Pribilof Islands," by Dr. Elliott Coues, pp. 168-212.

A reprint, without the illustrations, of the report (unpaged) by the same authors published in 1874.

ELLIOTT, HENRY W.

1881. The seal-islands of Alaska; 176 p., with maps and text illus. Published (together with "The history and present condition of the fishery industries," by G. Brown Goode) as Bull. Tenth Census of United States, by Int. Dept.

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Contains lists of the mammals and birds of the group, pp. 124-136, in substance much like the lists in his earlier work, but rewritten, and entirely by Elliott.

EVERMANN, BARTON WARREN.

1913. Eighteen species of birds new to the Pribilof Islands, including four new to North America: The Auk, vol. 30, no. 1, pp. 15-18, January.

Based on collections made by W. L. Hahn and M. C. Marsh on St. Paul Island from 1910 to 1912.

GRINNELL, JOSEPH.

1901. Record of Alaskan birds: The Condor, vol. 3, pp. 19-23, January.

Briefly annotated list of 21 species in the collection of Leland Stanford University, taken by R. E. Snodgrass and A. W. Greely on the Pribilof Islands in the summer of 1897. *Totanus melanoleucus* and *Saxicola oenanthe* added to the Pribilof list.

HANNA, G. DALLAS. (See also Mailliard and Hanna.)

1914. Interesting mammals on the Pribilof Islands: Proc. Biol. Soc., Washington, vol. 27, p. 218.

Notes occurrence of polar bear, walrus, and cachelot on St. George in 1914.

1916. Records of birds new to the Pribilof Islands, including two new to North America: The Auk, vol. 33, no. 4, pp. 400-403, October.

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1917. The summer birds of the St. Matthew Island Bird Reservation: The Auk, vol. 34, no. 4, pp. 403-410.

Contains a few notes on Pribilof birds.

1919a. Additions to the avifauna of the Pribilof Islands, Alaska, including species new to North America: Journ. Washington Acad. Sci., vol. 9, no. 6, pp. 176-177, March 19.

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1919b. Check list of birds of the Pribilof Islands, Alaska, with the names of persons first recording the species from the Islands: In Alaska Fisheries and Fur Industries in 1918, Bur. Fisheries, Doc. No. 872, by Ward T. Bower; App. VII, Rept. U. S. Comm. Fisheries for 1918, pp. 105-107.

1919c. Geological notes on the Pribilof Islands, Alaska, with an account of the fossil diatoms: Amer. Jour. Sci., vol. 48 (4th ser.), pp. 216-224, September.

Notes the occurrence of a few remains of mammals in the Pliocene deposits.

1920a. Additions to the avifauna of the Pribilof Islands, Alaska, including four species new to North America: The Auk, vol. 37, pp. 248-254, April.

Twenty-one species added to the Pribilof list; four of these new to North America. (These were listed in Jour. Washington Acad. Sci., vol. 9, no. 6, pp. 176, 177, publ. March 19, 1919, in a brief report of the meeting of the Biological Society of Washington for January 25, when the discoveries were announced.) Notes on several other species.

1920b. New and interesting records of Pribilof Island birds: The Condor, vol. 22, no. 5, pp. 173-175, September 24.

Three species added to the Pribilof list; notes on various other species of particular interest; table showing islands on which the various breeders nest.

1921a. The Pribilof sandpiper: The Condor, vol. 23, no. 2, pp. 50-57, March 31.

Account of the breeding distribution, nesting habits, and eggs of *Arquatella ptilinocnemis*.

HANNA, G. DALLAS—Continued.

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1874. On a new species of *Tringa* from Alaska: Proc. Zool. Soc. London, for year 1874, pp. 242-244.

Description of *Tringa gracilis* (= *Arquatella ptilocnemis*) from St. Paul Island. In a postscript, the author admits that his supposed new species is identical with *T. ptilocnemis* described a few months earlier by Coues.

HEATH, HAROLD.

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JUDGE, JAMES.

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LUCAS, FREDERIC A.

1898. The occurrence of mammoth remains on the Pribilof Islands: Science (N. S.), vol. 8, no. 203, p. 718, November 18.

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LUTZ, JOHN E.

1889. Report of Lieut. J. E. Lutz: Rept. of Cruise of revenue steamer *Corwin* in Arctic Ocean, 1884, pp. 28-35, 1889.

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MADDREN, ALFRED GEDDES.

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MAILLIARD, JOSEPH.

1923. The tree swallow added to the Pribilof list: The Condor, vol. 25, no. 1, p. 31, January.

Records a specimen of *Iridoprocne bicolor* taken on St. Paul Island.

MAILLIARD, JOSEPH, and G. DALLAS HANNA.

1921. New bird records for North America, with notes on the Pribilof Island list: *The Condor*, vol. 23, no. 3, pp. 93-95, May.

Adds two species, *Micropus pacificus* and *Loxia leucoptera*, to the Pribilof list.

MERRIAM, CLINTON HART.

1895a. Mammals of the Pribilof Islands: *Science*, N. S., vol. 1, no. 25, p. 698, June 21.

Eight species enumerated in notice of paper read by Doctor Merriam at meeting of the Biological Society of Washington, May 18, 1895.

1895b. Synopsis of American shrews of the genus *Sorex*: *North Amer. Fauna* No. 10, pp. 57-124, December 31.

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NELSON, EDWARD WILLIAM.

1883. Birds of Behring Sea and the Arctic Ocean: Cruise of Revenue-Steamer *Corwin* in Alaska and the N. W. Arctic Ocean in 1881: House Exec. Doc. no. 105, 47th Cong., 2d Sess., pp. 55-118.

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1887. Report on natural history collections made in Alaska between the years 1877 and 1881: Arctic ser. publ. issued in connection with Signal Service, U. S. Army, no. 3; *Birds*, pp. 21-226.

Mention of a few species from the Pribilofs.

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1918. The subspecies of *Larus hyperboreus* Gunnerus: *The Auk*, vol. 35, no. 4, pp. 467-474, October.

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1922. Notes on North American birds, XI: *The Auk*, vol. 39, no. 1, pp. 72-78, January.

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OSGOOD, WILFRED HUDSON, EDWARD ALEXANDER PREBLE, and GEORGE HOWARD PARKER.

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Mainly on fur seals; brief treatment of other mammals and birds.

PALMER, WILLIAM.

1894a. Do wading birds swim? *The Nidologist*, vol. 1, no. 12, p. 175.

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PALMER, WILLIAM—Continued.

1899. The avifauna of the Pribilof Islands: In the Fur Seals and Fur-Seal Islands of the North Pacific Ocean, pt. 3, pp. 355-431, with 4 pls.

History and detailed discussion of ornithological work on the islands, with comparative lists of species, discussion of distribution and migration, a bibliography, and an annotated list of 69 species.

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Notes on 25 species observed on St. George and St. Paul during the summer of 1895. Specimens of *Pagophila alba*, *Aegialitis semipalmata*, and *Oceanodroma furcata* recorded from the islands for the first time.

RIDGWAY, ROBERT.

1886. *Tringa damacensis* (Horsf.) in Alaska; a sandpiper new to the North American fauna: The Auk, vol. 3, no. 2, p. 275, April.

Records specimen taken by C. H. Townsend on Otter Island, June 8, 1885.

1887. A manual of North American birds; 631 p., 124 pls.

Original description of *Plectrophenax nivalis townsendi*, from Otter Island (p. 403).

1898. New species, etc., of American birds, II: The Auk, vol. 15, no. 4, pp. 319-324, October.

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RILEY, JOSEPH HARVEY.

1917. A bird new to the North American fauna: The Auk, vol. 34, no. 2, p. 210, April.

Records specimen of *Pinicola c. kamtschathensis* taken on St. George Island, October, 1915.

SCAMMON, CHARLES MELVILLE, and W. H. DALL.

1874. The marine mammals of the northwestern coast of North America, described and illustrated: together with an account of the American whale-fishery. 4to., p. 319+V, San Francisco and New York.

An appendix, by W. H. Dall, pp. 281-319, comprises mainly a catalogue of the Cetacea of the North Pacific Ocean.

SEALE, ALVIN.

1898. Notes on Alaskan water birds: Proc. Acad. Nat. Sci. Philadelphia, 1898, pp. 126-140.

Includes brief annotations on eleven species taken on the Pribilofs by A. W. Greely and R. E. Snodgrass. *Totanus melanoleucus* and *Saxicola oenanthe* added to the Pribilof list; *Tringa couesi*, also added, evidently based on misidentification; dates of specimens unreliable.

STANLEY-BROWN, JOSEPH.

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Reference made to discovery of remains of mammoth on the islands.

STEJNEGER, LEONHARD.

1889. Notes on the downy young of the parrot auk and of the crested auk: Rept. of Cruise of Revenue-Steamer *Corwin* in Arctic Ocean, 1884, pp. 125, 126.

Describes and figures the young of these species, not before known, from specimens taken on Otter Island by J. E. Lutz in 1884.

1885. Results of ornithological explorations in the Commander Islands and in Kamtschatka: Bull. 29, U. S. Nat. Mus., 382 p., 8 pls.
A few notes on Pribilof birds.

TOWNSEND, CHARLES HASKINS.

1887. Notes on the natural history and ethnology of northern Alaska: Rept. of Revenue Marine Steamer *Corwin* in Arctic Ocean in 1885.

Includes "Notes on Mammals, Birds, and Fishes obtained at various places between the Aleutian Islands and Kotzebue Sound" (pp. 96-102). A number of species recorded from the Pribilofs.

TRUE, FREDERICK WILLIAM.

1899. Mammals of the Pribilof Islands: In Fur Seals and Fur-Seal Islands of North Pacific Ocean, by David Starr Jordan and others; pt. 3, pp. 345-354.

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1904. Note on three very large beaked whales from the North Pacific: Science (N. S.), vol. 20, no. 521, pp. 888-889, December 23.

Records two large specimens, the skeletons of which were later received by the U. S. National Museum, found by James Judge, on the shore of St. George Island in June, 1903.

1910. An account of the beaked whales of the Family Ziphiidae in the collection of the United States National Museum, with remarks on some specimens in other American Museums: Bull. 73, U. S. Natl. Mus., 89 p., 42 pls.

Includes account of two skeletons of *Berardius bairdii* from St. George Island.

TURNER, LUCIEN M.

1886. Contributions to the natural history of Alaska, extending from May, 1874, to August, 1881: Arctic ser. publ., issued in connection with Signal Service, U. S. A.; no. 2, pt. 5; Birds, pp. 115-196.

A few species mentioned as found on the Pribilofs.

VENIAMINOF, BISHOP INNOCENT.

1840. [Extract from] *Zabieska ob Octrovah Oonahlalshkenskaho Otdayla*. St. Petersburg, 1840. Translation of "selections most pertinent to subject" (Pribilof Islands) published by Elliott in his report on the condition of affairs in the Territory of Alaska, 1875, pp. 241-244.

A paragraph mentioning somewhat over a dozen species of birds which visit the Pribilof Islands seems to be the earliest note on the ornithology of the group.

A BIOLOGICAL SURVEY OF THE PRIBILOF ISLANDS, ALASKA.

Part II. INSECTS, ARACHNIDS, AND CHILOPODS OF THE PRIBILOF ISLANDS, ALASKA.

INTRODUCTION.

By W. L. MCATEE, *In Charge Food Habits Research,
Bureau of Biological Survey.*

The bulk of the material upon which the present report is based was collected by Alvin G. and Elsie G. Whitney from October, 1912, to July, 1914, and by G. Dallas Hanna in 1914, 1915, 1916, and 1917. The collectors were employed on the Pribilof Islands during these years by the U. S. Bureau of Fisheries and thanks are due the Chief of that Bureau for turning over their collections of invertebrates to the Biological Survey. It has been of great assistance to have this material for working up simultaneously with the examination of the bird stomachs, reported on in earlier pages, which also for the most part were donated by the Bureau of Fisheries. Material of both classes from this source was supplemented by collections made by Edward A. Preble, of the Biological Survey, in 1914. The Whitneys and Hanna used a system of lot numbers for their collections of invertebrates, and these numbers have in all cases been placed on the specimen labels. Data for lot numbers applying to more than single specimens are reproduced on pages 132 to 138, as they may be useful in future when these collections are distributed. All type specimens mentioned in the following reports as well as the bulk of the remaining material will be deposited in the U. S. National Museum.

Previous general treatises upon the insects and arachnids of the Pribilof Islands are three in number. The first of these is the List of Insects Hitherto Known from the Pribilof Islands, which appeared in the report on The Fur Seals and Fur-seal Islands of the North Pacific Ocean, Part III, pages 547-554, 1899; prepared by E. A. Schwarz, with the assistance in a few groups of M. L. Linell, W. H. Ashmead, D. W. Coquillett, and Herbert Osborn. The second report was contained in several of the Papers from the Harriman Alaska Expedition, mostly published in the Proceedings

of the Washington Academy of Sciences from 1900 to 1902, and reprinted with some additions as volumes 8 and 9, Reports of the Harriman Alaska Expedition, 1904. These articles appeared under the authorship of the following 12 entomologists: W. H. Ashmead, Nathan Banks, A. N. Caudell, O. F. Cook, D. W. Coquillett, R. P. Currie, H. G. Dyar, J. W. Folsom, Otto Heidemann, Trevor Kincaid, Theo. Pergande, and E. A. Schwarz. More recently a report on specimens of insects collected in the summer of 1920 has appeared in Proceedings of the California Academy of Sciences, Fourth Series, volume 11, No. 14, pages 153-195, November 2, 1921. The collaborators in this case were E. C. Van Dyke, M. C. Van Duzee, F. R. Cole, J. R. Malloch, C. P. Alexander, H. Frison, A. D. MacGillivray, and E. P. Van Duzee.

Like its predecessors, the present report was brought to completion only through the efforts of a number of specialists, and the Biological Survey desires to put on record its hearty appreciation of their valued cooperation. The authors of parts of the following report are C. P. Alexander, Nathan Banks, R. V. Chamberlin, G. F. Ferris, W. T. M. Forbes, Morgan Hebard, W. L. McAtee, J. R. Malloch, Edith M. Patch, H. L. Viereck, W. R. Walton, and H. F. Wickham. The bureau is also indebted to Dr. J. W. Folsom for assistance in identifying specimens of Collembola.

The progress of knowledge of the insect, arachnid, and myriapod fauna of the Pribilof Group is shown in the subjoined table. Only fully identified forms have been included in the tabulation, generic determinations being ignored.

Species of insects, arachnids, and chilopods reported from the Pribilof Islands.

Group.	Fur-seal Islands Report, 1899.		Harriman Reports, 1900-1904.		California Academy Report, 1921.		Present report.	
	Number of species.	Described as new.	Number of species.	Described as new.	Number of species.	Described as new.	Number of species.	Described as new.
Apterygota.....			3	1			4	
Orthoptera.....					1		2	
Mallophaga.....							5	
Anoplura.....	1	1					3	
Homoptera.....			2	1			3	1
Heteroptera.....	1		1		1		3	
Trichoptera.....			2	2			5	
Lepidoptera.....			2		6		8	
Coleoptera.....	20		4		26	1	49	
Mecoptera.....							1	1
Diptera.....	7				33	8	75	21
Hymenoptera.....	1		66	53	7	6	81	2
Arachnida.....	1	1					33	2
Chilopoda.....			3	1			4	
Total.....	31	2	83	58	77	15	276	27

While a comparatively large number of species of insects are known from the Pribilof Group, discussion of the relations of this fauna to that of other areas can be only tentative for the following

reasons: (1) More than a third of the species recorded in the foregoing table have been described as new from the islands; (2) very few of these have been collected subsequently elsewhere; and (3) the distribution of most of the remaining species is very imperfectly known.

These limitations understood, the following may be said of species known both from the Pribilof Islands and other areas: All of the previously known spring-tails (3 species of Collembola) seem to be Holarctic in distribution. The two species of roaches (Orthoptera) are only waifs on the Pribilofs brought there on ships from the south. Of the 5 kinds of bird lice (Mallophaga), 3 have been recorded from Europe and probably are Holarctic, while 2 are known from other localities in the Pacific Ocean. The distribution of these ectoparasites as well as of the sucking lice (one species on man and two on the fur seal) depends entirely on that of their hosts; by living next the skin of warm-blooded animals they enjoy a habitat almost uniform as to temperature and other essentials and are thus practically exempt, so far as direct influence is concerned, from factors bearing on the distribution of animals in general.

One of the Homoptera recorded from the Pribilofs was described from Bering Island, while of the Heteroptera, one plant bug is Holarctic, another is known from northwestern North America and the northern Pacific Islands, and the bed bug exists practically everywhere that there are permanent habitations of man. Of the caddis flies (Trichoptera), one is known from the mainland of Alaska and another is Holarctic. Of the several species of moths (Lepidoptera), 2 occur in northwestern North America, 2 in Alaska, 4 in Arctic America, and 2 are Holarctic.

The distribution of the beetles is better known than that of most of the orders; 9 species recorded from the Pribilofs occur also in northwestern North America, 14 in Alaska, 7 in northern North America, and 6 in Alaska and Siberia; while 11 are Holarctic and 2 are cosmopolitan, being carried about in commerce. Of the flies (Diptera), 3 species are known from northwestern North America, 13 from Alaska, 12 from northern North America, and 9 are Holarctic.

Hymenoptera exceed in number of species any other order of insect on the Pribilofs, but their distribution is very imperfectly known. Five of those collected elsewhere have been taken in northern North America, 5 in Alaska, and 9 on other islands of the northern Pacific, while 1 is known to be Holarctic.

Summarizing the distributional data for all of the orders, it appears that the largest number of species the Pribilof Islands are known to have in common with another region is 35, with Alaska; 30 are Holarctic; 28 occur more or less throughout northern North

America; 15 in northwestern North America (usually including Alaska); 14 on other islands of the northern Pacific; 6 in Alaska and Siberia; and 6 are "tramp" species, parasitic on man, or distributed in commerce. As information on the distribution of insects increases it is probable that a large proportion of the Pribilof fauna will prove to be Holarctic.

Lot numbers and field notes of G. Dallas Hanna, from St. George Island, 1914.

1. Diptera, 96 specimens collected about fox houses and on beach among boulders. The most abundant species, the very woolly one, has become abundant the past few days in the outhouses, and the fox and meat houses, and among the boulders on the beach. The smooth-bodied species so common in the lot sent to Washington in May is becoming scarce. June 4.
2. Diptera, 30 specimens, 4 species. In the grass and on very wet soggy ground near village landing. June 4.
3. Coleoptera, 20 specimens. Found living in grass, under stones, and in sun near village landing. June 4.
4. Coleoptera, 11 specimens, 1 species. Found in copulation on sunny side of boulders about surf line, village landing. June 4.
5. Coleoptera, 17 specimens, 4 species. In grass and about stones, village landing. June 4.
6. Spiders, 4 specimens. Under stones, village landing. June 4.
7. Diptera, 14 specimens. Found on several species of flowers and in grass. When approached it darts into the grass but never tries to fly away. Up-lands. June 8.
8. Diptera, 17 specimens. The two largest from flowers. Near village. June 8.
9. Diptera, 64 specimens. The most abundant species is one which is very common along the beaches, living upon the decaying marine algae. Near North Rookery. June 10.
10. Coleoptera, 5 specimens. Crawling over grass and rocks of highlands. 2 copulating, 1 eating piece of dead bird. Near North Rookery. June 10.
11. Diptera (minute), 12 specimens from near beach at East Landing. June 10.
12. Coleoptera, 23 specimens. 2 water beetles seen eating a dead earthworm. Small very black beetles found only on boulders of beach near East Landing. June 10.
14. Coleoptera, 5 specimens. Found crawling over grass of bench lands. Not yet seen on top of high hills. June 12.
15. Coleoptera, 6 specimens. Crawling over grass of bench lands. Young found on wild parsnip. June 12.
16. Diptera, 4 specimens. Found crawling over grass of dry bench lands. Not seen near bogs or on top of high hills. June 12.
17. Diptera, 12 specimens, long legged. In wet places, mostly, but some seen crawling over grass far from water. None seen flying. Those with wings best developed from Spring Creek, Garden Cove. June 14. One seen with the very fuzzy fly in No. 18 beneath it; apparently they were fighting.
18. Diptera, 9 specimens, 5 species. Vicinity of Garden Cove. June 14.
19. Diptera, 10 specimens. Vicinity of Garden Cove. June 14.
21. Neuroptera, 3 specimens from Garden Cove. June 14.
23. Diptera, 5 species, 15 specimens from Garden Cove. June 14.

24. Coleoptera, 3 species, 8 specimens from Garden Cove. June 14.
25. Coleoptera, 5 specimens from Garden Cove. June 16. Mrs. E. G. Whitney, collector.
26. Diptera, 9 specimens from Garden Cove. June 16. Mrs. E. G. Whitney, collector.
27. Diptera, 5 specimens, from Garden Cove, June 16. Mrs. E. G. Whitney, collector.
28. Coleoptera, 10 specimens, toward East Rookery from Village; 2 females seen depositing eggs in wet packed earth which was clear of vegetation. Each had made a trench about 2 inches long, very shallow, and was depositing the eggs in a hole in the trench. The holes were $\frac{1}{2}$ to $\frac{1}{4}$ inch deep. June 16.
29. Coleoptera, 9 specimens. Toward East Rookery from Village. June 16.
30. Diptera, 7 specimens, long-legged. Toward East Rookery from Village. None seen with wings developed. June 16.
32. Diptera, several species, 78 specimens (small). Sweepings toward East Rookery. June 16.
33. Aphididae, 9 specimens. About East Landing. June 16.
34. Diptera, 50 specimens. Toward East Rookery from Village. June 16.
35. Diptera, 43 specimens. Toward East Rookery from Village. June 16.
36. Diptera, 24 specimens. Several species. Toward East Rookery from Village. June 16.
37. Diptera, 207 specimens (small), 1 Hymenoptera. Staraya Artel Rookery, June 17.
38. Diptera, 7 specimens. Neuroptera, 1. Uplands toward Staraya Artel Rookery. June 17.
39. Lepidoptera, 4 specimens (only 5 seen). Uplands toward Staraya Artel Rookery. June 17.
40. Diptera, 4 specimens (all seen) in bog plants, border Gull Lake beside Staraya Artel Rookery; caught on wing. June 17.
41. Diptera, 3 specimens. Uplands toward Staraya Artel Rookery. June 17.
42. Diptera, 36 specimens, spiders 1. Uplands toward Staraya Artel. June 17.
43. Aphididae, 4 specimens. Uplands toward Staraya Artel. June 17.
44. Diptera, 6 specimens. Around a sphagnum bog $\frac{1}{4}$ mile west of Village. June 17.
45. Caterpillars, 3 specimens with eggs and cocoons made. Preserved in alcohol. June 18.
46. Insects, 30 specimens, from toward East Rookery. June 24.
47. Insects and spiders, 30 specimens from toward North Rookery. June 25.
48. Lepidoptera, 17 specimens from top of ridge, Zapadni Trail. June 27.
49. Insects, 75 specimens approximately. Toward Zapadni. June 27.
50. Diptera, 13 specimens; Coleoptera, 1. Both common. Flies feeding about meat and fox dung. Toward Zapadni. July 4.
51. Lepidoptera, 5 specimens. Cream-colored species is very rare. Toward Zapadni. July 4.
52. Diptera, 29 specimens. From toward Zapadni Rookery. July 4.
53. 10 Coleoptera from trail toward Zapadni. July 4.
54. 4 wood ticks, 2 species. From Tolstoi Point. Found under boulders just above surf line on beach. July 9.
55. 50 insects, many species. Small black beetle is very common in some places, always found at surf line among boulders.

Lot numbers and field notes of Alvin G. Whitney and Elsie G. Whitney, from St. Paul Island, unless otherwise stated, 1912 to 1914.

1. 3 caterpillars in grass. Telegraph Hill. October 11, 1912.
4. Galls from *Salix*. Adult insects had emerged during September. (Slide No. 5 may be larvae from willow galls, No. 14 of collection). Flat north of Telegraph Hill. Autumn, 1912.
5. 9 larvae, 1 spring-tail, found in bottom of bag in which willows and mosses had been collected, March 23. St. Paul Island. Southwest Bay to Southwest Point. March 23, 1913.
11. Mites. April, 1913.
14. 4 larvae. Probably from galls on *Salix*. May, 1913.
21. 2 coleopterous larvae. At roots of native plant. May 14, 1913.
22. 5 chrysalids of black and red caterpillars. Caterpillars were collected on Lukanin Hill about May 1. After two days in the laboratory, they began to spin cocoons in this bottle, and finished within a day, when they were placed in alcohol. May 14, 1913.
23. 3 gnats. Company house. May 16, 1913.
24. 2 parasitized dipterous flies. 1 parasitic mite from one of the flies. Company House bathroom. May 16, 1913.
26. 13 dipterous flies. Company House. May 16, 1913.
27. 3 dipterous flies. Company House bathroom. May 16, 1913.
28. 2 dipterous flies. Laboratory. May 16, 1913.
33. Pupae in grass stems growing in shelter of rock crevices. 1 hymenopterous fly, which emerged from one of these pupae in warmth of laboratory. Tolstoi Hill. Spring (probably about May 20), 1913.
36. 10 bumblebees. June 5, 1913.
37. 2 (parasitized?) gnats; nearly dead when found. Laboratory. June 5, 1913.
39. 6 gnats. From a great many on window, probably hatched from native *Sagina* transplanted to Laboratory a few days before. Laboratory. June 5, 1913.
40. 2 crane flies. In grass, 1 at Kitovi and the other on Reef Peninsula. June 9 and 10, 1913.
41. 1 fly and pupal skin. Pupa collected June 10, hatched June 20. June 20, 1913.
42. 6 flies. The first of this species seen this season. Sand dunes, Reef Peninsula. June 11, 1913.
43. 8 centipedes. From crevices and holes in vesicular lava, under a thin layer of soil. Coll. by E. G. W. Centipedes were found also near bowlder beach just northeast of Little Polovina Rookery, July, 1914. (Prof. G. H. Parker collected specimens on Akutan Island, in the Aleutians, June, 1914.) Gorbatch Cliffs. June 11, 1913.
44. 3 flies. Abdomens covered with white woolly hairs. Sand dunes, Reef Peninsula. June 11, 1913.
45. 2 beetles. Sand dunes, Reef Peninsula. June 15, 1913.
47. 4 Carabidae. In grass and moss. Southwest Bay. June 17, 1913.
49. 2 ground beetles. A very common form. Tolstoi Hill. June 18, 1913.
50. About 20 hymenopterous flies and their pupa-cases. Egg cluster collected by E. G. W., May 29, flies hatched out some time before June 20, in the pill box in which collected. May 29, 1913.

51. 12 larvae. Orange-colored in life. Abundant on willow catkins in the "pussy" stage, slightly before blossoming. The larvae were secreted among the buds in the compact heads. These willows covered with galls just beginning to develop. Flat north of Telegraph Hill. June 22, 1913.
52. 4 mites. From plants. June, 1913.
56. 2 weevils. June 20, 1913.
57. 2 flies. Male and female mating. From house. June 24, 1913.
60. 2 flies; 1 crane fly; 1 beetle; 1 spider. Otter Island (6 miles from St. Paul). July 3, 1913.
63. 2 flies. Company House. July 6, 1913.
64. 2 flies. Same 2 species as No. 63. Company House. July 6, 1913.
66. 2 flies. Duplicate of species Nos. 64 and 65. Several eggs. The eggs were ejected by larger fly in its struggles to escape from vial. Company House. July 6, 1913.
68. 4 aphids. On *Pedicularis*. July 9, 1913.
69. 8 aphids. On lettuce. Originally on *Pedicularis* blooms brought to laboratory June 22, and escaped to lettuce bed where they multiplied rapidly. Laboratory hotbed. July 10, 1913.
74. 4 blue flies. Collected by E. G. W. Zoltoi Beach. July 17, 1913.
75. 2 mites. On *Montia fontana*. July 17, 1913.
77. 12 larvae. Abundant everywhere around the roots of grasses and of herbs, and especially under beds of moss on the roots of which it feeds, killing the moss over considerable areas. Under such a moss bed I found as many as 20 to the square foot. This larva is found over all the island in grassy or mossy places and all through the summer season. It must also be of considerable ecological importance, because of its food value to the birds and foxes. The foxes will dig over large areas of moss beds to feed on these larvae. Was unable to find the species in adult form. Could not seem to raise adults in laboratory by keeping larvae with one of the food plants. It may possibly be the larval form of the crane fly, which is very abundant. Color not altered by pickling in alcohol. St. Paul Island. Reef "Parade Ground." July 18, 1913.
78. 16 larvae. Same as No. 77. July 20, 1913.
80. 2 flies. Male and female mating. Reef Peninsula. July 18, 1913.
87. 7 mites. This form very abundant, found everywhere in moss and on flowering plants. July, 1913.
90. 3 cast larval skins of crane flies. Hutchinson Hill. July 22, 1913.
91. 20 gnats. Big Lake. Swarms of these insects were being driven by the breeze southeastward off of the lake. These clouds of gnats noticeable throughout July and August. July 22, 1913.
92. 10 gnats. Same as No. 91. Big Lake. Collected from our coats as they swarmed past us while driving along the lake. July 22, 1913.
93. 3 small gnats. Big Lake. Collected at same time with larger ones from lake shore. July 22, 1913.
94. 3 Diptera, 1 bug, 2 Neuroptera, 1 moth, 1 beetle. Northeast Point Peninsula. July 22, 1913.
95. 11 Hymenoptera. Collected by a native boy who said he found a nest of them. July 23, 1913.
96. 4 caterpillars. Collected by a native September 8; then left in a dry box until October 6, in the hope that they would pupate. None did so; several dried up. The specimens preserved were the ones left living October 6. October 6, 1913.

98. About 10 larvae from mud of dried-up pond, where *Leucosticte* had been scratching for them. This pond, about one-fourth mile long and eighteen inches deep, was dry from August 5 to mid-September. During this time its whole mud bottom was scratched entirely over by turnstones to get at these larvae, which were abundant. Color of larvae *ruby-red*. Mud bottom of Village Pond. August 10, 1913.
102. 4 water beetles. Creek outlet of Antone Lake. Fall, 1913.
104. 33 mites from *Stellaria*. September 13, 1913.
105. 6 Mallophaga. On choochkie (*Aethia pusillus*). November 4, 1913.
106. 11 Mallophaga. On *Aethia pusillus*. Same as No. 105. November 4, 1913.
107. 14 Mallophaga. On *Aethia pusillus*. Same as Nos. 105 and 106. November 4, 1913.
108. Lice on *Mus musculus*. November 16, 1913.
109. Lice on *Mus musculus*. Duplicate of No. 108. November 16, 1913.
110. Lice on *Mus musculus*. Duplicate of No. 108. November 16, 1913.
111. 6 caterpillars. On a sandy road. Halfway Point. August 1, 1913.
112. 5 caterpillars. Collected September 8 by a native, same as No. 96, left in box to pupate, but dried up without transforming. October 6, 1913.
113. 8 bumblebees. Collected by a native who killed them in grease. North-east Point. May 31, 1913.
116. 3 caterpillars. About 300 feet up on bare south cinder slope, where the snow was melted off and the surface of the cinders warmed by the sun. All insects in the wet, half-frozen tundra below were still dormant. Polovina Hill. March 29, 1914.
117. 2 larvae and 3 pupal shells. Found close together in moss on the flat near Polovina Lake. A fox was digging up insects near by. March 29, 1914.
118. 3 larvae; 3 rove beetles. From moss on flat near Polovina Lake. March 29, 1914.
119. 3 small beetles and several mites. April 5, 1914.
120. 2 aphids and one empty aphid skin, and 1 hymenopterous fly. The live aphids were bluish with whitish "bloom"; collected in moss on scoria bank back of "Company House." April 7, 1914. The fly emerged apparently from one of these aphids about April 18, 1914.
121. 1 beetle. Village Hill. April 15, 1914.
126. 2 lice from Aleut child's hair. April 22, 1914.
127. 4 Mallophaga, from European widgeon shot May 9 at Icehouse Lake. May 11, 1913.
128. 2 beetles. Male and female mating. From surface of tide pool under Gorbach Cliffs. May 13, 1914.
129. 2 insects. Found jumping like springtails on the bare sand dunes, Diamond Hill dunes. May 16, 1914.
131. 4 beetles. May 22, 1914. 5 beetles from Zoltoi Beach sand dunes. May 19, 1914.
132. 6 flies; 8 mites. From privy. The mites were parasitic on the flies, sometimes two or three mites on a single host. May 19, 1914.
133. 3 coleopterous larvae. Lukanin Hill. May 19, 1914.
3 coleopterous larvae. Zoltoi Beach sand dunes. May 22, 1914. These beetle larvae, resembling those of "potato beetles," are exceedingly common all summer, and feed on a large variety of plants, including *Pedicularis*. Probably are the larval stage of the species in No. 145 and the largest species in No. 189.
135. 9 rove beetles. Zoltoi Beach sand dunes. May 22, 1914.

138. 10 weevils. May 19, 1914.
139. 6 mites. Parasitic on flies. Same as in No. 132. May 19, 1914.
141. 7 mites. Parasitic on flies. Same as Nos. 132 and 139. May 23, 1914.
143. 6 Diptera. May 23, 1914.
146. 6 beetles, May 19, 1914. 7 beetles from Zoltoi sand dunes May 22, 1914.
7 beetles from meadow by villages. July 24, 1914.
147. 2 beetles, May 21, 1914. 1 beetle, Zoltoi sand dunes, May 22, 1914.
148. 22 rove beetles. Zoltoi sand dunes. May 22, 1914.
149. 8 click beetles. This species is found abundantly under spreading *Mertensia maritima* plants. Zoltoi sand dunes. May 22, 1914.
150. 39 beetles, Lukanin Hill, May 19, 1914. 3 beetles, Zoltoi sand dunes, May 22, 1914, 1 beetle, July 24, 1914.
152. 13 Diptera. From outside of laboratory window. May 23, 1914.
153. 4 flies. From privy. May 23, 1914.
154. 4 Diptera. May 23, 1914.
155. 2 Diptera. Gray in color, with 2 diagonal bands on under side of abdomen. Laboratory. May 23, 1914.
156. 10 Diptera and their parasitic mites. From outhouse. May 23, 1914.
157. 2 ———, male and female (?). Perhaps same species as No. 129.
Bronze-lustered, wingless insects, found among the moss. Grassy bank beyond village wells. May 23, 1914.
159. 6 beetles. These beetles were taken when a very heavy wind had been blowing all day, and they had been swept into the hollows among the dunes. Their wings protruded from under the half-expanded elytra, indicating that they had been in flight. I have never seen any other beetles on the Pribilofs that could fly. This was the only time I saw this species, which was fairly abundant in the one locality this one day. I saw perhaps twenty or more in the sand hollows. They were velvety brown in color, with blotches of darker brown, and when touched drew their legs into grooves on the body, so they were then as smooth as a bean. (Same as No. 166.) Zoltoi sand dunes. May 23, 1914.
160. 2 carabid (?) larvae. In moss. Grassy bankside near village wells. May 23, 1914.
167. 5 beetles. May, 1914.
168. 12 gnats, flying in a swarm by laboratory. Spring, 1914.
169. 1 bed bug, from native boy's clothes. 2 ———(?). Dark bluish in life, except the young ones, which are white. Probably same species as Nos. 13 and 200. These insects are common in damp herbage, especially in moss beds, and are sometimes seen in myriads in crevices of low ledges along the shores and crowded together on the surface of tide pools. April, 1914.
170. About 25 crane flies. 1 harvestman. Crane flies were crawling everywhere at this time, and many were mating. Tolstoi sand dunes. About June 1, 1914.
173. 2 beetles. Male and female, mating. (Probably same species as Nos. 180 and 181.) Ledges, Kitovi Rookery. June 16, 1914.
174. 3 mites, 1 moth, 1 hymenopteron, 1 crane fly. Spring, 1914.
176. 1 fly and several pupa cases. The pupa cases were found June 14 in the interstices of the nasal bones of a fur seal skull on the killing field. From these one fly hatched out in the vial June 20. Near village. June 20, 1914.

180. 12 beetles. From crevices and face of cliffs on southwest side of Sealion Rock, an islet less than $\frac{1}{4}$ mile long and about $\frac{1}{4}$ mile from St. Paul Island. The center of the island is about 60 ft. high and supports a little grass (*Glyceria*) and a few herbs. The island is similar in character to Walrus Island (12 miles distant), where a rare species of Coleoptera exists. Possibly this is the same species. June 29, 1914.
181. 44 beetles; 2 beetles; larvae. From face of cliffs and crevices of rocks on southwest side of island. Same as No. 180, and probably same species as No. 173. Sealion Rock. June 29, 1914.
182. 10 Diptera. From grassy summit, 60 ft. high. Sealion Rock. June 29, 1914.
183. 5 moths. June, 1914.
184. 3 moths. June, 1914.
185. 2 mites. From *Lunda cirrhata*. Color, pale blue. June 30, 1914.
187. 56 beetles (several species). Collected from mud shore of village pond. Many were mating. June 30, 1914.
188. 60 carabid beetles. Grass-covered upland. East Landing to village wells. These carabids are abundant and especially active and noticeable during June and July. June, 1914.
189. 181 beetles of several species. Near village. June, 1914.
190. 2 coleopterous larvae. June, 1914.
191. 5 mites. On *Rissa t. pollicaris*. July 4, 1914.
192. 4 Mallophaga. On *Rissa t. pollicaris*. These were from the same bird as the mites in No. 191, namely, E. A. Preble's catalog No. 2239. July 4, 1914.
193. Lice on *Sorex pribilofensis*. July 5, 1914.
194. Lice on *Sorex pribilofensis*. (Same as 193.) July 5, 1914.
195. 55 Diptera. This species was very abundant and active on *Chrysanthemum arcticum* flowers (in full bloom on this date) in salt marsh on north side of Salt Lagoon. Do not think I've seen it elsewhere on the Pribilofs. "Salt Lagoon" marsh. July 24, 1914.
196. 4 rove beetles. July 24, 1914.
197. 4 white larvae. 1 immature click beetle. (From underside of moss bed.) Reef "Parade Ground." July 28, 1914.
200. 2 ————. (Probably same species as Nos. 13 and 169.) Found in moss. Spring, 1914.
201. 2 click beetles, 1 small beetle. Summer, 1914.
204. 3 larvae, 1 beetle. Summer, 1914.
210. 7 Diptera. Summer, 1914.
212. 3 beetles. Summer, 1914.

APTERYGOTA.¹

By W. L. McATEE, *Bureau of Biological Survey.*

Family PODURIDAE.

Neanura gigantea Tullberg.

Anura gigantea, Tullberg, Tycho. Collembola borealia-Nordiska Collembola. Öfversigt af. Kongl. Vetenskaps Akademiens Forhandlingar, No. 5, p. 41, Pl. XI, fig. 59. 1876. [Siberia.]

Two lots collected on St. Paul Island in spring of 1914 by A. G. Whitney, who says: "Dark bluish in life, except the young which are white. These insects are common in damp herbage, especially in moss beds, and are sometimes seen in myriads in crevices of low ledges along the shore and crowded together on the surface of the tide pools."

Aphorura dentata Folsom.

Aphorura dentata Folsom, J. W., Proc. Washington Acad. Sci., vol. 4, pp. 91-92, Pl. VII, figs. 29-36, 1902.

Originally described from material including one specimen collected on St. Paul Island, August 1, 1897.

Isotoma viridis Bourlet.

Isotoma viridis Bourlet. Memoire sur les Podures. Memoires de la Societe Royale des Sciences, de l'Agriculture et des Arts, p. 401, Lille, 1839. [France.]

Two lots collected on St. George Island, June 8, 10, 1914, by G. D. Hanna, and two from St. Paul Island, by A. G. Whitney, one collected May 19, 1914. The remark, "common in tundra moss" accompanies last lot.

Isotoma violacea Tullberg var. *mucronata* Axelson.

Isotoma violacea Tullberg, Tycho. op. cit., p. 36. [Siberia.]

Isotoma violacea Tullberg var. *mucronata* Axelson, W. M. Vorläufige Mittheilung über einige neue Collembolen-Formen aus Finnland. Meddelanden af Societas pro Fauna et Flora Fennica, 36, p. 118, 1899-1900 (1900). [Finland.]

Several specimens of this variety representing a species previously known, according to Dr. J. W. Folsom, only from Norway, Sweden, Finland, and Greenland, were found in the stomach of a *Leucosticte griseonucha*, collected on St. George Island, August 2, 1920.

¹ The insects of this order were identified by Dr. J. W. Folsom. He has recorded from the Pribilofs three of the species here mentioned, in his admirable report on the Apterygota in Papers from the Harriman Alaska Expedition, XXVII, Proc. Washington Acad. Sci., vol. 4, pp. 87-116, pls. 4-7, March 27, 1902.

ORTHOPTERA.

By MORGAN HEBARD, *Academy of Natural Sciences of Philadelphia.*

Family BLATTIDAE.

Subfamily PANCHLOBINAE.

Panchlora cubensis Saussure.

P[anchlora] cubensis Saussure, Rev. et Mag. de Zool., (2), vol. 14, p. 230, 1862 [♀, Cuba].

A single green cockroach (♀) collected on St. Paul Island, in 1916, by G. Dallas Hanna apparently represents this common and widely distributed tropical American species, which is frequently introduced into the temperate regions of North America in bananas. As the northernmost point at which a species of the genus is known to be native is Brownsville, Tex., there is no doubt that the present is an adventive specimen, having been transported to the Pribilofs on board ship.

It agrees fully with West Indian material before me, except in having the interval between the eyes exceptionally wide (.5 millimeter) for females of the species, nearly three-quarters the occipital ocular width. The interocular width is subject to variation in the species, but in the great majority of females approximates one-third the occipital ocular width. For a detailed discussion of *cubensis* see Mem. Amer. Ent. Soc., No. 2, p. 198 (1917).

Blatella germanica Linnaeus is recorded as having been introduced into the Pribilof Islands at least twice and a preserved specimen has been reported from St. George. (Van Duzee, E. P., Proc. Calif. Acad. Sci., Fourth Ser., 11, p. 193, Nov. 1921.)—W. L. M.

MALLOPHAGA.

By G. F. FERRIS, *Assistant Entomologist, Stanford University.*

All of the material here reported on was collected by A. G. Whitney on St. Paul Island. While the collection is small it contains two very interesting records, two of the species not having been recorded previously from North America, their host records also being new.

Docophorus lari Denny.

Four specimens of this widely spread gull-infesting species from the Pacific kittiwake, *Rissa tridactyla pollicaris*. It has previously been recorded from the same host.

Docophorus merguli Denny.

Several specimens from the least auklet, *Aethia pusilla*. This species has previously been recorded but twice, both times from the little auk or rotchie, *Alle (Mergulus) alle*, of Europe. The specimens at hand agree very well with specimens from the latter, sent us by Mr. Waterston.

Nirmus maritimus Kellogg and Chapman.

Several specimens from *Aethia pusilla*. This record also is new. Another species of *Nirmus* (*N. citrinus* Nitzsch) has been recorded from the same host and this record may, perhaps, refer to the same species as the two are not very different.

Menopon lutescens Nitzsch.

Several specimens from *Aethia pusilla*. This is also a new record, both as to host and locality, the species previously having been recorded from *Alca torda* and *Alle (Mergulus) alle* of Europe. The determination of any species of *Menopon* is always attended with uncertainty, but this species has been figured by Waterston (Proc. Royal Phys. Soc. Edinburgh, vol. 18, No. 4, pp. 266-267, f. 3, 1912), and as it is apparently rather characteristic of the auklet group the determination is reasonably safe.

Trinoton luridum Nitzsch.

Four specimens of this common duck-infesting species from the European widgeon, *Mareca penelope*. It has previously been recorded from the same host.

ANOPLURA.

By W. L. McATEE, *Bureau of Biological Survey.*

Family PEDICULIDAE.

Pediculus capitis De Geer.

Pediculus (humanus capitis), De Geer, Charles, *Memoires pour servir à L'Histoire des Insectes*, Tome Septieme, p. 67, 1778.

Five specimens are in the collection, all collected from the heads of Aleuts on St. Paul Island in April and in "summer."

Family ECHINOPHTHIRIIDAE.

Antarctophthirus callorhini Osborn.

Haematopinus callorhini, Osborn, Herbert, *The Fur Seals and Fur Seal Islands of the North Pacific Ocean*. Part 3, p. 553, 1899.

This species was originally described from specimens collected on fur seals from the Pribilof Islands.

Echinophthirius fluctus Ferris.

Echinophthirius fluctus, Ferris, G. F., *Anoplura from Sea-Lions of the Pacific Ocean*. *Ent. News*, vol. 27, no. 8, pp. 366-370, Oct. 1916.

Mr. Ferris kindly gives me permission to publish the fact that this species, originally described from the Steller sea lion, has also been taken on the fur seal, and must therefore occur on the Pribilofs.

HOMOPTERA.

By EDITH M. PATCH, *State Entomologist, Maine Agricultural Experiment Station.*

Family APHIDIDAE.

(Plate VIII.)

Macrosiphum constrictum, new species.

Alate viviparous female.—Beak short, reaching second coxa. Antenna 3.09 mm. in total length with joints measuring: I, .13 mm.; II, .07 mm.; III, .78 mm.; IV, .49 mm.; V, .53 mm.; VI, base including sensoria .22 mm., spur .87 mm. III with nine sensoria in a row. Cornicle .65 mm. long, slightly but distinctly swollen at middle of distal half and constricted a little near the tip, where it is marked by faint reticulations for about .04 mm. There is nothing particularly distinctive about the venation of the wing, which is 3.55 mm. in length.

Apterous viviparous female.—Beak short, reaching second coxa. Antennae from two individuals were measured, one of which was 2.72 mm. long with joints as follows: I, .14 mm.; II, .08 mm.; III, .7 mm.; IV, .51 mm.; V, .5 mm.; VI, base including sensoria .22 mm., spur .57 mm. This antenna had nine sensoria on III. The other antenna measured 2.93 mm. with the joints as follows: I, .14 mm.; II, .10 mm.; III, .72 mm.; IV, .42 mm.; V, .49 mm.; VI, base including sensoria .25 mm., spur .81 mm. III in this case with six sensoria. Cornicle .63 mm. long, with shape and reticulations like that of the alate female except that the bulge of the distal half is slightly more pronounced.

Apterous oviparous female.—Beak short, reaching second coxa. Antenna 2.28 mm. in total length, with the joints measuring: I, .14 mm.; II, .09 mm.; III, .6 mm.; IV, .38 mm.; V, .39 mm.; VI, base including sensoria .2 mm., spur .48 mm. Sensoria of III variable in number. One individual had two on one side and three on the other. Cornicle .57 mm. long with shape and reticulation similar to those of the viviparous females. The tarsus to base of claw is .15 mm. long. The hind tibia is not perceptibly swollen.

As aphids vary somewhat in size in different collections and as the number of antennal sensoria is subject to fluctuation, the foregoing items should be taken as approximate rather than absolute.

Described from one alate viviparous, two apterous viviparous, and two apterous oviparous females.

Cotypes.—Locality St. Paul Island. Collection (Lot No. 69) taken by A. G. Whitney, June 22, 1913, from *Pedicularis*, and escaped from the laboratory to lettuce bed, where they multiplied rapidly. Specimens removed from lettuce July 10 comprised one apterous and one alate female and some nymphs. Collection (Lot No. 68) taken by A. G. Whitney from *Pedicularis* comprised two apterous oviparous females and one apterous viviparous.

Metatype, collected by A. G. Whitney, St. Paul Island, on *Saxifraga*, spring 1914, comprised one nymph (Lot No. 164).

Ideotypes collected by G. D. Hanna, St. George Island, June 16 (Lot No. 33) and June 17 (Lot No. 43), 1914. Nymphs only. Food plant not recorded.

This species shows certain resemblances to *Macrosiphum antirrhinum* (Macchiati) as described and figured by Theobald,¹ but the short beak of *M. constrictum* and the antennal sensoria of the apterous viviparous female and several minor differences serve to distinguish it. The most striking characters of *M. constrictum* are the slight dilation of the cornicle, with its very restricted area of faint distal reticulation; the short beak; the long slender basal portion of antennal joint VI and the short-pointed antennal setae.

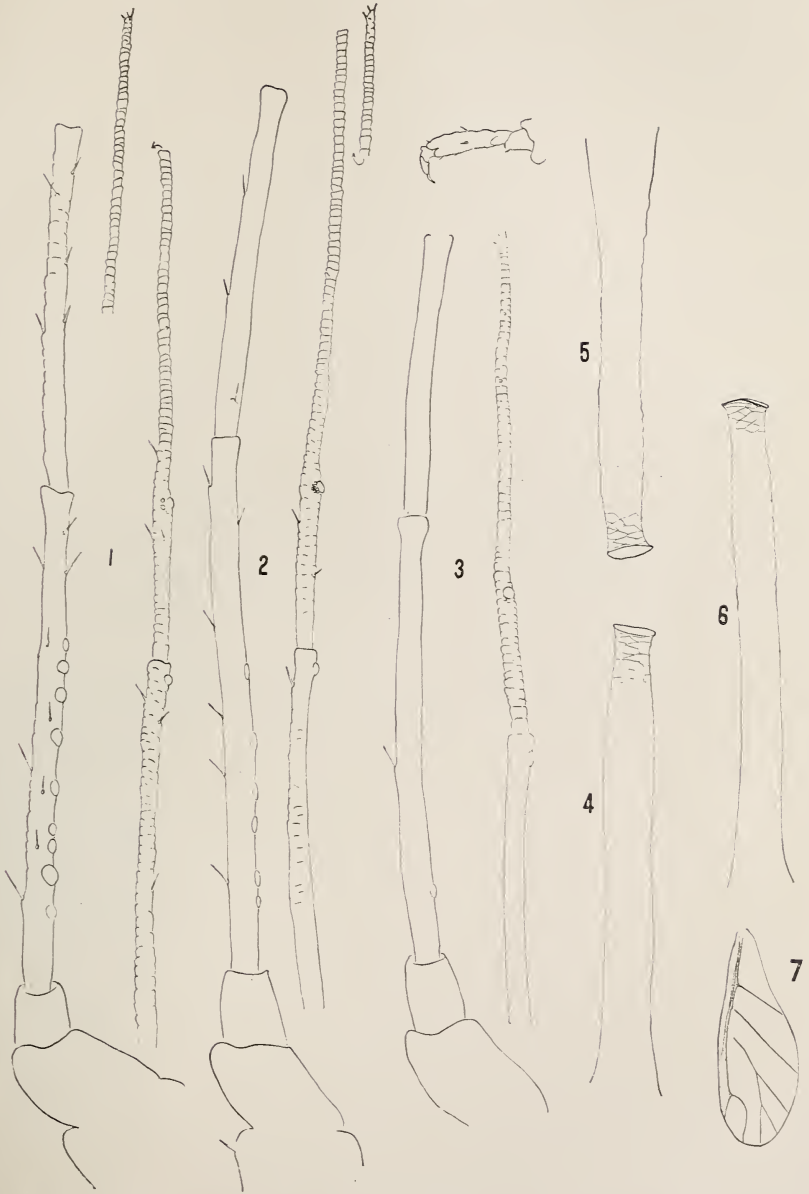
Another species of plant louse, *Nectarophora insularis*, was described from St. Paul Island by Theo. Pergande (Proc. Washington Acad. Sci., vol. 2, p. 515, Dec. 20, 1900); and a fulgoroid leaf-hopper, *Delphax stejnegeri* Ashmead, originally described from Bering Island, has been recorded as occurring on the Pribilofs (Ashmead. W. H., Harriman Alaska Expedition, vol. 8, p. 130, 1904).—W. L. M.

EXPLANATION OF PLATE VIII.

Details of Plant Louse (*Macrosiphum constrictum*).

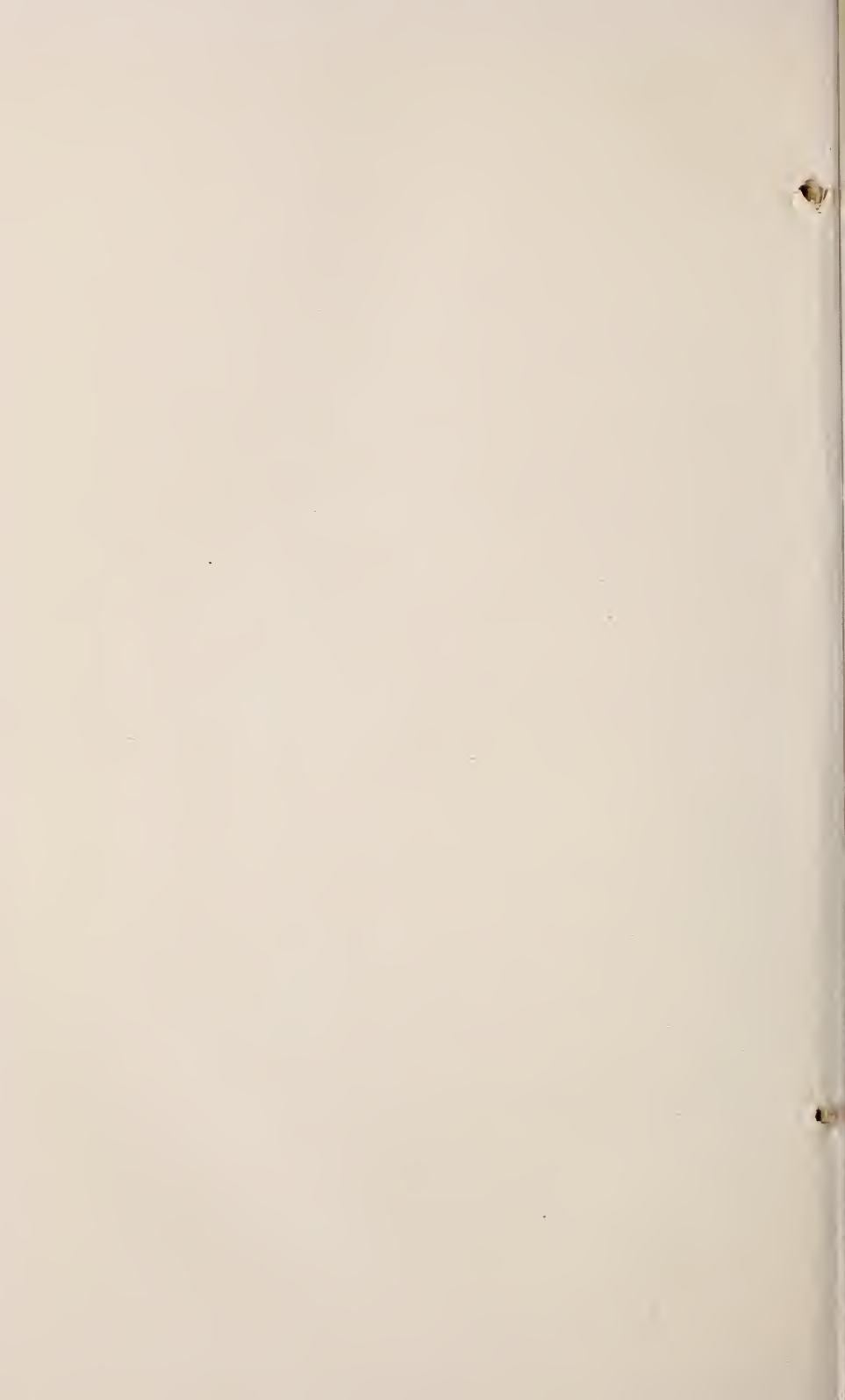
- Fig. 1. Antenna of alate female.
- Fig. 2. Antenna of apterous viviparous female.
- Fig. 3. Antenna and tarsus of apterous oviparous female.
- Fig. 4. Cornicle of apterous viviparous female.
- Fig. 5. Cornicle of apterous oviparous female.
- Fig. 6. Cornicle of alate female.
- Fig. 7. Wing of female.

¹ Theobald, Fred V. The British Species of the Genus *Macrosiphum*. Pt. II, Jour. Econ. Biol., vol. 8, p. 151, 1913.



DETAILS OF PLANT LOUSE (*MACROISIPHUM CONSTRICTUM*).

(Explanation on page 144.)



HETEROPTERA.

By W. L. MCATEE, Bureau of Biological Survey.

Family MIRIDAE.

Irbisia sericans Stal.

Leptomerocoris sericans Stal. C. Beitrag zur Hemipteren-Fauna Sibiens und des Russischen Nord-Amerika. Entomologische Zeitung (Stettin) 19, p. 188, 1858. [Sitka.]

Irbisia (Leptomerocoris) sericans Stal. Heidemann, O., Papers from the Harriman Alaska Expedition, vol. 13, Entomological Results (7); Heteroptera. Proc. Washington Acad. Sci., vol. 2, p. 504, December 20, 1900.

This, the only species of Heteroptera in the collection, has a wide distribution in Alaska and on the neighboring islands, and is known to occur as far south as Oregon. The specimens at hand were obtained on St. Paul Island in June, July, and September, and on St. George Island in August.

Orthocephalus saltator Hahn, also of the family Miridae, was collected on St. Paul Island by Barrett-Hamilton (Schwarz, E. A., the Fur Seals and Fur-Seal Islands of the North Pacific Ocean, Part 3, p. 552, 1899). *Cimex lectularius* Linnaeus also is known to be present on the islands.

TRICHOPTERA.

By NATHAN BANKS, *Museum of Comparative Zoology,*
Harvard University.

Family LIMNEPHILIDAE.

Limnephilus kincaidi Banks.

Two from St. George Island, August 4 and September, and one apparently this species from St. Paul, August 17. Originally described from St. George Island.

Arctoecia consocia Walker.

One from St. Paul Island, August 16.

Asynarchus simplex Banks.

Three from St. Paul Island, July 14 and 22, and one apparently this species, from St. George, August 4. Originally described from St. Paul Island.

A description of the larva of this species from the Pribilofs, has been published by R. A. Muttkowski, *Bul. Wisconsin Nat. Hist. Soc.*, vol. 13, N. S., No. 1, pp. 42-45, March, 1915.—W. L. M.

Chilostigma praeterita Walker.

Three from St. George Island, June 17, and St. Paul Island, May 1, and "Summer." In these specimens the bristle-bearing areas or the posterior warts, prothoracic lobes, mesothoracic stripes, and tegulae are yellowish or reddish. The typical form was described as having these black, but they are pale in some of my European specimens, and I believe are normally pale; sometimes drying out dark.

In addition to the above-mentioned species, *Anabolia simplex* Banks has been recorded from St. Paul Island. (Van Duzee, E. P., *Proc. Calif. Acad. Sci. Fourth Ser.*, 11, p. 193, Nov., 1921.)—W. L. M.

LEPIDOPTERA.

By WM. T. M. FORBES, *Department of Entomology,*
Cornell University.

There are nine species represented in this little collection, besides some larvae which can not be surely identified. The complete absence of butterflies is surprising, but may perhaps be explained by some peculiarity of the climate. The same thing occurs in Iceland, although as a rule butterflies are common in the Arctic regions.

There seems to be a slight tendency for the two islands, St. George and St. Paul, to have different local forms, but it is not marked enough to be certain. One specimen of *Hyphoraia subnebulosa* from St. George is exceptionally pale and shows some differences of marking but the other is like those from St. Paul. *Psychophora sabinii* is represented by a suffused specimen from St. Paul, while all those in good condition from St. George show crisp clean-cut markings, but such suffusion occurs commonly in the Arctic and is likely to be an individual rather than a racial character.

Family ARCTIIDAE.

Hyphoraia subnebulosa Dyar.

Three from St. Paul, June; 2, St. George, July. The type, in the U. S. National Museum, comes well within the range of this series, but is in poor condition. The thorax of the type in particular is beyond description. As the specimens in this series show it, the collar is yellow, with some black hairs along the posterior edge, the disk of the thorax is red-brown, concolorous with the wings, edged on each side by a broad yellow stripe, each side of which the black under-scaling shows more or less distinctly as a black line. The upper two-thirds of the tegulae is chocolate brown, while the part just over the base of the wing is black in front and yellow behind. The hair is loose and erect in the male, but in the female the vestiture of both body and legs is smooth and close, like that of *Apantesis*. The series in the National Museum (from a variety of places) indicates that there may be a large number of minor local forms.

Family NOCTUIDAE.

Agrotiphila alaskae Grote.

Three males and one female, from St. George, appear to be of this species. The males are normal enough. The female has reduced,

lanceolate wings of half the area of the male's, with no black markings at all. The specimen from St. George is marked in two shades of pale olive, but one from Popof Island in the National Museum is purple-brown. The antennae are serrate and fasciculate, not simple as Hampson describes them. Superficially the moth could be easily mistaken for *Pachnobia wockeï*.

Anarta richardsoni Curtis.

One from St. Paul. The hair on the deeply sunken eyes is sparse and easily overlooked.

Family GEOMETRIDAE.

Psychophora sabinii Curtis. (*Scinneria* Dyar).

There can be no doubt that this is *P. sabinii* of Curtis, as has been most generally believed and as has been specifically noted by Barnes and McDunnough since the preparation of this manuscript. They have proposed for it the genus *Barrovia*. "*Psychophora*" *fasciata* has nothing to do with this and no special resemblance to Curtis's figure. In it the pectinations of the antennae are as broad at the base as farther out, while in our form as well as in Curtis's figure they are shown as narrowing at the point of attachment and apparently articulated to the shaft. In *fasciata* the fringe is dark at the base with a white tip, the hind wing is dark-veined without transverse lines, the fore wing has no dark shade at the base; the t. a. line is angled on the cell only, while the t. p. line is not at all toothed. The antennae are serrate at the tip. In all these points *fasciata* differs from Curtis's figures and from the specimens in this lot. *Fasciata* is a noctuid, as shown by the venation and the large ocelli.

The long series from St. George (23 specimens, part of which look as if they were collected in alcohol) are very crisply marked and look like *Trichochlamys polata*. Some of them tend to show the four pale ovals in the median area which Curtis figures, and one is chocolate brown with contrasting white-filled lines. There is some tendency to suffusion, especially in the St. Paul specimen, but nothing like the forms *frigidaria* and *polaris*.

Family PYRALIDAE.

Titanio sp.

St. Paul.

Phlyctaenia sp.

Too poor to identify with certainty. It may possibly be *P. washingtonialis* Grote. St. George.

Family PTEROPHORIDAE.

Platyptilia sp.

It seems too far north for the Californian *P. modesta*, but there seems to be nothing else as close to it among the species of *Platyptilia* with obsolescent scale tuft. *P. pterodactyla* as described by Walker and as figured by Walsingham is a paler species with a pure white area and a couple of black dashes on the first feather, while this species is almost immaculate mouse-gray. The usual black scale-tuft in the third feather of the hind wing is represented by four or five scattered scales. Three from St. George. August.

Family TORTRICIDAE.

Sparganothis moeschleriana Wocke.

All the specimens I have seen of this species show the venation and other structures of *Sparganothis*, group *Cenopsis*, and the markings would indicate the same reference; 1, St. George, August.

TINEID.

Family Undetermined.

Too poor to name, 2 from St. George, June.

E. P. Van Duzee lists from the Pribilofs the pyralid, *Phlyctaenia washingtonalis* Grote, the tortricid, *Argyroplote schulziana* Fabricius (with a query), and the oecophorid, *Borkhausenia pseudospretella* Stainton. (Proc. Calif. Acad. Sci., Fourth Ser., 11, pp. 194-5, Nov. 1921.) H. W. Elliott stated (Report on the Seal Islands of Alaska, Rept. 10th Census, Vol. 8, 1884, p. 12) that "a very few species of butterflies, principally the yellow Nymphalidae, are represented by numerous individuals." However, no butterflies have thus far been collected on the Pribilofs, and it is likely that Elliott's note was merely from recollection, and perhaps had reference to the rather profusely yellow-marked *Hyphoraia*.—W. L. M.

COLEOPTERA.

By Prof. H. F. WICKHAM, *Department of Applied Zoology,
University of Iowa.*

The present collection of Coleoptera is probably by far the most complete of any ever brought out from the Pribilof Islands. Many of the species were obtained in large series, exhibiting wide variation and giving valuable information as to time of occurrence. The fact that both St. George and St. Paul were consistently worked for material enables us to form an opinion as to the faunal relations of these islands with each other; and finally it should be noted that a few species were obtained that had not previously been reported from Alaska.

Two features stand out very clearly from examination of the material and data—first the long season over which the adults of many species may be found, and second, the great individual variation. Color, sculpture, size, and even outline appear to have become inconstant as if the restraints which ordinarily hold the species within narrow limits had been relaxed. An explanation of this variability which seems to me probably fundamental was suggested by Alexander Wetmore, of the Biological Survey—namely, close interbreeding brought about by the narrow quarters to which these insects are confined. A contributing cause may perhaps be found in the rigorous climatic conditions which must often subject the forming chitinous exoskeleton of the newly emerged adult to severe physiological stress, resulting in modifications of the surface sculpture and possibly even of its texture. Retardation or hastening of evaporation is known to affect the intimate sculpture of the tegument in semiarid districts and may well have an influence here.

Several species of beetles have been found upon one of these islands which are not yet known to occur upon the other, but I do not see any evidence of the development of different races where a given species inhabits both St. Paul and St. George, even though a large percentage of the Coleopterous fauna is incapable of flight and probably rarely crosses the distance of forty miles or so between the land areas. A few cosmopolitan beetles are becoming introduced by commerce.

Family CARABIDAE.

Genus *Carabus* Linnaeus.*Carabus truncaticollis* Eschscholtz.

Numerous specimens are contained in the collections from St. Paul and St. George. Those from the former island were found in every month from May to October, and those from the latter island from April 14 to September 10. Taken as a whole, the series ranges from a vivid green through duller and bronze greens, red or copper bronzes to a brown bronze. In general the greens predominate, but the dates do not indicate any relation between season and color. Neither is there any correlation between color and locality, as specimens from either island show practically all of the intergrades. The legs vary from reddish yellow, with dark tarsi and tibial apices, to piceous. The size runs from 15.5 mm. to 20 mm. Several larvae, apparently about fully grown, are dated May 23 and June.

Genus *Nebria* Latreille.*Nebria bifaria* Mannerheim.

Three specimens, St. Paul, without date other than "Summer, 1914." Already known from this island as well as from Alaska, Siberia, and Kamchatka.

Genus *Pelophila* Dejean.*Pelophila eschscholtzii* Mannerheim.

Three specimens, St. Paul, one without date, the other two taken August 16; numerous specimens June 30. The first-mentioned example is distinctly metallic in color with greenish elytral border; the others are nearly black above, the elytra castaneous. Great variation is shown in number and position of the elytral foveae, even on the two sides of the same individual.

Genus *Patrobus* Dejean.*Patrobus septentrionis* Dejean.

St. George and St. Paul. The dates run through every month from June 25 to September 3. A common and widespread species.

Genus *Pterostichus* Bonelli.

A very fine series of small pterostichi, belonging to the subgenus *Pseudocryobius*, was brought out by the collectors. It contains representatives of all the species hitherto known from the Pribilof group and also a few others apparently described from different parts of Alaska. The separation and identification of these forms has been a difficult task and the results of my study are by no means

satisfactory. In common with better known and more readily recognized insects like *Carabus truncaticollis* and *Chrysomela subsulcata*, these pterostichi appear to vary enormously in size, color, and depth of sculpture. There seems, also, to be some variation in thoracic outline; the basal foveae are affected by the sculptural inconstancy and the number of elytral striae of one individual. In consequence the characters ordinarily used for specific distinction become much lessened in value and one has to depend, in great part, upon facies for separation. Nevertheless the only basis for assigning most of the species to their names, most of which were given by Dejean and the early Russian writers, is found in these same characters and the attempt has been made to use them with discrimination. A study of the species of *Pseudocryobius* of both hemispheres is absolutely needed for the proper delimitation of our native forms.

Pterostichus vindicatus Mannerheim.

St. George, June, July 16; St. Paul, June. While placed in this species on account of the much finer elytral striae, the identification must be considered provisional. This is the first record for the Pribilofs.

Pterostichus ventricosus Eschscholtz.

St. George, April 17, May 6, June 4 and 25, July 16, August 4, September. St. Paul, June.

Pterostichus subexaratus Mannerheim.

St. George, April 1 and 17, May 6 and 17, August 4, September 2; St. Paul, June. Some doubt attaches to this identification. The species has not hitherto been recorded from these islands.

Pterostichus pinguedineus Eschscholtz.

St. Paul and St. George, taken every month from April 17 to September 3. Evidently a common species.

Pterostichus hyperboreus Mannerheim.

St. George, May 6 and June 10.

Pterostichus similis Menetries.

Common on both islands. Records from St. George are June 4, 10, 14, 19, 25, July 4 and 16; August 4; from St. Paul, April 15 and "May to July".

Pterostichus quadricollis Menetries.

St. George and St. Paul, June. Less abundant than *P. similis*.

Pterostichus subcaudatus Mannerheim.

St. Paul and St. George, June. This is the first record for the Pribilof Islands.

Pterostichus empetricola Dejean.

St. George, June 4, 10, 25, July 4 and 16, August 4; St. Paul, May 17, 19, 22, 31, June, July 13, September 1 and 3; also Sea Lion Rock, June 29. Fairly abundant and seems variable in size.

Genus *Amara* Bonelli.*Amara brunnipennis* Dejean.

St. Paul and St. George. Dates are shown for each month between April 17 and September 3. Specimens run from shining black to some with distinct metallic tinge and several are of the form with brown elytra. There is also a good deal of variation in the extent of punctuation of the prothoracic basal impressions. This insect belongs to the subgenus *Curtonotus* Stephens.

Amara glacialis Mannerheim.

Several specimens from St. Paul, without definite date. Belongs to the subgenus *Bradytus* Zimmermann.

Amara brunnea Gyllenhal.

Many examples from St. Paul, May, June, and July. Belongs in the subgenus *Acrodon* Zimmermann.

Family DYTISCIDAE.

Genus *Hydroporus* Clairville.*Hydroporus* sp. indet.

A few specimens are at hand from St. George (April 4 and September 3) and St. Paul (June 11). At present it is not feasible to attempt specific determination of this insect, which is a small black species 3.5 mm. long; it is evidently close to or identical with *H. nigellus* Mannerheim, which figures in our lists as a synonym of *H. tartaricus* Leconte.

Hydroporus sp. indet.

Three examples of a bicolored species, 5 mm. in length, come from St. George, dated June 10. They appear to be related to *H. truncatus* Mannerheim in size, color, and oblique truncation of the elytral apices, but differ from the description in some details.

Genus *Agabus* Leach.*Agabus* sp. indet.

Three females from St. George, June, August, and September. The male is necessary for identification.

Family SILPHIDAE.

Genus *Lyrosoma* Mannerheim.*Lyrosoma opaca* Mannerheim.

St. George, abundant; St. Paul, two specimens; taken every month from May 17 to September 6; Sealion Rock, June 29.

Family STAPHYLINIDAE.

Genus *Atheta* Thomson.

Atheta (*Megista*) *nomadica* Casey.

St. Paul, May 22 and July 4, many specimens. The determination is due to Dr. A. Fenyès who writes that it is probably correct. He has also given us the generic references for the two species following.

Atheta sp. indet.

St. Paul, May 22.

Genus *Ocyusa* Kraatz.

Ocyusa sp. indet.

St. George, May 4, one specimen in bad condition.

Genus *Liparocephalus* Mäklin.

Liparocephalus *brevipennis* Mäklin.

St. Paul, a pair, May 13: St. George, one specimen, September 2.

Genus *Quedius* Stephens.

Quedius *hyperboreus* Erichson.

St. Paul, May 22, one specimen.

Quedius *molochinus* Gravenhorst.

One specimen, St. George, August 4.

Genus *Tachinus* Gravenhorst.

Tachinus *apterus* Mäklin.

About sixty specimens of *Tachinus* belong to a species which runs close to *instabilis* Mäklin by Dr. Horn's table. Some of the females, however, have the median dorsal lobe of the abdominal apex short, this being the character upon which *T. apterus* Mäklin is based. Likely enough, the whole series might properly be referred to *T. apterus*, which was not known to Dr. Horn. Specimens occur on both Islands, and the dates cover April, May, June, July, and September.

Genus *Bryoporus* Kraatz.

Bryoporus near *insignis* Mäklin.

A specimen of *Bryoporus* collected on St. Paul, May 22, may be compared with *Mycetoporus insignis* Mäklin from the island of Afognak. The description seems to agree in most of the principal points but differs in regard to coloration. The St. Paul specimen is 5.5 mm. in length, very shining, piceous black, the elytra tending toward castaneous. The antennae are blackish, strongly thickened externally and as long as the head and prothorax together, the two basal joints yellowish, third a little darker. Legs pale testaceous, coxae darker, hind femora and trochanters infusate. Hind margins of abdominal segments scarcely perceptibly lighter above, more distinctly

so beneath. The four punctures described by Mäklin as being placed slightly in front of the hind margin of the pronotum are very distinct, the lateral and apical series are small. Elytra sparsely and finely punctate on the disk, a little more closely toward the scutellum, in addition to showing the usual sutural, discal, and lateral series of larger punctures. I do not make out any sexual characters. *Mycetoporus* and *Bryoporus* are separated by slender characters and have been united by Fauvel. It is entirely probable that the species in hand is congeneric with that of Mäklin though perhaps not conspecific.

Genus *Deliphrum* Erichson.

Deliphrum sp. indet.

About a dozen specimens, St. Paul and St. George, covering the months of April, May, June, August, and September. These belong to *Deliphrum* or some closely allied genus but the species can not be identified with any hitherto recorded from North America. Quite possibly it may be described from Siberia.

Genus *Olophrum* Erichson.

Olophrum marginatum Kirby.

St. George, May 6 and September 2.

Olophrum fuscum Gravenhorst.

St. George, June and September; St. Paul, May.

Genus *Micalymma* Westwood.

Micalymma dicksoni Mäklin.

St. George, April 12, June 4, 25, August 16, September 2; St. Paul, April 5. The identification of this very interesting beach-inhabiting insect is based upon comparison with specimens in the United States National Museum, having the above specific label in the handwriting of Mr. Schwarz.

Family LATHRIDIIDAE

Genus *Enicmus* Thomson.

Enicmus protensicollis Mannerheim.

St. Paul, one specimen. May 24.

Family BYRRHIDAE

Genus *Byrrhus* Linnaeus.

Byrrhus fasciatus Fabricius.

St. Paul, several specimens. The only dates given are May 23 and July 13. These specimens agree very closely with examples in the United States National Museum from Copper Island, carrying the above specific label.

Family ELATERIDAE.

Genus *Cryptohypnus* Eschscholtz.*Cryptohypnus littoralis* Eschscholtz.

Several, from St. Paul. The dates given are April 30 to May 22, but most of the specimens are simply marked "Summer."

Genus *Hypnoidus* Stephens.*Hypnoidus musculus* Eschscholtz.

St. Paul, four specimens. The only definite date is June 20. Common at various points on the Alaskan seacoast, occurring under shingle along the beaches.

Family PTINIDAE.

Genus *Trigonogenius* Solier.*Trigonogenius globulum* Solier.

St. Paul, April; St. George, April 17. Widely distributed by commerce.

Genus *Ptinus* Linnaeus.*Ptinus fur* Linnaeus.

St. Paul, January 6, May 16; St. George, May 17 and September 3. Common in houses over most of the civilized world.

Family CHRYSOMELIDAE.

Genus *Chrysomela* Linnaeus.*Chrysomela subsulcata* Mannerheim.

The collection contains a beautiful and extensive series, varying in size, color, and depth of sculpture. Some specimens are green, others blue, while several are decidedly coppery. A few are blackish with very little luster. They come from both St. George and St. Paul and were mostly collected in May, June, and July, though the dates run as early as April 30 and as late as September 3. Several larvae of different sizes bear the date of May 14-22.

Family AEGIALITIDAE.

Genus *Aegialites* Mannerheim.*Aegialites californicus* Motschulsky.

Numerous specimens from St. Paul, St. George, and Sea Lion Rock. The dates run between June 4 and July 8. Larvae were taken June 4 and June 29.

Family CURCULIONIDAE.

Genus *Lophalophus* Leconte.*Lophalophus inquinatus* Mannerheim.

St. Paul, fairly common, May 19 to August 16.

Genus *Trachodes* Germar.*Trachodes ptinoides* Germar.

St. George, May 6 to September 10.

Genus *Orchestes* Illiger.*Orchestes parvicollis* Leconte.

Three specimens, St. Paul, spring of 1914.

A specimen of *Ilybius angustior* Gyllenhal was present in the stomach of a red phalarope, collected on St. George Island August 2, 1920, and one of *Hadrotus*, not specifically identified, in the stomach of a pectoral sandpiper collected on St. Paul Island August 22, 1914.

In addition to the beetles mentioned in the preceding list, E. A. Schwarz recorded (Report on Fur Seals and Fur Seal Islands, Pt. 3, pp. 548-549, 1899), partly on the basis of Wosnesenski's specimens as reported by Menetries, Motschulsky, and Mannerheim, the following species as inhabitants of the Pribilofs:

Laccophilus decipiens Le Conte. St. George. | *Cercyon lateralis* Marsham. St. Paul.
Berosus maculosus Mannerheim. St. George. | *Hadrotus crassus* Mannerheim. St. George.

In his paper on the Metamorphoses of some Alaska Coleoptera (Proc. Washington Acad. Sci., vol. 2, p. 201, Nov. 24, 1900) Trevor Kincaid records also the weevil *Lepidophorus lineaticollis* Kirby from St. Paul and describes its larva and pupa.

E. C. Van Dyke in the 1921 report (Proc. Calif. Acad. Sci., Fourth Ser., 11, pp. 156-166, Nov., 1921) adds the following 7 species: *Pterostichus hudsonicus* Le Conte, *Amara remotestriata* Dejean, *Agabus hypomelas* Mannerheim, *Atheta graminicola* Gravenhorst, *Quedius fulvicollis* Stephens, *Arpedium beringenus* Van Dyke, and *Lepyryus palustris* Scopoli.

An easily overlooked paper recording 26 species of Coleoptera from the Aleutian Islands, but none specifically from the Pribilofs, is the following: Coinde, J. P., Notice sur le faune ornithologique de l'île de Saint-Paul, suivie de l'énumération de quelques espèces d'insectes (Coléoptères) des Aléoutiennes et du Kamtschatka. Rev. et Mag. Zool., 2^e Sér., T. XII, pp. 396-405, 1860.—W. L. M.

MECOPTERA.

By NATHAN BANKS, *Museum of Comparative Zoology,
Harvard University.*

Pl. IX, fig. 8.

Family PANORPIDAE.

Boreus borealis, n. sp.

Brassy black; the legs, including coxae and the pleura, the lower half of the beak, the wings (except tip in the male), and the ovipositor (except tip), are yellowish; the extreme tips of tibia and tarsal joints black; male genitalia pale; face hairy, vertex shining; wings in male very long and slender, fully one-half as long as abdomen, tip curved downward and ending in two points, one more slender than the other; ventral plate of male truncate, not notched at tip; in the female wings reach to abdomen, about twice as long as broad, larger than in allied species; ovipositor one-half the length of the abdomen, basal part concave above, beyond straight, below hairy.

Length: Male, 3.8 mm.; female, with ovipositor, 5 mm.

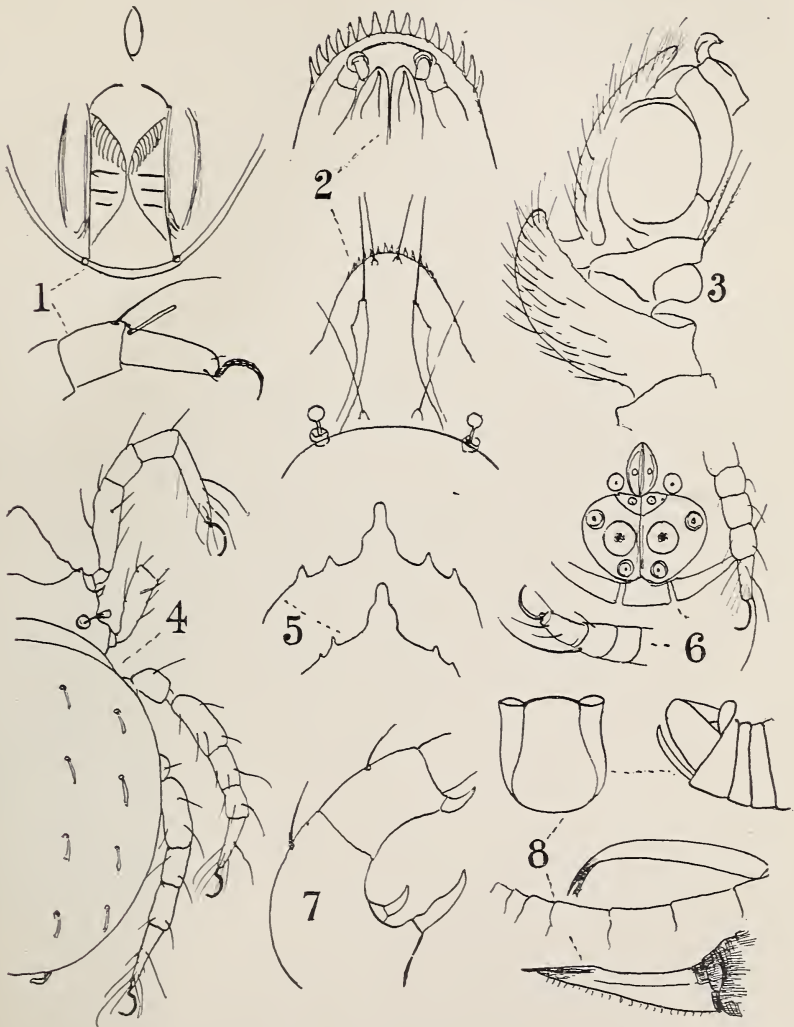
From St. Paul Island, Bering Sea, Alaska, May 16-23, 1914 (Whitney coll.). Differs from other American species in pale coxae and pleura, longer wings, and larger size.

See Plate IX, Figure 8, male genitalia from side and behind, and side view of wings and ovipositor.

EXPLANATION OF PLATE IX.

Details of Scorpion Fly (Mecoptera) and Mites (Arachnida, pp. 237-239).

- Fig. 1. *Dermacarus* sp., venter and tarsus I—hypopus.
Fig. 2. *Notaspis serrifrons*, edge of head and top of cephalothorax.
Fig. 3. *Hilaira glacialis*, palp of male.
Fig. 4. *Lohmannia scabra*, dorsum.
Fig. 5. *Parasitus borealis*, epitomae showing variation.
Fig. 6. *Tyroglyphus whitneyi*, venter and tarsus I—hypopus.
Fig. 7. *Parasitus borealis*, leg II of male.
Fig. 8. *Boreus borealis* (Mecoptera); above, male genitalia from side and behind; below, side view of wings and ovipositor.



DETAILS OF SCORPION FLY (MECOPTERA, FIG. 8) AND MITES (ARACHNIDA, FIGS. 1-7).
(Explanation on page 158.)



DIPTERA.

Suborder Orthorrhapha.

Division NEMATOCERA.

Families TIPULIDAE and RHYPHIDAE.

By CHARLES P. ALEXANDER, *Department of Entomology,
Massachusetts Agricultural College.*

(Plates X and XI.)

Our knowledge of the crane flies of the Pribilof Islands is due largely to the collections made by G. Dallas Hanna on the island of St. George and by Alvin G. and Elsie G. Whitney on the island of St. Paul, previous collections yielding very fragmentary data. In E. A. Schwarz's list¹ the following records for members of this family of flies occur:

Trichocera sp. A single specimen collected by Mr. Barrett-Hamilton. To this or an allied species I am inclined to refer the "gnat" mentioned by Mr. Elliott which "flits about in large swarms, but it is inoffensive and seeks shelter in the grass."

Tipulid. A single larva from Mr. Barrett-Hamilton's collection from St. Paul indicates a larger species than the *Trichocera* just mentioned.

The above material was determined by the late D. W. Coquillett; additional specimens that were collected by Mr. Elliott in 1895 were found among the undetermined material in the United States National Museum and will be found recorded under *Tipula whitneyi* on a later page.

The crane fly fauna of these islands is similar to that of many other wind-swept islands, in the large number of species with the wings so atrophied that the flies are incapable of flight. The relatively large number of species that seem to be confined to the Pribilofs is partly accounted for in this manner. The Alaskan Tipulidae named by Mr. Coquillett and now contained in the National Museum have been compared with the Pribilof material and were found to represent quite a different fauna, some comparisons to which are noted in later pages.

The notes of the collectors of the material are quoted under their original numbers.

¹ Schwarz, E. A., List of insects hitherto known from the Pribilof Islands: Report on Fur Seals and Fur-seal Islands, Part 3, pp. 550-552, 1899.

Family RHYPHIDAE.

Genus *Trichocera* Meigen (1803).*Trichocera* sp.

Numerous specimens of these crane-flies were included in the collection, but the systematic condition of the species of the genus is such that it is impossible to identify the insects at this time. St. George Island, June 14, 1914; St. Paul Island, Sept. 30, 1911. Mr. Whitney's note on his number 168 follows:

"Spring 1914. 12 gnats (?) flying in a swarm by the laboratory, St. Paul Island."

Family TIPULIDAE.

Subfamily LIMNOBIINAE.

Tribe Pediciini.

Genus *Tricyphona* Zetterstedt (1840).*Tricyphona hannai*, n. sp.

Male, length about 7.7 mm.; wing, 5.8 mm.

Rostrum and palpi very short, dark brown. Antennae short, dark brown, first segment about half again as long as the second; flagellum short, of an indeterminable number of segments, the basal segments greatly enlarged, thence tapering to the apex; the terminal segments very small, more or less fused, and provided with long verticils; eyes small, hairy; head with the front and vertex broad, dark brown, with a grayish yellow pollen.

Pronotum prominent; thorax dark brown with a grayish-yellow pollen; halteres long, more or less flattened and twisted, the knob not prominent; wings considerably atrophied both in length and width, the venation considerably degenerated (see pl. 10, fig. 1); the color is light brown, the disk darker anteriorly; the costa is incrossated and provided with several ranks of stout hairlike bristles; R_1 's elongated, straight, in a line with R_{4+5} , which is forked at the apex, R_4 and R_5 being separate at the wing-margin; R_{2+3} indistinct on its terminal portion; cross-vein $r-m$ elongate, prominent; media with only the upper branch clearly defined, this branch apparently unforked; cubitus well developed, dark brown, well defined; two anal veins, the second very long and straight; some of the veins with strong hairs or hairlike bristles on them, a group of about five in the stigmal region, about six along R_{2+3} ; a considerable series on the apical portion of R_{4+5} and on R_4 and R_5 ; about twelve on the upper branch of M , others on the forks of Cu , and about nine, evenly spaced, on the second anal vein.

Abdomen dark brown, with sparse long, yellow appressed hairs; caudal and lateral margins of the segments paler; hypopygium (see PL. X, fig. 6) with the ninth tergite rather broad, the caudal margin

gently concave; pleurites very short and stout, the outer face with numerous pale hairs, the inner face with numerous black spicules; appendages two, the dorsal appendage a capitate lobe on a very short pedicel, the head with numerous black spicules and a few long yellow hairs; ventral appendage a flattened blade-like subchitinized arm; ninth sternite narrow, the caudal margin with the median portion straight but slightly denticulate at the ends.

Holotype, ♂, St. George Island, Bering Sea; June 10, 1914 (Hanna). "Lot-number 13. Found near a pool in Sphagnum bog, west of village."

There can be little doubt but that this insect is a degenerate species of *Tricyphona* with the fused portion of veins R_{4+5} of the wings very extensive, and many details of the venation considerably atrophied or hypertrophied. The insect is named in honor of the collector, G. Dallas Hanna.

Subfamily TIPULINAE.

Tribe Tipulini.

Genus *Tipula* Linnaeus (1758).

Tipula whitneyi, n. sp.

Male, length 13-14 mm.; wing, 2.8-5.5 mm.

Female, length 19-22 mm.; wing, 2.5-3 mm.

Frontal prolongation of the head moderate in length, gray, nasus indistinct; palpi dark brown. Antennae dark brownish-black, the segments of the flagellum very slightly constricted beyond the enlarged base; the segments covered with a short, dense, gray pubescence. Head clear whitish gray with a distinct impressed median line.

Pronotal scutum light gray with a narrow median brown vitta. Mesonotal praescutum and scutum clear light gray without apparent darker markings of any kind; scutellum and postnotum brownish gray with a narrow brown median vitta; pleura brownish gray; halteres short, yellowish brown, the knob darker brown; legs with the coxae prominent, light gray, with numerous long pale hairs; trochanters reddish brown; femora and tibiae reddish brown, tipped with dark brown; tarsi dark brown to black; wings extremely reduced in both sexes, in some specimens a little longer than in others, one male having the right wing twice as long as the left wing; in most specimens the wings extend about to the tip of the first abdominal segment; wings light brown, the costal margin very greatly in-crassated, the region immediately behind the costa with an abundance of short bristles; venation (see Pl. X, fig. 2) indistinct, distorted, but traceable.

Abdomen varying from brown to reddish brown, with a broad, dark brown dorso-median stripe; first tergite largely dark brown;

lateral margins of the sclerites broadly, caudal margins very narrowly, pale; sternites grayish brown; hypopygium (see Pl. X, fig. 7) with the ninth tergite (see Pl. XI, fig. 13) prominent, the caudal margin with a broad U-shaped median notch which is notched again by a smaller W-shaped incision; the lateral lobes are broadly truncated, with the caudal margin shiny, tumid; ninth pleurite large, complete, situated on the dorso-caudal face of the ninth sternite, the ventral inner angle clothed with numerous long pale yellow hairs; pleural appendages two, the outer appendage a slender, cylindrical fleshy lobe that is clothed with comparatively short hairs; inner pleural appendage large, prominent, compressed, projecting cephalad as a narrowed lobe which occupies the notch of the tergite; near the apex it is split into a smaller lobe which is deflected laterad; ninth sternite with a broad U-shaped notch on the caudal half; on the cephalic half the margins of each side are approximated but not contiguous, the median area membranaceous; eighth sternite with the caudal margin simple, unarmed.

The female is similar to the male but the dorso-median abdominal vitta is often interrupted on the basal third of each segment; the wings are still shorter, extending to just beyond the base of the first abdominal segment; valves of the ovipositor (see pl. 11, fig. 21) very long and slender, the tergal valves slightly divergent, enlarged basally, thence gradually narrowed to the tip; sternal valves shorter, compressed, the apices rather blunt.

Holotype, ♂, St. George Island, Bering Sea; June 12, 1914 (Hanna); lot 16. Allotype, ♀, topotypic; lot 27, June 16, 1914. Paratypes, 35 ♂'s, ♀'s, as follows: 18 ♂'s, 8 ♀'s, topotypic, June 12 to July 8, 1914 (Hanna); lots 16, 17, 27, 30, 41, 46, 49, 52, and 55. 1 ♂, Otter Island, July 3, 1913 (Whitney); lot 60. 1 ♂, 1 ♀, St. Paul Island, June 10, 1913 (Whitney); lot 40. 2 ♀'s with the last, June 1, 1914; lot 170. 1 ♂, bred from pupa, with the last, June, 1914; lot 186. 1 ♂, 1 ♀ (gravid), St. Paul Island, July 10, 1895 (H. W. Elliott). 1 ♂, with the last, July 12, 1895; U. S. Nat. Mus. Acc. No. 30147.

The accompanying collectors' notes with the above lot numbers are as follows:

Hanna: Lot 16. Found crawling over grass of high beach lands, not seen near bogs or on top of high hills; lot 30, toward East Rookery from village—none seen with wings developed; lot 41, uplands toward Staraya Artel Rookery; lot 46, from toward East Rookery; lot 49, toward Zapadni—damaged by cyanide; lot 52, from toward Zapadni Rookery.

Whitney: Lot 40. In grass, one at Kitovi and the other on Reef Peninsula; lot 60, Otter Island (6 miles from St. Paul).

This fly is named in honor of the collector of certain of the paratypes, Mr. Alvin G. Whitney.

The pupal skin from which one of the paratypes was bred was collected about June 1 and the adult fly emerged early in June. The following notes on the exuvium are included:

Length about 21.5 mm; diameter about 5 mm.; prothoracic breathing horns very short, finely crenulated; abdominal tergites with the caudal half of each segment bearing four blunt tubercles in alignment; the eighth segment with a fleshy tubercle on each side; ninth tergite (see Pl. XI, fig. 23) with the caudal margin deeply concave; the lateral angles wrinkled; tergal valves very elongated, blunt at their apices; sternal valves shorter; caudal half of sternite five (see Pl. XI, fig. 24) with four subacute fleshy tubercles on each side of the median line; sixth sternite with three similar tubercles; seventh sternite with two similar tubercles; eighth sternite with six large tubercles; leg pads ending about at the base of abdominal segment four; wing pads ending just beyond the base of segment three.

Tipula pribilofensis, n. sp.

Pls. X and XI.

Male.—Length 12.5–13.5 mm.; wing, 10.5–11.5 mm.; antennae about 5.5 mm.

Female.—Length, 15.5–19 mm.; wing, 10–11 mm.

Frontal prolongation of the head rather short, dark brown, with a dark gray bloom; nasus distinct; palpi short, dark brown; antennae rather elongated, black, the flagellar segments beyond the first deeply constricted at their middle; head dark with a dense, dark gray bloom.

Pronotal scutum gray, the scutellum yellowish on the lateral margins, this color becoming confluent with the same color of the dorso-pleural membranes; mesonotum gray, stripes not indicated; sides of the scutellum and postnotum more yellowish; pleura brownish gray; halteres rather short, dull yellow, the knobs more brownish; legs with the coxae gray, trochanters, femora and tibiae brown, the two latter a little darkened at their apices; tarsi black; wings semi-atrophied, the length little reduced but the width considerably restricted so that the venation is much distorted; color of the wings pale brownish, the stigma distinct, pale brown, not encroaching into the base of cell R_2 ; veins brown; venation as in Plate 10, Figure 3.

Abdominal tergites reddish yellow with three indistinct interrupted brown lines, the lateral stripes becoming distinct only on the apical segments where they suffuse the entire bases of the sclerites; ninth tergite black; tergites with conspicuous transverse punctured areas on the basal half of each segment, these areas interrupted on the mid-dorsal line; hypopygium (see Pl. X, fig. 8) with the ninth tergite (see Pl. XI, fig. 14) extensive, the caudal margin with a very broad V-shaped notch, the lateral angles prolonged caudad as shiny impunctate horns; pleural appendages two; the outer appendage a conspicuous elongated fleshy lobe, narrowed at

the base, thence very slightly expanded and tapering gradually to the blunt apex; it is clothed with abundant hairs, on the caudal face very long, divergent, on the cephalic and lateral faces short, more appressed; inner pleural appendage a complex, flattened, chitinized lobe divided into two lobules, the ventral or caudal lobule projecting caudad as a compressed blade that is blunt at the apex, the outer face with about eight short bristles, the inner face with several long pale hairs; the inner or dorsal lobule jutting into the notch of the ninth tergite, flattened, compressed, with indistinct parallel grooves; the sterno-pleural suture is indistinct; at the point where it is usually located a short, slender, fleshy setigerous lobe; eighth sternite (see pl. 11, fig. 19) produced caudad as a very flattened, depressed, median arm that is shaped like a spade; the apex is gently notched medially by a broad U-shaped incision; the caudal margin of this tongue is fringed with delicate pale hairs.

The female is similar to the male; the antennal segments simple throughout; abdominal tergites dark gray, the caudal margins of the segments brighter, more yellowish; ovipositor (see Pl. XI, fig. 20) with the last tergite extremely elongated, smooth, shiny black, chitinized; tergal valves of the ovipositor triangular, lying both transversely and vertically, short, acutely pointed from very broad bases, the apices divergent; the dorsal face smooth, light chestnut brown; the outer face with a prominent median carina running from the base to the apex, the remaining surface of this face with a roughened irregular meshwork of raised lines; the ridges between the three faces of the valves with numerous fimbriate hairs; sternal valves reduced to tiny lobes.

Holotype, ♂, St. Paul Island, June 1, 1914 (Whitney); lot 170. "No 170. About June 1, 1914. Tolstoi sand dunes. Crane flies were crawling everywhere at this time and many were mating. Allotype, ♀, topotypic. Paratypes, 20 ♂'s, 3 ♀'s, topotypic.

Tipula aleutica, n. sp.

Pls. X and XI.

Male.—Length about 13–14 mm; wing, 13.5 mm. Discolored by cyanide.

Frontal prolongation of the head dark brown, short and stout; nasus indistinct; antennae dark brown, rather short, the segments not constricted; head dark grayish brown with abundant long pale hairs.

Pronotal scutum grayish brown with abundant long pale hairs; mesonotal praescutum gray with blue-gray stripes, these latter indistinctly margined with darker; the median stripe broadest at the cephalic end, narrowed at the suture, these stripes appearing to be discolored, probably by the action of cyanide; scutum gray, the lobes blue-gray; pleura dull gray; halteres short, pale yellowish

throughout; legs with the coxae dull gray densely covered with long pale hairs; trochanters brown; femora and tibia light brownish yellow, the apices slightly darkened; tarsi dark brown; wings with a very faint brownish tinge, the stigma brown; veins dark brown; venation as in Plate 10, Figure 4.

Abdomen brownish gray, the caudal margins of the segments ringed with paler; hypopygium (see Pl. X, fig. 9) with the ninth tergite (see Pl. XI, fig. 15) moderately prominent, the caudal margin straight across, with two lobes, one on either side of the median line; these lobes pale yellow, conical, their apices rather acute, the notch between them narrowly V-shaped; ninth sterno-pleurite prominent, the pleural region partially separated from the sternite by a conspicuous arcuated suture beneath; pleural appendages two, situated far out near the apex of the sterno-pleurite, the outer appendage pale, prominent, flattened, a little narrowed toward the blunt apex; inner appendage of a very simple structure, a pale slightly chitinized lobe whose anterior angle is produced cephalad as a long subacute lobule, on the outer face near the caudal margin, a slender, acutely pointed horn directed cephalad; ninth sternite profoundly incised by a very narrow V-shaped notch, the adjacent margins pale-pubescent, not approximated; eighth sternite narrow, the caudal margin straight across, unarmed.

Holotype, ♂, St. George Island, June 27, 1914 (Hanna). "Lot 49. Toward Zapadni."

This crane fly belongs to the group of *perlongipes* Johnson, *sulphurea* Doane, *tenebrosa* Coquillett, and *kennicotti* Alexander. The only species with which it requires comparison are *cimmeria* Speiser, and *tenebrosa* Coquillett, and this comparison is given herewith, the notes and figures being based upon the types in the United States National Museum.

Tipula cimmeria Speiser (Dem Kilimandjaro, dem Meru Expedition, 10, Diptera. 4, Orthorhapha. Nematocera, p. 57, 1909) is the correct name for *Tipula strigata* Coquillett. Type number 5205, U. S. National Museum, from Yakutat, Alaska, June 21, 1899, collected by Kincaid.

The type of *strigata* is a male; antennae rather short, scape dull yellow, flagellum, dark brown, the segments a little constricted beyond the base: Frontal prolongation of the head short, nasus very prominent; Wing-venation with the basal deflection of R_{4+5} , $r-m$ and the basal deflection of M_{1+2} almost in a line. Hypopygium with the tergite, pleurite and sternite fused in an almost continuous ring, the pleural suture well-indicated beneath; the tergo-pleural notch small, on the caudal margin only; ninth tergite (see Pl. XI, fig. 16) subquadrate, dark brown, with the caudal margin transversely truncated and bearing a pair of median lobes (as in the

tephrocephala group); these lobes pale, darkened at their apices, very closely approximated on the basal three-quarters, the tips more separated, the apices of the lobes minutely spiculose; the length of these lobes is about the same as the length of the tergite; they are fringed on their outer lateral margin with long hairs; ninth pleurite with the suture conspicuous beneath, broadly U-shaped; the ventrocaudal angle with a tuft of long hairs which are decussate on the median line beneath; outer pleural appendage (see Pl. X, fig. 12) large, prominent, pale, fleshy, very flattened, elongate, slightly constricted beyond the base, then expanded, the apex a little pointed; the outer face with scanty strigose yellow hairs; inner pleural appendage very large, powerful, bilobed, the outer or caudal lobe short, subrotund, the apex a little truncated, densely and finely pale strigose on the inner face; inner lobe flattened, compressed; ninth sternite deeply divided, at the caudal angle just behind the suture with a sparse tuft of long pale hairs, decussate on the median line beneath; near the base of the split a dense tuft of golden yellow hair; eighth sternite prominent, straight across the caudal margin, unarmed with any brush or tuft.

Tipula tenebrosa Coquillett was described from Berg Bay, Alaska; collected June 10, 1899, by Kincaid; type number 5206, U. S. National Museum. The type is a male; the hypopygium has the ninth tergite (see Pl. XI, fig. 17) large, convex, the caudal margin with a prominent stout lobe on either side of the median line, these separated by a space equal to about one-half the diameter of the lobe; the apices of these lobes blackened, minutely spiculose; caudal margin of the tergite sloping obliquely backward from these lobes; notch between the ninth tergite and the ninth pleurite quite deep, but not running back to the eighth segment; ninth pleurite incomplete, the pleural suture well indicated beneath; the pleural region produced caudad as a blunt triangular arm bearing the appendages out near its apex; outer pleural appendage (see Pl. X, fig. 11) flattened, subquadrate or slightly elongated, bearing at the base on the inside the inner pleural appendage which is flattened, bilobed, the caudal lobe a short, blackened, chitinized point; the caudal face of the lobe on the basal half is downy pubescent; ninth sternite deeply cleft on the median line beneath but the adjoining sides contiguous; eighth sternite prominent, the caudal margin unarmed. Coquillett's description of the hypopygium does not agree at all with the type; the outer pleural appendages are described as being nearly twice as long as wide, the lower outer angle considerably prolonged beyond the upper one; this agrees much better with the somewhat similar *Tipula cimmeria*, discussed above.

Tipula alascaensis, n. sp.

Pls. X and XI.

Male.—Length, 11–13.5 mm.; wing, 14.5–15 mm.

Female.—Length, 15–18 mm.; wing, 17.5 mm.

Frontal prolongation of the head bluish gray, very short, nasus indistinct; palpi gray, short; antennae very short, black, with a sparse grayish bloom; first segment elongated, longer than the second and third together; the flagellar segments very short, slightly constricted beyond the basal swelling; head blue-gray with abundant long hairs, especially a tuft on the genae.

Mesonotum dark gray with rather indistinct stripes, the median vitta very broad, rapidly narrowed behind; lateral stripes narrow, beginning behind the conspicuous pseudosutural foveae; thoracic interspaces with short pale, erect hair; scutum and lateral portions of the postnotum with abundant erect black hairs; pleura dark gray, smooth, a large setigerous area on the mesepisternum behind the fore coxae; halteres short, brown, the knobs a little brighter; legs with the coxae gray, clothed with abundant long yellow hairs; femora yellowish brown tipped with dark brown; tibiae brown tipped with darker brown; tarsi dark brown; wings fully developed in both sexes, strongly tinged with brownish yellow, the costal cell not different in color from the other cells of the wing; stigma conspicuous, oval, dark brown; small areas before the stigma in cell 1st R_1 and beyond the stigma in cell 2d R_1 , and the base of R_2 slightly paler; veins dark brown; venation as in Plate X, Figure 5.

Abdomen dark gray, the segments narrowly ringed with pale yellowish around the caudal margin; hypopygium (see Pl. X, fig. 10) very inconspicuous and somewhat concealed; ninth tergite (see Pl. XI, fig. 18) rather prominent, the caudal margin rounded, with a deep, narrow median notch; the lateral lobes are thus very broad and somewhat obliquely truncated; dorsal surface of the sclerite densely hairy; ninth pleurite small, complete, situated on the dorso-caudal face of the ninth sternite; outer pleural appendage short, clavate, slightly enlarged at the base, the head rounded, clothed with abundant golden hairs; inner pleural appendage compressed, flattened, on the outer face clothed with short, appressed golden hairs; ninth sternite prominent, with a very deep median notch whose margins are widely separated.

The female is generally similar to the male; the ovipositor has the last two segments exceedingly narrowed as in *besselsi* Osten Sacken and *pilicops* Alexander; the tergal valves (see Pl. XI, fig. 22) acute but small, tapering gradually from the broad base, the apices divergent.

Holotype, male, St. George Island, June 14, 1914 (Hanna), Lot number 17. Allotype, female, topotypic. Paratypes, 2 males, 3 females, topotypic; 2 females, topotypic on June 16, 1914 (Lot 27). "Lot number 17. In wet places, mostly, but some seen crawling over grass far from water. None seen flying. Those with wings best developed (the present species) from Spring Creek, Garden Cove. One seen with the very fuzzy fly in No. 18 (*Scatophaga*) beneath it; apparently both were fighting." "Lot number 27. Garden Cove. Mrs. E. G. Whitney."

Tipula, sp.

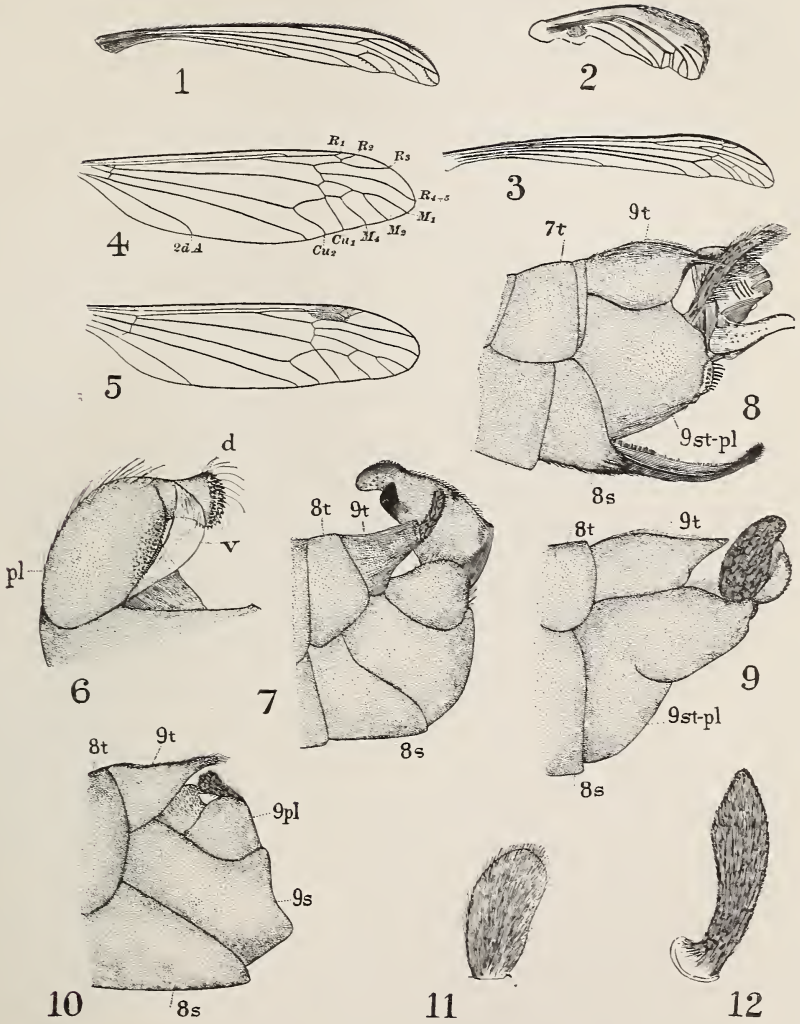
Abundant larvae of an unknown species of *Tipula* taken on St. Paul island July 18-20, 1913. Mr. Whitney's notes on the species are very interesting:

No. 77. July 18, 1913. Reef Parade Ground. 12 larvae. Abundant everywhere there around the roots of grasses, herbs, and especially under beds of moss on the roots of which it feeds, killing the moss over considerable areas. Under such a moss bed I found as many as 20 to the square foot. This larva is found all over the island in grassy or mossy places and all through the summer season. It must be of considerable ecological importance because of its food value to the birds and foxes. The foxes will dig over large areas of moss beds to feed on these larvae. Was unable to find the species in adult form. Could not seem to raise adults in laboratory by keeping larvae with one of the food plants. It may possibly be the larval form of the crane fly, which is very abundant. Color not altered by pickling in alcohol.

The identity of the form with any of the adult flies known from the Pribilofs is very doubtful. The large size of the larvae in mid-July would imply a species that emerges at or near the very end of the growing season, and it seems possible that they belong to such a species, as yet unknown.

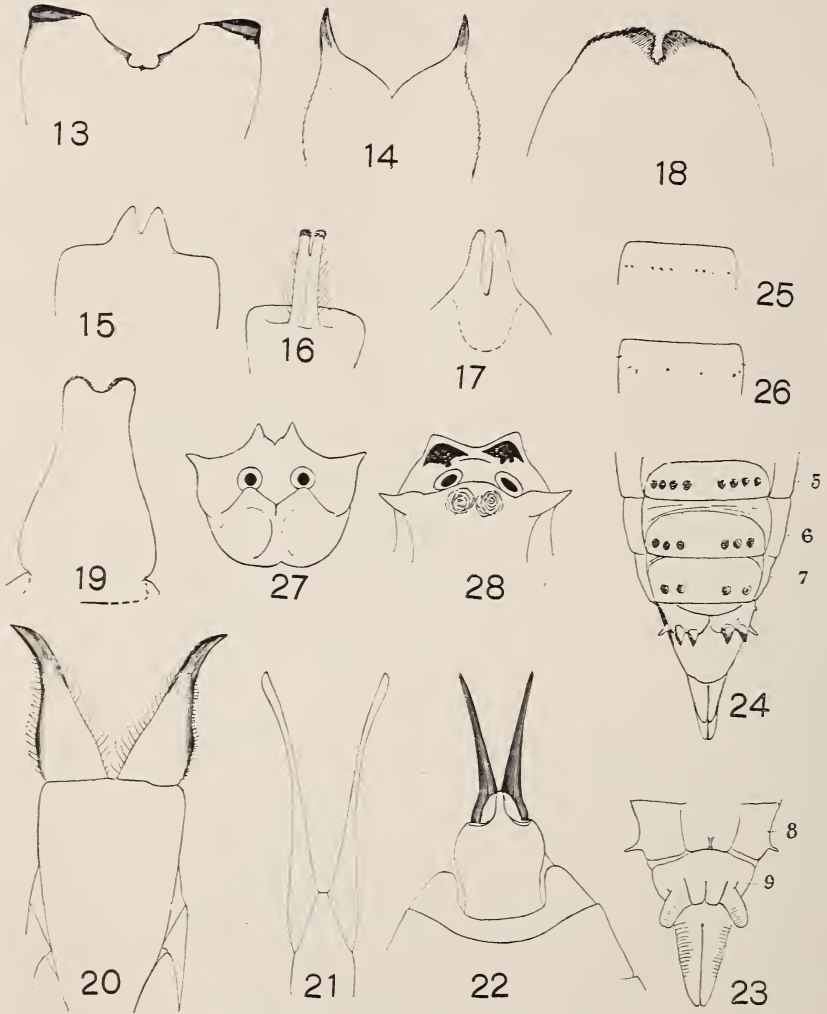
The fully grown larva measures 29-30 mm. in length and about 5 mm. in diameter; the form is plump, color light brownish yellow without conspicuous darker markings; hairs and setae sparse; the dorsa of the thoracic segments with hairs as in Plate 11, Figure 25; the abdominal segments have six bristles in alignment, the intermediate four being almost evenly spaced, the outer one being much the strongest; the fifth and sixth again are weak and situated close to the strong bristles (see Pl. XI, fig. 26). The stigmal field is surrounded by six weak teeth, the dorsal pair closely approximated, the lateral pair being latero-dorsal in position; the ventral pair very broad, the inner face with a broad-triangular black chitinized area. Stigmata large, separated by a distance about equal to the diameter of one stigma, located ventrad of the four dorsal-lying teeth that surround the stigmal field; gills fleshy, not prominent. (See Pl. XI, figs. 27, 28.)

Tricyphona glacialis Alexander, and *Tipula pribilovia* Alexander have previously been recorded by this author. (Proc. Calif. Acad. Sci., Fourth Ser. 11, pp. 183-184, Nov., 1921.)—W. L. M.



DETAILS OF CRANE FLIES (TIPULIDAE).

(Explanation on page 169.)



DETAILS OF CRANE FLIES (TIPULIDAE).

(Explanation on page 169.)

EXPLANATION OF PLATES X AND XI.

Plate X.—Details of Crane Flies (Tipulidae).

- Fig. 1. Wing of *Tricyphona hannai*, sp. n.
 Fig. 2. Wing of *Tipula whitneyi*, sp. n.
 Fig. 3. Wing of *Tipula pribilofensis*, sp. n.
 Fig. 4. Wing of *Tipula aleutica*, sp. n.; $R_1, 2, 3, 4, s$ =Radial veins; M_1, M_2, M_4 =Medial veins; Cu_1, Cu_2 =Cubital veins; 2d A=second anal vein.
 Fig. 5. Wing of *Tipula alascaensis*, sp. n.
 Fig. 6. Hypopygium of *Tricyphona hannai*; dorsal aspect; pl =ninth pleurite; d =dorsal appendage; v =ventral appendage.
 Fig. 7. Hypopygium of *Tipula whitneyi*; lateral aspect; 8t, 9t=eighth and ninth tergites; 8s=eighth sternite.
 Fig. 8. Hypopygium of *Tipula pribilofensis*; lateral aspect; lettering as in fig. 7; 9 st-pl=ninth sterno-pleurite.
 Fig. 9. Hypopygium of *Tipula aleutica*; lateral aspect; lettering as in figs. 7 and 8.
 Fig. 10. Hypopygium of *Tipula alascaensis*; lateral aspect; lettering as in fig. 7; 9s, 9pl=ninth sternite and pleurite.
 Fig. 11. Outer pleural appendage of *Tipula tenebrosa* Coquillett, lateral aspect.
 Fig. 12. Outer pleural appendage of *Tipula cimmeria* Speiser; lateral aspect.

Plate XI.—Details of Crane Flies (Tipulidae).

- Fig. 13. Ninth tergite of *Tipula whitneyi*; dorsal aspect.
 Fig. 14. Ninth tergite of *Tipula pribilofensis*; dorsal aspect.
 Fig. 15. Ninth tergite of *Tipula aleutica*; dorsal aspect.
 Fig. 16. Ninth tergite of *Tipula cimmeria*; dorsal aspect.
 Fig. 17. Ninth tergite of *Tipula tenebrosa*; dorsal aspect.
 Fig. 18. Ninth tergite of *Tipula alascaensis*; dorsal aspect.
 Fig. 19. Eighth sternite of *Tipula pribilofensis*; ventral aspect of the median lobe.
 Fig. 20. Ovipositor of *Tipula pribilofensis*; dorsal aspect.
 Fig. 21. Ovipositor of *Tipula whitneyi*; dorsal aspect.
 Fig. 22. Ovipositor of *Tipula alascaensis*; dorsal aspect.
 Fig. 23. Pupa of *Tipula whitneyi*; end of the abdomen, dorsal aspect; 8, 9=eighth and ninth segments.
 Fig. 24. Pupa of *Tipula whitneyi*; end of the abdomen, ventral aspect; 5, 6, 7=fifth, sixth, and seventh segments.
 Fig. 25. Larva of *Tipula* sp.; second thoracic segment, dorsal aspect, showing the distribution of the setae.
 Fig. 26. Larva of *Tipula* sp.; fifth abdominal segment, dorsal aspect, showing the distribution of the setae.
 Fig. 27. Larva of *Tipula* sp.; stigmal field, caudal aspect.
 Fig. 28. Larva of *Tipula* sp.; stigmal field, dorso-caudal aspect.

DIPTERA.

(Except TIPULIDAE, RHYPHIDAE, and CALLIPHORIDAE.)

By J. R. MALLOCH, *Assistant Biologist, Bureau of Biological Survey.*

(Plates XII-XV.)

The present collection contains a very large number of specimens but is not particularly rich in species. Moreover, there is nothing very remarkable in the material, the only genus that has not previously been recorded from Alaska being *Smittia*, a genus of Chironomidae described from the Arctic regions of Europe (Spitzbergen).

I have taken the opportunity of indicating in the introductory notes to each family what the known larval habits of the species are, considering that this information may have a certain value in a list of this nature even though it does not refer directly to the species in the list.

The arrangement is that of the Aldrich Catalogue, but there are several changes in generic names.

Suborder Orthorrhapha.

DIVISION NEMATOCERA.

Family CHIRONOMIDAE.

The larvae of most of the members of this family are aquatic in habit and those in the present collection are representatives of that section, belonging entirely to the subfamily Chironominae, though it is not improbable that some of them may be terrestrial as is the case with *Camptocladius byssinus* and some others. All of them except *Smittia* may be located generically by the use of the keys in my paper on Illinois Chironomidae subsequently cited. I have made figures of the male genitalia of the species described herein to prevent any misconceptions by future workers on the group as to their identity.

Genus *Chironomus* Meigen.

There is a striking similarity in the species of *Chironomus* in the collection. All are black, have the basal joint of the fore tarsi very little longer than the fore tibiae, and the males of all have the fore tarsi with long, soft hairs. Fortunately, the hypopygia of the males present in their structure good characters for differentiation of the species.

Synopsis of species.

- | | |
|---|--------------|
| 1. Males..... | 2. |
| Females..... | 4. |
| 2. Hypopygium with the superior processes indistinguishable, the inferior pair very small, apex of lateral arm obtusely truncate (Pl. XIII, fig. 6)..... | obtusilobus. |
| Hypopygium with superior and inferior processes present, the latter well developed, apex of lateral arm pointed or rounded..... | 3. |
| 3. Superior process of hypopygium small, obtuse, a distinct fasciculus of hairs above it under the dorsal plate, the apical process of the latter stout, apex of lateral arm rounded (Pl. XIII, fig. 16)..... | deviatus. |
| Superior process of hypopygium large, sickle-shaped, no fasciculus above it, apical process of dorsal plate slender, apex of lateral arm pointed (Pl. XIII, fig. 13)..... | conformis. |
| 4. Small species 3-4 mm. in length; mesonotum with a conspicuous pale spot on anterior lateral angles..... | deviatus. |
| Larger species 5-7 mm. in length; thorax black..... | 5. |
| 5. Wings brownish, veins very distinct; posterior branch of radius arcuate at tip..... | conformis. |
| Wings whitish, veins indistinct; posterior branch of radius straight or very slightly arcuate..... | obtusilobus. |

The males of all three species run down to caption 11 in my key to Group B, Subsection I of *Chironomus*.² The structure of the hypopygia readily separates them from the species therein included except in the case of *conformis* which has the hypopygium similar to that of *quadripunctatus*; the latter, however, has yellow legs.

Chironomus obtusilobus, n. sp.

Male.—Black, opaque. Antennal plumes fuscous. Legs fuscous, tibiae and tarsi yellowish or pale brown. Wings whitish, veins rather indistinct, cross vein faintly darkened. Halteres testaceous. Hairs on abdomen and legs pale brown.

Hypopygium as in Plate XIII, Figure 6, the lateral arms rather stouter than normal. Fore tarsi with long hairs, basal joint slightly longer than tibiae (120:113), second joint not greatly longer than third (35:30). Radius almost entirely straight, ending as far before apex of wing as media does behind it.

Female.—Agrees with the male in color. Fore tarsi without long hairs; legs stouter than in male.

Length, 7—8.5 mm.

Type locality.—St. George Island, June 17, 1914 (G. D. Hanna, lot 40), 4 males caught on the wing among bog plants, border of Gull Lake, beside Staraya Artel Rookery. Paratypes from St. Paul Island, 9 specimens, July 22, 1913, Big Lake (A. G. Whitney, lot 92), "collected from our coats as they swarmed past us while driving along the lake"; 18 specimens, same date and place (A. G. Whitney,

² Bull. Illinois State Lab. Nat. Hist., vol. 10, art. 6, 1915, p. 417.

lot 91), "swarms of these insects were driven by the breeze south-eastward off of the lake. These clouds of gnats noticeable throughout July and August."

*Chironomus deviatu*s, n. sp.

Male.—Black, shining, without pruinescence on thorax. Mesonotum slightly yellowish on anterior lateral angles. Legs fuscous, tibiae and tarsi paler. Wings whitish, veins pale, cross vein not infuscated, a black longitudinal streak on base of wing as in *Camptocladius*. Halteres testaceous. Antennal plumes and hairs on body and legs fuscous.

Hypopygium as in Plate XIII, Figure 16; the fasciculus of hairs below dorsal plate is more characteristic of the hypopygia of *Tanytarsus* than of *Chironomus* but the wings are not hairy. Basal joint of fore tarsi slightly longer than tibia (50:42), second joint distinctly longer than third (29:21); fore tarsi and mid and hind legs with long hairs. Wings narrow; radius ending appreciably farther in front of apex of wing than does media behind it.

Female.—Differs from the male in having the anterior lateral margins of the thorax with a conspicuous yellow or greenish spot, the legs much paler, and the base of the wings noticeably yellowish. Fore tarsi without long hairs.

Length, 3.25–4.5 mm.

Type locality.—St. Paul Island, Laboratory (A. G. Whitney, lot 39), 3 males and 1 female. "From a great many on window; probably hatched from native *Sagina* sod transplanted to laboratory a few days before."

The specimens taken on this occasion did not represent a single species, as a male of an *Orthocladius* bears the same lot number. I regret that more specimens were not taken, as it is not improbable that there were more than 2 species present.

Chironomus conformis, n. sp.

Male.—Deep black, opaque. Antennal plumes fuscous; thorax with slight indications of 3 longitudinal grayish pruinulent lines; abdomen with faint brownish posterior margins to segments; legs fuscous, tibiae and tarsi yellowish; wings slightly brownish, veins distinct, cross vein darkened; halteres yellowish brown; hairs on body black, on legs brownish.

Hypopygium similar to that of *decorus* Johannsen, the superior process and apical portion of lateral arm as in Plate XIII, Figure 13. Basal joint of fore tarsi very little longer than fore tibia (82 : 78), second joint very much longer than third (52 : 30); fore tarsi and mid and hind legs with very long and rather dense hairs. Radius slightly arcuate apically, ending as far before apex of wing as does media behind it.

Female.—Agrees in color with male. Fore tarsi without long hairs; basal joint about as long as fore tibia.

Length, 8–9 mm.

Type locality.—St. Paul Island, August 16, 1914 (E. A. Preble), 2 males, 1 female; paratypes, 1 male, 1 female, same island, June 5, 1913 (A. G. Whitney, lot 37), laboratory. I have before me a paratype from Admiralty Bay, Alaska, June 27, belonging to the Philadelphia Academy of Natural Sciences. I had purposed describing the species from this specimen but take the present opportunity of doing so in company with this additional material and make the Admiralty Bay specimen a paratype.

Genus *Tanytarsus* Van der Wulp.

There is one species of this genus amongst the present material, *similatus*, which was originally described by the present writer, in the paper cited under the previous genus, from material obtained at Madison, Wisconsin. The species described on a previous page as *Chironomus deviatus* has the hypopygial characters of *Tanytarsus*, but I can not detect any surface hairs on the wings and pending the receipt of better specimens I leave it in *Chironomus*, although inclined to consider it as possibly belonging to the present genus.

Tanytarsus similatus Malloch.

Tanytarsus similatus, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, art. 6, p. 494, 1915.

In my original description of this species I stated that the hypopygium was similar to that of *viridiventris*, differing in the structure of the superior and inferior processes. The dorsal plate of my specimen appeared to have the apical extension broken off and I did not figure it. In the example before me I find that the dorsal plate is the same as in the type and presents an added character for distinguishing the species. (Pl. XIII, fig. 11.)

Locality, St. Paul Island, 1 male and 2 females, July 22, 1913 (A. G. Whitney, lot 93); Big Lake. "Collected at same time as larger ones [*Chironomus conformis*] from lake shore."

Genus *Orthocladius* Van der Wulp.

Most of the specimens of this family in the present collection belong to the genus *Orthocladius*. A few of the examples are in fairly good condition and are identifiable, but the greater portion are poorly preserved and in that condition are impossible of identification, or at least are not in condition that warrants my giving a specific name to them, because of the very large number of extremely closely allied forms occurring in the genus and the liability to error. It is possible for me to identify the following species.

Orthocladius obumbratus Johannsen.

Orthocladius obumbratus Johannsen, Bull. 86, New York State Museum, p. 281, 1905.

This species is represented by a large number of specimens in the collection. Johannsen described the species from examples obtained at Ithaca, N. Y., and Douglas, Alaska. A comparison of the hypopygia of an Ithaca specimen sent me by Prof. Johannsen and one of those from St. George Island shows that they are the same species. I give herewith (Pl. XIII, fig. 10) a figure of the apical prolongation of the dorsal plate of the hypopygium; in *nivoriundus* and most allied species this plate is without conspicuous hairs.

The data on specimens in collection is as follows: St. George Island, 35 specimens June 17, 1914 (lot 37, G. D. Hanna).

Orthocladius nivoriundus Fitch.

Chironomus nivoriundus Fitch, Winter Insects of Eastern New York, p. 274, 1846.

Not so numerously represented as the foregoing.

St. George Island:

- 1 specimen, June 5, 1913 (lot 39, A. G. Whitney).
- 1 specimen, June 10, 1914 (lot 11, G. D. Hanna).
- 8 specimens, June 17, 1914 (lot 37, G. D. Hanna).

Orthocladius sp. I.

A male specimen in rather poor condition has the hypopygium differing from that of *nivoriundus* in having no distinct extension of the dorsal plate. This may be the result of an accident as the normal extension is easily broken.

St. George Island: 1 specimen June 17, 1914 (lot 37, G. D. Hanna).

Orthocladius sp. II.

A male specimen lacking front tarsi and otherwise in poor condition has the hypopygium very different from that of *nivoriundus*. Undoubtedly the example belongs to a distinct species that is probably undescribed.

The extension of the dorsal plate is very long and slender, and the apical shoe-shaped portion of the lateral arm is much stouter than in any species known to me.

St. George Island: 1 specimen, June 14, 1914 (lot 23, G. D. Hanna).

Orthocladius sp. III.

A male specimen lacking the apical portion of the abdomen represents a species unknown to me. Differs from the 4 species already mentioned in having the scutellum yellow apically. The fore tarsi are bare, and very long, the basal joint being four-fifths as long as the tibia.

St. George Island: June 5, 1913 (lot 39, A. G. Whitney).

Orthocladius sp. IV.

Two males of a small species in poor condition. The species resembles *Trichocladius infuscatus* Malloch, but the legs are slightly yellowish.

St. George Island: June 17, 1914 (lot 37, G. D. Hanna).

Genus *Smittia* Holmgren.

The genus *Smittia* has not previously been recorded from America, the only described species having been taken on the islands of Nova Zembla (*longipennis*) and Spitzbergen (*brevipennis*) in the Arctic regions of the Old World. Although the original description of the genus is not very full I have no hesitation in placing the present species in *Smittia*. It is possible, though not at all probable, that the Alaskan species is the same as that described from Spitzbergen, but I am not able to find in the description of the latter confirmation that is necessary to permit me arriving at a decision that they are identical. I am therefore describing the present species as new. I have also taken this opportunity of redescribing the genus and indicating its true position in the Chironominae.

Description of Genus.

Male.—Antenna apparently 10-jointed (2+8), basal and apical flagellar joints elongated, joints 5, 6, and 7 not separated on their entire circumference (Pl. XIII, fig. 7), flagellar hair very short, the longest not exceeding the apical joint in length; palpi 4-jointed, base slightly tuberculate, basal joint about as broad as long and half as long as second, joints 2, 3, and 4 subequal; fore tarsi with the basal joint shorter than fore tibia; hypopygium as in *Orthocladius* (sens. lat.) and *Camptocladius*, the apical portions of lateral arm recurved (fig. 5), venation as in *Orthocladius*.

Female.—Differs from the male in having the antenna (Pl. XIII, fig. 8) 7-jointed (2+5).

Keiffer has indicated that Orthocladariidae may be separated from the group which contains *Chironomus* by the nature of the armature of the apex of the hind tibia. In *Orthocladius* there is a distinct spur, while in *Chironomus* and allied genera there is a comblike series of setulae. In the present species the hind tibial characters and also those of the hypopygium are those of the *Orthocladius* group. The genus as a more specialized form should be placed after that genus in our lists.

Smittia arctica, n. sp.

Male and female.—Black, opaque. Halteres obscurely yellowish. Legs piceous. Wings whitish, veins yellow.

Male.—Antennal sensory organs pale, hairlike (Pl. XIII, fig. 7); eyes bare. Pronotum linear, very slightly notched centrally; meso-

notum with 3 longitudinal series of weak hairs on disc, the central series weakest. Abdomen 1.5 times as long as head and thorax combined; hypopygium as Plate XIII, Figure 5. Basal joint of fore tarsi slightly over half as long as tibia (26:47); legs with very short hairs; claws flattened at apices but without distinct apical incisions; empodium slender, as long as claw, distinctly fringed. Wings not extending to apex of fifth abdominal segment; costa extending to apex (Pl. XIII, fig. 12).

Female.—Antenna as in Plate XIII, Figure 8. Abdomen stout. Basal joint of fore tarsi distinctly over half as long as fore tibiae (15:25); claws acute at apices. Wing veins not so thick as in male.

Length, 1.75–2.25 mm.

Type specimen.—St. Paul Island, May 23, 1914 (A. G. Whitney, lot 143).

Paratypes.—St. Paul Island, 6 males and 7 females, May 23, 1914, from outside of laboratory window (A. G. Whitney, lot 152); 1 female, May 17, 1913 (A. G. Whitney, lot 29); 1 female, July 9, 1913 (A. G. Whitney, lot 67); St. George Island, 2 females, June 16, 1914 (G. D. Hanna, lot 32), taken by sweeping toward East Rookery; and 1 female, June 17, 1914 (G. D. Hanna, lot 37), Staraya Artel Rookery.

The type and lot 67 are on slides, the others are mounted on card points.

In my paper on the Chironomidae of Illinois³ the genus *Smittia* runs down to *Orthocladus* (sens. lat.) and is readily separated from any of the subgenera therein contained by the very short wings and the number of antennal joints in both sexes.

Family MYCETOPHILIDAE.

The larvae of most of the species of this family feed upon fungi and decaying vegetable matter, some of them occurring in colonies under bark of dead trees or fence posts. The flies are usually difficult to collect except by sweeping amongst overhanging bushes or grasses or at lights, though at times they may be found in numbers on fungi or on the inner sides of windows of out-houses or buildings. There are only seven specimens of the family in the present collection, representing five genera. Unfortunately, a specific identification is not possible in two cases owing to the poor condition of the specimens.

Genus *Macrocera* Meigen.

There are 9 species of the genus *Macrocera* described from North America, none of which have been recorded from Alaska. The only

³ Bull. Illinois State Lab. Nat. Hist., vol. 10, art. 6, 1915.

example of the genus in the present collection apparently belongs to an undescribed species.

Macrocera beringensis, n. sp.

Male.—Glossy black-brown. Mouth parts and basal 2 antennal joints yellowish; antennal flagellum shining, black. Prothorax, pleural sutures, and scutellum yellowish, remainder of thorax glossy black-brown. Abdomen unicolorous black-brown. Legs testaceous, apices of mid and hind coxae, and the tarsi infuscated. Wings slightly grayish, a large fuscous spot over petiole of media; another between the branches of cubitus touching the posterior branch along its apical half and not extending to anterior branch; a similarly colored, slightly curved, fasciform spot between middle of wing and apex, the posterior extremity of which covers the apical half of anterior branch of cubitus and the anterior one extending to fork of radius; apical spot rather faint. Halteres testaceous, more or less tinged with brown.

Antenna not over $1\frac{1}{2}$ times as long as entire body, flagellum rather thick and from fourth joint to apex distinctly hairy, basal flagellar joint about one-fourth longer than second and slightly longer than third; median ocellus as large as lateral; frons with a distinct median furrow. Hypopygium stout, apex of lateral arms each with a stout black thorn on inner angle. Legs long but not particularly slender; basal joint of fore tarsus two-thirds as long as fore tibia and slightly longer than the remaining tarsal joints combined. Petiole of media very short, about 3 times as long as its own diameter; costa extending almost to apex of wing; its last section about 4 times as long as its penultimate one—the one preceding fork of radius; disk of wings without distinct hairs, veins except the anal one with setulose hairs. Length, 6 mm.

Type.—St. Paul Island, Summer, 1914 (E. A. Preble).

Genus *Boletina* Staeger.

A single female specimen of a species of this genus is contained in the collection but is in such poor condition that its identity is uncertain. In most particulars it agrees with *beringensis* Coquillett. It is an abnormal specimen in so far as its wing venation is concerned, one wing having the base of the anterior branch of media absent while the other has it present. As this character, the absence or presence of this portion of this vein, is used as a generic one, this departure in the present case is worth recording.

Locality.—St. George Island, June 27, 1914 (G. D. Hanna, lot 49); toward Zapadni.

Boletina obesula Johannsen.

Boletina obesula Johannsen, The Fungus Gnats of North America, Bull. 196, Maine Agr. Exp. Sta., Dec., 1911, p. 276.

Recorded by Cole (Proc. Calif. Acad. Sciences, 4th ser., vol. 11, p. 169, Nov., 1921) from St. Paul Island, the record being based upon one female taken by G. D. Hanna June 21, 1920.

Boletina sp.

One male of an "undescribed species" recorded by Cole as "too poorly preserved for description" in the same paper as above, from St. Paul Island, June 21, 1920, G. D. Hanna (p. 170).

Genus *Rhymosia* Winnertz.

Rhymosia sp.

A female specimen in poor condition, minus legs and antennae. St. Paul Island, August 19, 1914 (E. A. Preble).

Genus *Allodia* Winnertz.

Allodia subelata, n. sp.

Pl. XIII, fig. 9.

Male.—Fuscous, opaque; flagellum and legs brown; wings grayish, veins brown; halteres testaceous yellow; hairs yellow, bristles blackish.

Antenna about one and one-third times as long as head and thorax together; frons with the normal soft decumbent hairs, scutellar bristles 4 in number; 3 bristles above base of fore coxa and about 6 at apex of each. Comparative lengths of fore tibia and fore metatarsus 28:23; hind tibial setulae very weak; spurs on mid and hind tibiae long and stout. Hypopygium as in plate 13, figure 9. Furcation of media distinctly beyond apex of cross vein, the latter barely more than half as long as petiole; furcation of cubitus directly below proximal end of cross vein, the angle very acute; anal vein indistinct, subcostal vein very short, ending in radius.

Length, 3 mm.

Type.—St. George Island, June 14, 1914 (G. D. Hanna, Lot. 23); Garden Cove.

This species is closely allied to *elata* Johannsen, differing in venation and hypopygial characters chiefly.

Genus *Exechia* Winnertz.

Exechia casta Johannsen.

Exechia casta Johannsen, The Fungus Gnats of North America, part 4, Bull. 200, Maine Agr. Exp. Sta., p. 74, June, 1912.

One male and 2 females in collection evidently belong to this species. The data on specimens is as follows: St. George Island, June 16, 1914 (G. D. Hanna, Lot 32). Taken by sweeping, toward East Rookery. I have made a drawing of the male hypopygium

(Pl. XIII, fig. 14) which shows some slight differences from that given by Johannsen.

Johannsen's specimens were obtained from the following localities: Black Rock Creek, Dubois (type), Dinwiddie Creek, Hunters Creek, Wyoming, in September.

Family SCIARIDAE.

The species of this family represented in the collection belong to the genus *Sciara*. The members of this genus are remarkably similar in general appearance and it is only by the use of characters of wing venation and of genitalia that they can be differentiated with anything like certainty in the adult stage. The larvae which I have examined likewise very closely resemble each other, and those I have found were invariably feeding upon decaying vegetable matter, manure, or in fungi. One species I have reared from fallen plums. I have recently described the larva of a species that is often found crawling on the surface of the ground in immense numbers in the form of a rope-like mass.⁴ A number of other species in the family are known to have the same habit. The imagines, exclusive of the Arctic forms, have been dealt with in an extensive paper by Prof. O. A. Johannsen.⁵

Genus *Sciara* Meigen.

There are representatives of 3 species of this genus in the collection. One of these is, I am confident, identical with one described by Rubsaamen; one is evidently undescribed, while the third is in too poor condition to permit of its exact identity being ascertained.

Sciara glacialis Rubsaamen.

Pl. XIII, fig. 3.

Sciara glacialis Rubsaamen, Bibl. Zool., Orig.—Abh. aus dem Sessannu. d. Zool. Suft. 20, 1898, p. 109.

Sciara humicola Lundbeck, Vidensk. Middel. f. d. Naturhist. Foren. Kjobenhaven, 1898, p. 252.

Hypopygium of male as in Pl. 13, fig. 3. This species is evidently common on St. George Island, as it is represented by 64 specimens in the collection, with data as follows:

3 specimens, June 10, 1914 (lot 11, G. D. Hanna).

3 specimens, June 14, 1914 (lot 23, G. D. Hanna).

32 specimens, June 16, 1914 (lot 32, G. D. Hanna).

1 specimen, June 16, 1914 (lot 36, G. D. Hanna).

22 specimens, June 17, 1914 (lot 37, G. D. Hanna).

3 specimens, June 24, 1914 (lot 46, G. D. Hanna).

Lots 32, 36, and 46 were obtained "toward East Rookery;" lot 11 from near beach at East Landing; lot 23 from Garden Cove; and lot 37 Staraya Artel Rookery.

⁴ Bull. Illinois State Lab. Nat. Hist., vol. 11, art. 4, 1915.

⁵ The Fungus Gnats of North America, Part IV, Bull. No. 200, Maine Agr. Exp. Sta., 1912.

Sciara unguicauda, n. sp.

Male.—Brownish black, thorax shining, abdomen opaque. Legs, especially the fore pair, yellowish brown. Wings clear, veins pale brown. Halteres rufotestaceous. Arms of hypopygium reddish.

Face slightly buccate; eyes hairy, disc of mesonotum with short and very sparse hairs. Hypopygium similar to that of *glacialis*, the apical portion of lateral arm stouter, and the terminal thorn very strong. First branch of radius ends distinctly short of furcation of media; costa extends half way from apex of radius to apex of anterior branch of media; petiole of media subequal in length to anterior branch of that vein, the branches not appreciably divergent apically; cross vein over midway from base of first branch of radius; media leaves radius distinctly proximad of midway from base to cross vein; furcation of cubitus slightly proximad of base of media.

Female.—Slightly paler in color than the male. Apical plate of genitalia nearly twice as long as wide, subequal in length to pre-apical, and distinctly longer than basal one.

Length, 3–4 mm.

Type.—St. George Island, July 8, 1914 (lot 55, G. D. Hanna). Allotype and paratypes, same data. Paratypes, July 4, 1914 (lot 52, G. D. Hanna); toward Zapadni Rookery. Seven specimens.

Sciara sp.

A single male specimen in rather poor condition differs from the other two in structure of the hypopygium (Pl. XIII, fig. 4). In the form of the apical portion of the hypopygium it approaches closely that of *varians* Johannsen, a species described from Lawrence, Kans.; Ithaca, N. Y.; and Moscow, Idaho. The wings are in very poor condition and the specimen is otherwise in such a state that I can not give a definite identification. The data connected with it is as follows:

St. George Island, July 8, 1914 (lot 55, G. D. Hanna).

Genus *Neosciara* Petty.

Neosciara sp.

Cole (Proc. Calif. Acad. Sciences, 4th ser., vol. 11, p. 170, Nov. 1921) records a female specimen "in rather poor condition, so that its identity is not certain" but "near *tridentata* Rubs.", St. Paul Island, June 21, 1920 (G. D. Hanna).

Family BIBIONIDAE.

Genus *Dilophus* Meigen.

Dilophus tibialis Loew.

Dilophus tibialis Loew, H. Diptera Americae septentrionalis indigenae. Centuria, IX, 61, 1869. Complete Work, vol. 2, p. 200. [Sitka.]

A single female, collected on St. Paul Island, June 24, 1916, by G. Dallas Hanna is referred to this species by W. L. McAtee, who notes that it differs from the typical form by absence of yellow on body; when males are available the species may prove to be new.

DIVISION BRACHYCERA.

Family LEPTIDAE.

This family is represented in the present collection by a single species of the genus *Ptiolina*.

The larvae of the known species of the family are largely terrestrial, living in the soil in woods or in decaying tree stumps and feeding upon earthworms and larvae of insects. One genus, *Atherix*, is aquatic in the larval and pupal stages, living in flowing water. The genus *Ptiolina* occurs in the larval stage in Europe in woods, under moss or in the earth. I have taken the imagines only in very marshy spots at rather high altitudes.

Genus *Ptiolina* Zetterstedt.

This genus is separable from *Spania* by the structure of the third antennal joint as pointed out by Verrall.⁶ It is highly probable that all of our three North American species previously described belong to this genus instead of *Spania*. The latter occurs in the same situations as *Ptiolina* in Europe, but is much commoner.

Ptiolina arctica, n. sp.

Male and female.—Brownish black, slightly shining. Immature specimens yellowish brown. Wings clear or slightly grayish. Halteres brown or yellowish.

Male.—Eyes large, closely contiguous for a short distance; ocelli situated upon a distinct elevation; space above antennae subtriangular; eyes widely divergent posteriorly on sides of face; basal 2 antennal joints short, subequal, short-haired above, third joint missing; palpi broad, rather hairy. Thorax with rather short and sparse hairs, most noticeable on the anterior lateral and posterior portions; scutellum convex, rounded in outline, surface hairs of moderate length, not dense. Abdomen more conspicuously hairy than thorax; hypopygium chitinised, lateral arms stout, symmetrical, rounded apically, not hairy. Legs moderately stout, their surfaces with short hairs; mid and hind tibiae with apical spurs. Venation normal; fork of third vein frequently evanescent at base; branches of media not fused at apex of discal cell; anal cell closed.

Female.—Agrees in color with the male.

⁶ British Flies, vol. 5, p. 316, 1909.

Eyes very widely separated; third antennal joint much longer than broad, its apex tapering; style terminal, as long as third joint. Apex of abdomen slightly tapering. Otherwise as male.

Length 7-8 mm.

Type locality.—St. George Island, August 4, 1914 (G. D. Hanna).

This species is larger than any of those previously described from North America. Coquillett has recorded *Spania edeta* Walker, from Alaska. This species is velvety black and has only a length of 4 mm. Neither of Loew's species can be identical with the one here described, differing both in color and venation.

The specimens before me are in poor condition either having been wet or at one time in alcohol, and are much discolored. Some of them were evidently immature when captured. The thorax may be in well preserved examples more or less distinctly vittate as traces of vittae are visible in one or two of those in this collection. The venation is like that of most Leptidae, rather unstable.

The larva of this species has not been described. A vial numbered 14116, containing 2 larvae from the stomach of *Plectrophenax nivalis townsendi*, St. Paul Island, June 19, 1890, is before me and the specimens are, I believe, referable to this species. The description is as follows:

Length, 8-9 mm. White, cephalic parts dark castaneous. Body cylindrical, tapered on prothorax and mesothorax, and flattened on dorsal surface of apical segment. Head of the same general structure as that of *Chrysopila*, differing in having the labrum much broader, blunt at apex, the sides slightly tapered anteriorly, and the dorsum slightly ridged transversely on anterior half; antennae short and stout, not twice as long as thick, terminal joint very minute; between the antennae and the labrum there is on each side a large pale membranous area, the surface of which is granular; maxillae large, almost entirely pale and membranous, palpi much smaller than antennae; mandibles stout, slightly hooked at apex; posterior dorsal arcuate shield about $1\frac{1}{2}$ times as long as broad, rounded posteriorly; internal cephalic rods extending to posterior margin of head. Thoracic and abdominal locomotor organs not easily distinguishable in specimens owing to condition, but evidently consisting of slightly raised transverse areas on venter, similar to those on *Chrysopila*, which are armed with very small, sharp toothlike elevations; apical segment slightly longer than its basal breadth, rounded from near middle, its apex with 2 small upwardly directed, slightly chitinized teeth, which are separated by a distance greater than the height of either tooth, dorsum with 6 longitudinal grooves or furrows which do not extend to apex, and give a ridged appearance to the segment; venter of apical segment with flat elevation extending from base to

near apex, its apical outline in the form of 2 rounded lobes, slightly cephalad of middle of this flat area is the anal opening which is very distinct, and oval in shape; between the apex of the above elevation and extreme apex of segment there is a slight but distinct incision parallel to apical margin of segment.

Family EMPIDIDAE.

The larvae of the great majority of the species in this family are terrestrial and feed upon vegetable matter in the soil or in rotten wood or upon larvae or other small animals. One species has been found in the larval and pupal stages in running water in New York State. The adult females are predaceous but many species are found in large numbers upon flowers of various plants. The two genera represented in the present collection are the largest in point of numbers in the family, and are the most widely distributed and common. Coquillett has described or recorded about 20 species of the genus *Rhamphomyia* and seven species of *Empis* from Alaska.

Genus *Empis* Linnaeus.

There are four species of this genus in the collection, all in rather poor condition and all represented by females only. With one exception the species in this collection are referable to the group that contains *virgata* Coquillett.

Coquillett⁷ recorded *Empis virgata* Coquillett from Alaska and *pellucida*, *fumida*, and *infumata* were described by him at the same time, all being referred to as resembling *virgata* and only the first being described fully, the others being briefly compared with it. I had 4 specimens before me that belong to the same group as *pellucida*; because of the rather meagre descriptions I was unable to satisfactorily identify the species. I was obliged, therefore, to borrow paratypes of Coquillett's species from the United States National Museum for comparison. I have drawn up a key to the species (females), which is presented herewith, using characters not mentioned in the original descriptions.

All of the species are black in color, the legs sometimes brownish in *pellucida*, the mesonotum either trivittate or quadrivittate, the vittæ shining and the intervening spaces grayish pruinose; legs with very few weak spines, not feathered; halteres yellow. There is a very great similarity between the 5 species, and the synopsis now given embodies practically all the essential characters useful for their separation.

⁷ Proc. Washington Acad. Sci., vol. 2, p. 408, 1900.

Key to species of virgata group.

1. Hind femora with several distinct bristles on antero-dorsal surface of apical third; tibial bristles strong, those on hind tibiae longer than the diameter of the tibia; notopleural bristles 5 in number, the anterior one weak, the posterior 4 strong, subequal in length and rather closely placed, the series in a straight line; third antennal joint tapering except on a short space at base; fork of third vein about twice as long as the section of costa preceding it.....*fumida* Coquillett.
Hind femora without distinct bristles on apical third of antero-dorsal surface, only the normal short hairs present; hind tibial bristles not longer than the tibial diameter; notopleural bristles rather weak, widely placed and usually 3 in number, fork of third vein not twice as long as section of costa preceding it..... 2.
2. Fore coxa with very few widely placed hairs on anterior surface, seen from the side only about a dozen visible; hind femora and tibiae slender, the former almost nude on anterior surface; distance between apices of third vein and first branch of media distinctly greater than that between branches of media, measured along margin of wing, because of a distinct deflection of the first branch of media just below fork of third.....*pellucida* Coquillett.
Fore coxae with numerous rather long, soft hairs anteriorly..... 3.
3. Thorax trivittate, the vittae shining, the spaces between gray pruinose; wings slightly infuscated at apices.....*virgata* Coquillett.
Thorax quadrivittate, occasionally the vittae are not very distinct; wings evenly lutescent or pale brownish, not noticeably darker at apices than elsewhere..... 4.
4. Proboscis distinctly more than twice as long as height of head; fork of third vein slightly bent in middle, base of cell enclosed by it acute posteriorly.....*infumata* Coquillett.
Proboscis less than twice as long as height of head; fork of third vein rather abruptly bent at middle, the base of cell enclosed by it obtuse posteriorly.....*subinfumata*, n. sp.

Empis infumata Coquillett.

Empis infumata Coquillett, Proc. Washington Acad. Sci., vol. 2, p. 409, 1900.

Two specimens in rather poor condition, having been wet, obtained June 27, 1914 (lot 49, G. D. Hanna), on St. George Island, are evidently referable to this species. Originally described from Popof Island, Alaska.

Empis subinfumata, n. sp.

Female.—A more robust species than *infumata* with a more intense black coloring, the legs and palpi being entirely black. The thoracic hairs are more conspicuous and the legs are rather stouter. The hind femora and tibia each possess a sulcus on the anterior surface apically, but this may not be evident in fresh, well-matured examples. Other characters are mentioned in key.

Length, 6 mm.

Type locality.—St. George Island, June 16, 1914 (lot 35, G. D. Hanna). One specimen.

Empis sp.

A female taken May 1, 1913 (lot 18, A. G. Whitney) on St. Paul Island, very probably represents a distinct species. It differs from *subinfumata* in having the mesonotum much more distinctly pruinose and in having 4 notopleural bristles, but is in such poor condition that I do not deem it advisable to describe it as new.

Empis sp.

Cole (Proc. Calif. Acad. Sciences, 4th ser., vol. 11, Nov., 1921, p. 170) records a male of a species "probably undescribed" in "poor condition" from St. George Island, June 30, 1920 (G. D. Hanna).

Possibly one of the species listed above.

Empis frontalis Coquillett.

Empis frontalis Coquillett, Proc. Ent. Soc. Washington, vol. 5, p. 271, 1903.

This species was originally described from specimens obtained on St. George Island by Professor Kincaid and is represented in the collection by 2 females also from that island. The data connected with the specimens are as follows:

June 17, 1914 (lot 49, G. D. Hanna).

August 4, 1914 (G. D. Hanna).

Genus *Rhamphomyia* Meigen.

This genus is represented by one species of which there are 56 specimens in the collection. I can not definitely associate it with any described North American species and describe it herewith.

I have reared one species of this genus from larvae found in rotten tree-stumps.

Rhamphomyia opacithorax, n. sp.

Male.—Black, slightly shining, the thorax almost entirely opaque, because of the dense brownish surface pruinescence. Head entirely black. Mesonotum not vittate, hairs and bristles black. Abdomen not so distinctly pruinose as thorax, the hairs yellowish or whitish. Legs entirely black, the femora glossy; surface hairs fuscous. Wings whitish hyaline, veins brown, stigma brown. Halteres brown, knobs fuscous.

Eyes contiguous for one-half the length of frons; third antennal joint long, tapering from base to apex; style nearly one-third as long as third joint; proboscis not over $1\frac{1}{2}$ times as long as height of head. Mesonotum with very long upright hairs laterally; acrostichals 2-rowed, very weak; scutellum with 4 bristles. Hairs on abdomen rather long; hypopygium as in Plate XIII, Figure 15. Legs moderately stout; basal joint of fore tarsi slender, not as thick as tibia at apex; hind femora and tibiae slightly thickened, the lat-

ter appreciably so at apices; dorsal surfaces of hind tibiae clothed with rather dense soft hairs which become longer from base to apex; basal joint of hind tarsi thicker than basal joints of other tarsi but slightly thinner than hind tibiae apically, the dorsal surface with long hairs. Greatest length of discal cell equal to length of last section of fifth vein; sixth vein incomplete; veins 1 to 3 more distinct than other veins.

Female.—Differs from the male in having the wings rather uniformly pale brownish, all the veins equally distinct, the hind legs less stout and without long hairs.

Length, 4.25–5.25 mm.

Type locality.—St. Paul Island, July 24, 1914 (lot 195, A. G. Whitney), 56 specimens.

Rhamphomyia sp.

Cole (Proc. Calif. Acad. Sciences, 4th ser., Vol. II, p. 170, Nov., 1921) records the occurrence of the female of a species "very close to *conservativa* Malloch" from St. Paul Island, August 10, 1920 (G. D. Hanna).

Family DOLICHOPODIDAE.

A surprising feature of the present collection is the fact that there is but one species of Dolichopodidae in it. The majority of the members of this family are aquatic, many of the species being confined to the seashore. The single species represented in the material before me belongs to a group that is invariably aquatic in habit, the adults running with facility on the surface of pools of water on or near the seashore. Several species belonging to genera closely allied to *Hydrophorus* are predaceous and in some manner the whole family has been credited by various authors as being predaceous, which is erroneous, the great majority of species in the family feeding upon nectar or other liquids.

Genus *Hydrophorus* Fallen.

Hydrophorus fumipennis Van Duzee.

Hydrophorus fumipennis Van Duzee, Proc. Cal. Acad. Sciences, vol. 11, p. 167, 1921.

This species is represented by 60 specimens taken on St. George Island, by G. D. Hanna, and 1 specimen by the same collector on St. Paul Island, August 16, 1915. The St. George specimens bear dates and lot numbers as follows: 2 specimens, June 4, Lot No. 2; 4 specimens, June 10, Lot No. 11; 9 specimens, June 16, Lot No. 36; 4 specimens, June 17, Lot No. 44. Lot No. 2 was taken in grass and on very wet, soggy ground near Village Landing; Lot No. 11 near beach at East Landing; Lot No. 36 toward East Rookery from Village;

and Lot 44 around a sphagnum bog one-fourth mile west of Village. Specimens from St. George without lot numbers are: 13, September 3, 1913; 9, May 4, 1914; and 19, April 1, 1914, G. D. Hanna.

The species was originally described from St. Paul Island.

Suborder Cyclorrhapha.

DIVISION ASCHIZA.

Family PHORIDAE.

The larvae of this family have in the different genera very diverse habits. Some are internal parasites of living insects, larvae, pupae, and imagines, but the great majority are scavengers, feeding upon decaying animal and vegetable matter. A summary of the larval habits appears in my paper on the family printed in 1912.⁸

The only species in the present collection belongs to the genus *Aphiochaeta* and to the group of that genus that feed upon fungi in their larval stages.

Genus *Aphiochaeta* Brues.

Aphiochaeta dubitata Malloch.

Aphiochaeta dubitata Malloch, Proc. U. S. Nat. Mus., vol. 43, p. 480, 1912.

Six specimens with data as follows:

St. George Island.

1 specimen, June 16 (lot 32, G. D. Hanna).

3 specimens, June 17 (lot 37, G. D. Hanna).

St. Paul Island.

2 specimens, August 16, 1915 (G. D. Hanna).

Family SYRPHIDAE.

The larvae of the different genera of Syrphidae have very diverse habits; some are scavengers, others are aphidophagous, while some live in nests of Hymenoptera, assumably feeding upon the detritis of the nests. The two species in the present collection are probably scavengers in an aquatic or semiaquatic habitat in their larval states.

Genus *Helophilus* Meigen.

Helophilus borealis Staeger.

Helophilus borealis Staeger, Kroy. Natur. Hist. Tidsskrift, n. ser. 1, p. 359, 1845.

This species which was originally described from Greenland is represented in the collection by one female the data for which is August 1, 1914 (E. A. Preble).

⁸ Proc. U. S. Nat. Mus., vol. 43, pp. 411-529, 1912.

Helophilus dychei Williston.

Helophilus dychei Williston (in Hunter), Can. Ent., vol. 29, p. 136, 1897.

This species, which was originally described from specimens obtained at Sitka, Alaska, is represented by 2 males and 1 female in this collection. The data are as follows:

St. George, August 22, 1913 (G. D. Hanna).

St. George, June 14, 1914 (Lot 18, G. D. Hanna).

St. Paul, June 5, 1913 (Lot 38, A. G. Whitney).

The thorax in both specimens is very densely long pilose and the 2 abbreviated discal stripes are very indistinct, almost invisible.

Genus *Pterallastes* Loew.*Pterallastes borealis* Cole.

Pterallastes borealis Cole, Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 170, Nov., 1921.

Described from a male and female collected on St. Paul Island, August 20, 1920 (G. D. Hanna). Closely related to *perfidiosus* Hunter.

Genus *Syrphus* Fabricius.*Syrphus contumax* Osten Sacken.

Syrphus contumax Osten Sacken, Proc. Boston Soc. Nat. Hist., vol. 18, p. 148, Oct., 1875.

Recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 171, Nov., 1921), from St. George Island, June 30, 1920 (G. D. Hanna).

DIVISION SCHIZOPHORA.

Family ANTHOMYIIDAE.

The larvae of the species comprising this family are mostly phytophagous or scavengers, though certain species are recorded as parasitic upon nestlings of some birds, living attached to various parts of their bodies. The few species in the collection before me belong apparently to the group that feeds upon decaying vegetable matter; a closely allied species was reared by me from rotten wood. The family is well represented in North America, but very few collectors know more than a small percentage of the species.

Subfamily PHAONIINAE.

Genus *Phaonia* Robineau-Desvoidy.

This genus is distinguished from others of the subfamily in this paper by having in both sexes a strong bristle beyond middle on the postero-dorsal surface of hind tibia. A comprehensive revision of the genus by the writer is now ready for the press. There is but one species known to me from the Pribilof Islands.

Phaonia minima Malloch.

Phaonia minima Malloch, J. R., Rep. Can. Arctic Exped., 3, Part C, p. 61, 1919.

St. Paul Island, July 19, 1916 (G. D. Hanna).

Genus *Helina* Robineau-Desvoidy.

The name *Helina* has been used by me in all of my recent papers on Anthomyiidae for a segregate of that group listed under the generic name *Mydaea* R-D. by Stein and other authors. The true species of *Mydaea* all have the third wing-vein setulose at base above and below, and the females have the penultimate abdominal sternite with short stout bristles. *Helina* as at present limited has no species that possesses the above combination of characters.

The species *hannai*, of which a full description is presented herein, was included in a recently published synopsis of the genus by the writer and a description also included.*

Helina borealis Malloch.

Aricia borealis Malloch, J. R., Rep. Can. Arctic Expedition, 3, Part C., pp. 64-5. 1919.

St. Paul Island, Alaska, July 19, 1916 (G. D. Hanna).

Helina hannai Malloch.

Helina hannai Malloch, J. R., Can. Ent., vol. 53, no. 5, p. 109. May, 1921.

Puparium.—Length, 8 mm.; diameter at middle, 2.5 mm. Color, reddish testaceous, distinctly shining. Cephalic extremity rather slender, glossy; anterior margin of first dorsal thoracic segment subcarinate; integument throughout with very minute longitudinal striae, which are not continuous but in the form of short, slightly irregular lines; transverse rugae indistinct anteriorly, except between the last thoracic and first abdominal segments, becoming noticeable between the third and fourth abdominal segments and from that point becoming stronger to apex where they are present in the form of conspicuous raised ridges; lateral fasciform areas distinct, margined throughout their length by a series of microscopic rounded swellings, which series is continued over the venter in the form of a single line along the margin of each segment; each ventral segment has 2 short transverse series of similar raised areas on the disc (dorsal segments glued to card and thus invisible); anal opening rather large, surrounded by a heart-shaped slightly elevated ridge (Pl. XV, fig. 29); anal spiracles consisting of 3 slit-like openings on a slightly raised base (fig. 30).

Imago.—Male. Black, distinctly shining. Head black; orbits with silvery pile; frontal stripe opaque black. Thorax without dis-

* Can. Ent., vol. 53, p. 109, 1921.

tinct pruinescence, with a faint bronzy tinge, and indistinctly trivittate anteriorly. Abdomen, when viewed from behind, with distinct brownish pruinescence and continuous dorso-central longitudinal black stripe; in some lights with a slight bronzy reflection. Legs black. Wings slightly fuscous, base yellow; cross veins not infuscated. Calyptrae bright yellow. Halteres brown, knobs black.

Eyes distinctly separated, narrowest part of stripe about one-tenth the width of head at that point; width of frons at base of antennae about one-fourth that of head at that point; orbital bristles strong and of moderate length; third antennal joint over twice the length of second; arista very short haired; eyes with very few microscopic hairs; face slightly receding toward lower margin; cheeks with numerous bristly hairs; proboscis rather thick, of moderate length; palpi slightly dilated apically. Acrostichals irregularly 4-rowed; dorso-centrals 2+4. Abdomen subcylindrical, elongate, slightly narrowed apically; hypopygium small, almost entirely retracted; surface hairs on dorsal segments strong, especially on apical 2 segments. Fore tibia with 2-3 weak bristles on the postero-ventral surface; mid tibia with 2 posterior bristles; hind tibia with 2 antero-dorsal and 2 antero-ventral bristles. Costal spine weak; third and fourth veins slightly divergent apically, the former with 2-3 bristles at base; outer cross vein slightly undulated; last section of fourth vein less than 1.5 as long as preceding section.

Female.—Agrees in color with the male except that the abdomen is less distinctly pruinescent. Frons over one-third the width of head; ocellar triangle produced in the form of a long slender point nearly to anterior margin; upper orbital directed outward, the others inward; cruciate central bristles absent; cheeks higher than in male, each about one-third as high as eye. Abdomen rather broad. In other respects as male. Length, 6.5-7.5 mm.

Four specimens, St. George Island, June 24, 1914 (lot 46, G. D. Hanna), 1 male and puparium, the male in poor condition, June 20, 1913 (lot 41, A. G. Whitney); 1 male, abnormal in having 4 bristles on antero-dorsal surface of hind tibia, June 10, 1914 (lot 9, G. D. Hanna); 1 male and 2 females, June 17, 1914 (lot 42, G. D. Hanna).

The example mounted along with the empty puparium bears no data that throws any light upon the habits of the larva, neither is there any data which indicates the habits of the adults of the other lots.

Helina sp.

A female in very poor condition differs distinctly from the foregoing; I am unable to identify it with any described species. Because of its sex and condition, I refrain from attempting a description of the species.

Locality, St. George Island, July 8, 1914 (lot 55, G. D. Hanna).

Genus *Mydaea* Robineau-Desvoidy.*Mydaea rugia* (Walker).

Anthomyia rugia Walker, List of Insects in the British Museum, Diptera, Part 4, p. 923, 1859.

I have recorded this species from St. George Island, July 1, 1920 (Proc. Calif. Acad. Sciences, 4th ser., vol. 11, Nov., 1921, p. 178).

Genus *Melanochelia* Rondani.

The species of this genus resemble those of *Helina* R-D. that have the abdomen with paired dorsal abdominal spots, but they differ in having the arista bare or pubescent. The species form a very homogeneous group and although rather closely resembling the above mentioned group in *Helina*, they seem also to differ largely in habits of the adults. The species of *Melanochelia* are most generally found near streams or on the shores of lakes or of the sea, and many species may be taken upon the exposed surfaces of rocks in stream beds, especially in sunshine, though they are very quick of flight and difficult to detect because their gray and black colors blend very well into the color of the rocks upon which they settle. One species that I have found commonly in Scotland is predaceous upon insects, but the majority of the adults are flower frequenters. The larval habits are not well known but some are feeders upon decaying animal and vegetable matter.

Melanochelia nobilis Stein.

Limnophora nobilis Stein, Berl. Ent. Zeitschr., p. 207, 1898.

There are two males and one female of this species in the material before me. The males, although in rather poor condition, agree in almost every respect with Stein's description. The specimen in the best condition shows indications of thoracic vittae but in all other respects agrees with the original description. The female I am not so certain of but consider it very probably as belonging to *nobilis*.

Localities.—Males, St. George Island, June 17, 1914 (lot 42, G. D. Hanna); female, St. Paul Island, July 21, 1913 (lot 85, A. G. Whitney). Lot 42 was taken on uplands toward Staraya Artel; lot 85 is given as Webster House, Northeast Point.

The original description of this species was made from a male obtained in Alaska. Coquillett subsequently recorded it from Sitka, Seldovia, and Popof Island, Alaska.¹⁰

Melanochelia sanctipauli Malloch.

Melanochelia sanctipauli Malloch, Proc. Calif. Acad. Sciences, 4th ser., vol. 11, Nov., 1921, p. 180.

Described from St. Paul Island, July 12, 1920 (G. D. Hanna).

¹⁰ Proc. Washington Acad. Sci., vol. 2, p. 445, 1900.

Melanochelia spinicosta Malloch.

Melanochelia spinicosta Malloch, Proc. Calif. Acad. Sciences, 4th ser., vol. 11, p. 181, 1921.

Described from St. Paul Island, and recorded from St. George Island, June 30, July 12, and August 10, 1920 (G. D. Hanna).

Genus *Eriphia* Meigen.

Eriphia cinerea Meigen.

Eriphia cinerea Meigen, Syst. Besch., 5, p. 206, 1826.

Collected in 1920, by G. D. Hanna and recently recorded for the first time from this hemisphere (Proc. Calif. Acad. Sciences, 4th ser., vol. 11, 1921, p. 178).

Genus *Eupogonomyia* Malloch.

Eupogonomyia pribilofensis Malloch.

Eupogonomyia pribilofensis Malloch, Proc. Calif. Acad. Sciences, 4th ser., vol. 11, p. 179, 1921.

Described from St. Paul Island, June 21, 1920 (G. D. Hanna).

Genus *Hydrophoria* Robineau-Desvoidy.

This genus is represented by a large number of specimens belonging to a single species.

Hydrophoria alaskensis Malloch.

(Pl. XV, fig. 34.)

Hydrophoria alaskensis Malloch, J. R., Can. Ent., vol. 52, no. 11, p. 257, Nov., 1920.

St. George Island—

- 14 specimens, June 8, 1914 (lot 7, G. D. Hanna).
- 9 specimens, June 10, 1914 (lot 9, G. D. Hanna).
- 1 specimen, June 16, 1914 (lot 34, G. D. Hanna).
- 26 specimens, June 16, 1914 (lot 35, G. D. Hanna).
- 2 specimens, May 6, 1914 (G. D. Hanna).
- 1 specimen, June 16, 1914 (lot 36, G. D. Hanna).
- 19 specimens, June 17, 1914 (lot 42, G. D. Hanna).
- 2 specimens, June 24, 1914 (lot 46, G. D. Hanna).
- 2 specimens, June 25, 1914 (lot 47, G. D. Hanna).

Lot 7 has the following data: "Found on several species of flowers and on grass. When approached it darts into the grass but never tries to fly away. Uplands." I am unaware of this characteristic in other anthomyids; it may be due to prevailing strong winds. The remaining lots were evidently collected by sweeping and bear no data of interest. The places of collection were mostly "towards East Rookery" and "towards North Rookery" with a reference to "Uplands" towards Staraya Artel in the case of Lot 42. All the specimens were taken on St. George Island. I have recorded the occurrence of this species from St. Paul Island, June 21, 1920, G. D. Hanna (Proc. Calif. Acad. Sciences, 4th ser., vol. 11, 1921, p. 182).

Genus *Hylemyia* Robineau-Desvoidy.

This genus contains a large number of very closely allied species, although the number recorded from North America is comparatively small. I have reared some of the European species from decaying vegetation and from manure, but several occur in the larval stage upon the roots of various plants, wild and cultivated. There is a single species in the present collection which appears to be new to science.

Hylemyia flavisquama, n. sp.

Male.—Black, very slightly shiny. Head black; frontal stripe orange red, orbits blackish brown, distinctly silky; facial orbits and cheeks brown, with silky surface; face blackish brown, surface with brownish pile. Thorax with faint pruinescence, most distinct on 2 narrow lines between the acrostichals and the dorso-centrals, and on the lateral anterior angles. Abdomen with grayish pruinescence; when viewed from behind there is a distinct dorso-central stripe visible which is not disconnected at the abdominal sutures and is laterally extended anteriorly in the form of a narrow stripe along the fore margin of each segment. Legs black. Wings slightly grayish or fuscous. Squamae bright yellow, fringes concolorous. Halteres brown at base, knobs yellow.

Eyes distinctly separated, the narrowest part of frons about one-fifth the width of either eye; above bases of antennae the frons is over one-fourth the width of head at that point; orbital bristles very long though fine, about 6 pairs present on lower orbits in addition to a number of weaker hairs; face in profile protruding beyond eyes about as far as the width of third antennal joint, mouth margin protuberant; antenna of moderate length; arista pubescent; cheeks with numerous long hairs, the upper ones upcurved, those on vibrissal angle strong, the vibrissae noticeably strong; cheeks broader than third antennal joint; proboscis rather long, stout; palpi slender, slightly dilated apically, with a number of weak surface hairs. Thoracic hairs strong; 2 pairs of very strong presutural dorso-centrals; acrostichals 4-rowed anterior to suture. Abdomen equal in length to thorax, rather broad, the surface with conspicuous hairs; hypopygium rather small, without conspicuous lamellae. Fore tibia with a weak bristle at middle on postero-ventral surface (usually with a still weaker one below it), and a short one below middle on antero-dorsal surface, preapical bristle usually duplicated; antero-ventral surface of mid-femur with a graduated series of bristles, the longer ones at the base; mid-tibia usually with the following bristles: 1 antero-ventral, 2 antero-dorsal, 3-4 postero-dorsal, and 2-3 postero-ventral; hind femora with a rather irregular series of strong bristles on the antero-dorsal and antero-ventral surfaces; hind tibia

with antero- and postero-dorsal surfaces armed with series of rather strong bristles; postero-ventral surface with usually 2 weak bristles near base, the uppermost just above middle. Costa with black, setulose hairs; costal spine small; inner cross vein just beyond apex of first vein; outer cross vein almost straight, its upper extremity much nearer apex of wing than its lower; veins 3 and 4 slightly convergent apically; last section of 4 about one and two-thirds times the length of penultimate section.

Female.—Differs from the male in being less intensely black and in having the surface of the body parts more distinctly pruinose; the upper half of the central stripe of frons is velvety black, merging into the bright orange of the anterior portion. The base of the wing is noticeably yellowish.

Frons over one-third the head width; orbits each over half as wide as center stripe; upper 2 (or 3) orbitals directed slightly outward, lower 4 slightly inward; cruciate frontal bristles strong; head much as in the male in other respects except that the hairs on the cheeks are less numerous and much stronger, 2 or 3 slightly upwardly directed bristles being noticeably so. Thorax with less hair than in male; acrostichals irregularly 4-rowed. Legs with a similar armature to those of male, the pair of weak bristles on postero-ventral surface of fore tibiae either absent or represented by very weak hairs.

Length, 3.75–4.25 mm.

Type.—St. George Island, June 14, 1914 (lot 19, G. D. Hanna), vicinity of Garden Cove.

Paratypes:

5 specimens, June 16, 1914 (lot 35, G. D. Hanna).

2 specimens, June 17, 1914 (lot 42, G. D. Hanna).

2 specimens, June 25, 1914 (lot 47, G. D. Hanna).

3 specimens (including allotype), July 4, 1914 (lot 52, G. D. Hanna).

13 specimens, July 8, 1914 (lot 55, G. D. Hanna).

The data contains no information as to habits, the specimens being recorded as from "toward" the various rookeries, and all are from St. George Island.

This species has much the appearance of *Anthomyia radicum* Linnaeus, but differs in having the upper scale of squamae larger than the under one. From *P. badia* Walker it differs in having the acrostichals 4-rowed instead of 2-rowed and in having the squamae yellow instead of whitish.

Hylemyia sp.

A male which is rather smaller than the smallest specimen of the preceding species and differs in having the acrostichals 2-rowed, represents a distinct species, but the condition of the specimen precludes my arriving at a definite identification.

Locality.—St. George Island, June 17, 1914 (lot 44, G. D. Hanna). The specimen was taken with other species "around a sphagnum bog $\frac{1}{4}$ mile west of Village."

Genus *Fucellia* Robineau-Desvoidy.

This genus has been considered as belonging to the Anthomyiidae by several authorities while others have placed it in the Cordyluridae. However, it is most properly placed in the Anthomyiidae and is distinguished from the genera in that family which have the eyes separated in both sexes by the presence of a pair of cruciate bristles on the center of the frontal stripe.

The genus is separable from Scatophagidae, as are all Anthomyiidae known to me except 4 species, by the area below the prothoracic spiracles, above and in front of the prothoracic and stigmatal bristles, being bare instead of covered, at least in part, with long soft hairs.

Stein¹¹ in 1910 revised the genus and fully described the known species; Aldrich in 1918¹² again revised the genus for North America and recorded 13 species as occurring in the Western Hemisphere. Of the described species 3 occur in the material before me. Two of these species, *fucorum* and *antennata*, are mentioned by Stein as occurring on St. Paul Island; the third was originally described from Greenland. A fourth species occurring in northern latitudes is *pictipennis* Becker, recorded from Hecla Haven, East Greenland.

The species are invariably found on or near the shore either of the sea or rivers, and generally are common. Their habits are very similar to those of the Cordyluridae, the larvae being recorded as feeding upon decaying drift, though there is no record so far as I know of the imagines being predaceous. I have taken specimens of the genus at considerable distances from the sea on the banks of various rivers and as most entomologists have the impression that the genus is exclusively maritime in habit it seems pertinent to put upon record here the capture by myself of a male of *maritima* at Carmi, Illinois, a town on the Little Wabash River, several hundreds of miles from the sea and nearly 300 miles from Lake Michigan, the nearest large area of fresh water where it also occurs. I have also seen a male of this species taken by R. P. Dow at Claremont, N. H., which is about 90 miles from the sea in a straight line.

Fucellia fucorum Fallen.

Scatomyza fucorum Fallen, *Scatomyz.*, 5, 1819.

This species is widely distributed in the Arctic regions and extends as far south as Friday Harbor. Stein records it from St. Paul Island, and Meidnaja, Bering Straits, in addition to Friday

¹¹ Wiener Ent. Zeit., vol. 29, p. 11, 1910.

¹² Proc. Calif. Acad. Sci., 4th ser., vol. 8, p. 157, 1918.

Harbor. There are records of the species from as far south as Porto Rico but it is probable that most of these refer to *maritima*. In the present collection the species is represented by 127 specimens with data as follows:

St. George Island:

- 16 specimens, May 6, 1914 (G. D. Hanna).
- 2 specimens, June 16, 1914 (lot 34, G. D. Hanna).
- 5 specimens, June 4, 1914 (lot 1, G. D. Hanna).
- 50 specimens, June 10, 1914 (lot 9, G. D. Hanna).
- 1 specimen, June 14, 1914 (lot 19, G. D. Hanna).
- 1 specimen, July 4, 1914 (G. D. Hanna).

St. Paul Island:

- 14 specimens, August 1, 1914 (E. A. Preble).
- 44 specimens, August 19, 1914 (E. A. Preble).
- 1 specimen, Summer, 1914 (lot 210, A. G. Whitney).
- 10 specimens, August 16, 1915 (G. D. Hanna).
- 2 specimens, August 26, 1916 (G. D. Hanna).

Lot 1 contains specimens collected about fox houses and on beach among boulders; lot 9 contains specimens that are recorded as "very common along the beaches, living upon the decaying marine algae"; lot 19 is from the vicinity of Garden Cove; lot 34, from "toward East Rookery"; the others have no data other than that already given.

One specimen in the last lot in the series listed has 2 large mites attached to the posterior portion of thorax close to base of posterior coxae.

Fucellia ariciiformis Holmgren.

Scatophaga ariciiformis Holmgren, Kongl., Vetenskap. Akad. Forhandlingar, No. 6, p. 103, 1872.

Fucellia ariciiformis (Holmgren) Lundbeck, Vidensk. Meddel. Naturhist. Foren. Kjobenhaven, p. 292, 1900.

This species was originally described from Greenland by Holmgren and afterwards recorded from there by Lundbeck. Stein indicated in his revision of the genus the characters that are available for distinguishing the sexes from those of *fucorum* to which it is most closely related. The male possesses the tuft of short spines at base of hind femora but the tubercle at base of hind femora in *fucorum* is absent in *ariciiformis*. The female differs from that of *fucorum* in having only one antero-ventral midtibial bristle, and the antero-ventral hind tibial bristles very much stronger, more numerous, and carried nearly to base.

There are 4 specimens of the species in the present collection, with data as follows:

St. Paul Island:

- 1 female, May 23, 1914 (lot 154, A. G. Whitney).
- 1 female, 2 males, August 16, 1915 (G. D. Hanna).

A series taken on St. Paul Island, August 10, 1920 (G. D. Hanna), has been recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 172, 1921).

Fucellia antennata Stein.

Fucellia antennata Stein, Wien. Ent. Zeit., vol. 29, p. 23, 1910.

This species was originally described from Alaska, the localities given being Sitka, St. Paul Island, and Karluk. It differs from all other species in the genus in having the antennae elongated, the apex of the third joint being almost on a level with the upper mouth margin. The male is further distinguished by having the antero-ventral surface of the posterior femora with a series of closely placed bristles extending from slightly before the middle to their apices. The species has much the same habitus as *Amaurosoma*, a genus of predaceous cordylurids, but the fore femora in that genus are usually armed on their antero-ventral surfaces with a group of setulae and the cruciate frontal bristles are absent.

Amongst the material before me there are 29 specimens of *antennata* as follows:

St. Paul Island:

2 specimens, May 23, 1914 (lot 155, A. G. Whitney).

9 specimens, August 1, 1914 (E. A. Preble).

14 specimens, August 19, 1914 (E. A. Preble).

2 specimens, Summer, 1914 (E. A. Preble).

1 specimen, May 16, 1913 (lot 28, A. G. Whitney).

1 specimen, August 16, 1915 (G. D. Hanna).

Only the first and next to the last lots have any information regarding the exact place of capture attached to them. The three specimens in Lot 155 were taken in the Laboratory, as was also that in Lot 28; the latter is pinned with a specimen of *Scatophaga dasythrix*, but the data indicates nothing other than that they were taken at the same time.

Recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 172, November, 1921), as a "common species on St. Paul Island, August 10 to 25, 1920" (G. D. Hanna).

Fucellia pictipennis Becker.

Recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 172, November, 1921) from three specimens taken on St. Paul Island, June 21 and August 25, 1920 (G. D. Hanna).

Family SCATOPHAGIDAE.

Some species of the subfamily Scatophaginae are remarkably common, both on the seashore and throughout areas remote from the sea, while others are invariably confined to the seashore or its immediate vicinity. All, however, are very similar in larval habits, feed-

ing upon manure or decaying vegetable matter. The adults are, so far as is known, predaceous, though they are commonly found feeding both on flowers and fresh manure. The larval habits of the species of the subfamily Cordylurinae are not very generally known. Some of them feed upon decaying vegetable matter; I have reared one species from river drift; and one species, *Hydromyza confluens* Loew, feeds in the stems of *Nymphaea advena*, forming gall-like swellings thereon. So far as I know, the adults are predaceous, some of the genera being particularly adapted for this mode of life, the fore legs being armed with strong spines to aid in catching and retaining prey, but even where these spines are present the insects may also be found feeding upon nectar of flowers.

The material belonging to this family contained in the present collection consists principally of Scatophaginae belonging to the genus *Scatophaga*. I have taken pains to dissect the males of the species of *Scatophaga* and figure certain parts with a view to facilitating their identification for future students; this has resulted also in confirming their identity in some cases with species from more temperate latitudes.

Subfamily CORDYLURINAE.

Cordylura beringensis, n. sp.

Male.—Black, slightly shining. Anterior portion of frons reddish, merging into whitish on sides at anterior margin; face and cheeks yellowish white; frons, face, and cheeks with pale gray or whitish pruinescence; antennae black, apex of second joint brown; proboscis and palpi black. Thorax and abdomen with distinct, brownish gray pruinescence. Legs black, tarsi reddish on the ventral surfaces. Wings clear, veins black; calyptrae yellowish white, their fringes white. Halteres pale brown, knobs reddish.

Frons slightly broader than eye, narrowed anteriorly; orbits usually with 6 pairs of bristles, the upper 2 pairs directed outward, the next pair directed forward, and the lower pairs incurved; third antennal joint of moderate length, rounded apically; arista plumose; vibrissae very long; cheeks very narrow; proboscis stout; palpi slender, armed with a pair of long hairlike bristles. Two pairs of dorso-central bristles on thorax anterior to suture; acrostichals 2-rowed; mesopleura with 4-5 moderately strong bristles; sternopleurum with 1 very strong bristle; scutellum with 4 marginal bristles. Abdomen short and stout; hypopygium very large, hairy; fifth ventral segment ending in 2 large rounded lateral lobes. Legs stout, the fore and hind femora especially so; all legs with long and strong bristles; fore and mid femora with long pale hairs on ventral surfaces, the latter with 2-3 strong antero-ventral bristles near apex; hind femora with a very long downward directed hair near

base on ventral surface; hind tibia with 2 antero-ventral, 3 antero-dorsal and 3 postero-dorsal bristles. Apical portion of first wing-vein bristly.

Length, 5 mm.

Type.—St. George Island, June 16, 1914 (lot 35, G. D. Hanna). The type and 2 paratypes were taken "toward East Rookery from Village." Other paratypes as follows:

3 specimens, June 17, 1914, uplands near Staraya Artel (lot 42, G. D. Hanna).

1 specimen, June 17, 1914, near a sphagnum bog, $\frac{1}{4}$ mile west of Village (lot 44, G. D. Hanna).

1 specimen, June 25, 1914, from toward North Rookery (lot 47, G. D. Hanna).

There is a Colorado species which very closely resembles the above. It differs in having the legs with weaker bristles, the wings clearer, the inner cross vein more distinctly beyond middle of discal cell, and the first vein almost bare.

This species has a decided affinity to *proboscidea* Zetterstedt. a species that has a northern range in Europe. It differs, however, in being smaller and in having the abdomen much less conspicuously hairy, as well as in several other minor characters.

Genus *Allomyella* n. n.¹³

Generic characters.—Head about as high as long, face slightly retreating below, cheek of moderate width, eye higher than long, vibrissa weak, below it one bristle; antennae of moderate length, third joint subangulate at apex on upper side, arista bare, occiput with bristles along upper half on eye-margin, and below these another series or irregular group on back of head. Dorso-centrals 5, the other bristles as in *Cordylura*; 1 sterno-pleural; pteropleura with a few hairs. Abdomen at least as long as wings, broad, apical segment short, compressed, but little protruded. Fore tibia with short black setulae on ventral surface. First wing vein bare.

Allomyella brevipennis, n. sp.

Female.—Black, abdomen distinctly shiny. Head black; frons opaque; central stripe brown, paler anteriorly; lower part of face and anterior angles of cheeks yellow; antennae black, second joint slightly reddish apically; arista black; proboscis glossy black; palpi brown at base, yellow apically. Legs black, tibiae and tarsi testaceous yellow, the apices of the latter slightly darkened. Wings slightly brownish, the veins thick and slightly darkened, faintly infuscated along their margins. Calyptrae brown, fringes yel-

¹³ The generic name *Allomyia* given by me to this genus in my paper on the Canadian Arctic Diptera is preoccupied by *Allomyia* Felt and the name of my genus accordingly is changed herein.

lowish. Halteres reddish yellow. Hairs and bristles yellow, the stronger bristles on head, legs, and abdomen blackish, but paler in transmitted light.

Frons distinctly broader than eye, very slightly narrowed anteriorly; orbits each with 5 bristles, the 2 upper ones directed outward; arista bare; profile as in Plate XV, Figure 28. Thorax and abdomen with rather numerous surface hairs; pleural bristles not well distinguished from the other hairs, the prothoracic and stigmatal bristles weak. Last abdominal segment distinctly elongated, its lateral margins with a number of long bristles. Legs rather stout; fore femora distinctly incrassated; all femora with rather widely separated hair-like central bristles; fore tibia with 4 bristles, 2 on the dorsal surface (one at middle and one near tip), and 2 slightly below them transversely on posterior surface; hind tibia with the following bristles: 2 on postero-dorsal surface, one at middle and the other at one-fourth from base; 2 on antero-dorsal surface, the upper in transverse line with the upper on postero-dorsal surface, the lower slightly below middle; 2—3 on antero-ventral surface near apex. Wings not extending to apex of abdomen; third and fourth veins divergent, the former ending in apex of wing.

Length, 5.25 mm.

Type.—St. George Island, June 8, 1914 (lot 8, G. D. Hanna).

Subfamily HYDROMYZINAE.

Genus *Pogonota* Becker.

Pogonota kincaidi Coquillett.

(Pl. XII, fig. 2.)

Pogonota kincaidi Coquillett, Proc. Washington Acad. Sci., vol. 2, p. 455, 1900.

This species is represented by seven specimens, with data as follows: 2 males and 1 female, St. George Island, June 16, 1914 (G. D. Hanna, Lot 36); 1 male and 3 females, August 16, 1915 (G. D. Hanna). The original description was made from a male and female obtained by Prof. T. Kincaid on Popof Island, Alaska, and there are no subsequent records of the species.

Subfamily SCATOPHAGINAE.

Genus *Scatophaga* Meigen.

There is not a published synopsis of the North American species of this genus, and in presenting one covering the species contained in the present collection I hope to accomplish two objects—to make it possible for future students to recognize the forms recorded, and to indicate that, similar though the species appear, there are just as good characters available for their separation as there are in most of the dipterous families and even better than there are in some.

Becker in 1894¹⁴ published the most complete study of the family that has been undertaken up to the present. In the genus *Scatophaga* the synoptic key is very full and quite satisfactory; but few of the species are described fully in the text, the author confining himself to notes upon the species and to indicating their synonymy except in the case of new species. So far as I know, the present paper is the first in which use has been made of the characters of the fifth ventral segment of the abdomen of the males except that by the writer on the Diptera of the Canadian Arctic Expedition. The differences in structure in this segment are very marked in some of the species, as can be seen from an examination of the figures. There are four distinct types of structure of this segment in the species I have examined. The simplest form is represented by 1 species, *crinita*, and has on each lateral angle of the fifth sternite a small rounded prolongation; in 3 species there is a very long prolongation of this segment on each side of the median line; *furcata* has a small, rather knoblike process on each side of the median line on posterior margin of the segment; and *stercoraria* has a similar pair to those of *furcata* in addition to the lateral elongations, presenting the most elaborate structure of any species known to me. *Stercoraria* (Pl. XIV, fig. 17) has been recorded from Alaska, but is unrepresented in the present collection, the figure being introduced here to show the difference in form of the segment. It will be observed that there is a distinct similarity in the male hypopygia of *Scatophaga* and *Coelopa* (Pl. XIV, figs. 23, 24, and 25). I published figures of the fifth sternites of the males of *S. suilla* and *S. lutaria* in my report on the Diptera collected by the Canadian Arctic Expedition, 1919.

Key to species of Scatophaga.

- | | |
|---|------------|
| 1. Males ----- | 2. |
| Females ----- | 6. |
| 2. Mid and hind tibiae with a number of strong, outstanding bristles in addition to the soft hairs ----- | 3. |
| Mid and hind tibiae with remarkably long soft hairs, and without strong bristles except at apex and in <i>crinita</i> one bristle near apex on posterior surface ----- | 5. |
| 3. Cross veins of the wings not infuscated; legs black, very densely brownish pruinose, bases of tibiae indistinctly reddish; fifth ventral segment of abdomen as in Plate XIV, Figure 21 ----- | islandica. |
| Cross veins of the wings conspicuously infuscated; legs either almost entirely yellow, or reddish with black femora ----- | 4. |
| 4. Legs reddish or vinous colored, shining, femora black; hairs on hind tibiae woolly, nearly as long as the bristles, the latter rather slender; fifth ventral segment of abdomen with a long, thornlike projection on each side of the median line (Pl. XIV, fig. 20) ----- | rubicunda. |

¹⁴ Berl. Ent. Zeitschr., vol. 39, pp. 77-196.

- Legs pale testaceous or yellowish, only the fore femora in part black; hairs on hind tibiae setulose, very much shorter than the bristles, the latter very stout, fifth ventral segment of abdomen with short knoblike process on each side of the median line (Pl. XIV, fig. 22)-----*furcata*.
5. Legs shining black; abdominal hairs yellow, varying from whitish to orange; mid tibiae with a bristle near apex on the posterior surface; fifth ventral abdominal segment as in Plate XIV, Figure 19-----*crinita*.
Legs dull black; abdominal hairs black, occasionally a few of those on the ventral surface are yellowish; mid tibiae without bristle near apex; fifth ventral abdominal segment as in Plate XIV, Figure 18-----*dasythrix*.
6. *Pteropleura* bare----- 7.
Pteropleura hairy----- 9.
7. Cross veins of the wings not infuscated; hairs on dorsum of abdomen black, contrasting sharply with those of venter and lower part of pleura, which are pale yellow and silky; legs black-----*crinita*.
Cross veins of wings conspicuously infuscated; legs in great part yellow or reddish----- 8.
8. Large species, averaging 10 mm. in length; legs vinous in color, femora in large part black; all hairs on abdomen fuscous; apical spur on hind tibia very strong and much curved-----*rubicunda*.
Smaller species, averaging 7-8 mm. in length; legs yellow, fore femora more or less blackened above; hairs on dorsum of abdomen blackish and setulose, those on venter yellow and soft; apical spur on hind tibia of moderate strength and almost straight-----*furcata*.
9. Frons conspicuously reddish in front; tibiae reddish or brownish; hairs on mesonotum not numerous, setulose, those on hind tibia very much shorter than the intermixed bristles, and setulose; apex of abdomen with normal hairing-----*islandica*.
Frons not noticeably reddish in front; tibiae black; hairs on mesonotum numerous, long and rather soft, those on hind tibiae soft and slightly curled, some of them as long as the intermixed bristles; apex of abdomen with a noticeable tuft of soft curled black hairs-----*dasythrix*.

Scatophaga islandica Becker.

Pl. XIV, fig. 21.

Scatophaga islandica Becker, Berl. Ent. Zeitschr., vol. 39, p. 175, 1894.

Apical ventral segment of male as Plate 14, Figure 21.

This species was originally described from specimens in the Loew collection from Iceland and Labrador. Coquillett subsequently recorded it from Commander Islands and Alaska.

There are 9 specimens in the present collection from St. Paul Island with data as follows:

4 specimens, August 19, 1914 (E. A. Preble).

1 specimen, August 1, 1914 (E. A. Preble).

4 specimens, August 16, 1915 (G. D. Hanna).

Recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 172, Nov., 1921) from St. Paul Island, June 21 and August 10, 1920 (G. D. Hanna).

Scatophaga rubicunda Malloch.

Pl. XIV, fig. 20.

Scatophaga rubicunda Malloch, J. R., Can. Arctic Exp., 1913-1918, vol. 3, p. 81c (1919).

Male.—Opaque black-brown. Head concolorous with thorax; frontal stripe orange red, orbits on lower portions grayish; face and cheeks reddish orange, their surfaces covered with grayish yellow pruinescence, antennae brownish black, apex of second joint on inner side reddish; proboscis glossy black; palpi reddish or yellowish. Disc of mesonotum with indications of 6 vittae, a median confluent pair on acrostichal area, a narrow line along the region of the dorso-central bristles and a broader irregular streak laterad of the latter. Hypopygium and apex of last segment reddish. Legs vinous colored, the femora except their apices darkened. Wings slightly grayish, with a yellow tinge along the costal region, the cross veins distinctly infuscated, veins reddish brown. Halteres reddish. Bristles black, the soft hairs fuscous.

Arista bare, swollen at base, apical part very slender; cheek half as high as eye, anterior angle with a group of 8 to 10 long, black hairs; palpi elongate, slightly leaflike. Thorax with long soft hairs, acrostichal bristles not distinguishable from the discal hairs, the dorso-central bristles barely so; pteropleura bare; scutellum with 4 strong marginal bristles and numerous long hairs. Abdominal hairs not so long as in *crinita*, more dense and not "crinkly"; fifth ventral plate as Plate XIV, Figure 20. Legs with long hairs; mid-tibiae with 7 long bristles distinguishable from the hairs, in addition to the apical spines, situated as follows: 2 on the antero-dorsal surface, one above the other, the upper one just below middle; 3 on the postero-dorsal surface, the upper near base; and 2 on posterior surface, in transverse line with those on the antero-dorsal surface; hind tibiae each with 6 bristles in addition to the hairs and apical spurs as follows: 3 strong ones on antero-dorsal surface, the upper one just above middle and the lower one close to tip; and 3 long hairlike ones on postero-dorsal surface, the upper one being about one-fourth from base of tibiae, the next close to middle, and the lowest one very near to apex; apical spurs bent.

Female.—Similar to the male in color. Differs from the male in having the hairs throughout shorter, stronger, and less numerous and the bristles stronger. Length, 9-10 mm.

Type.—St. George Island, June 16, 1914 (lot 34, G. D. Hanna). Paratype, St. George Island, 1 specimen, same data as type. Allotype, St. George Island, one of 2 specimens, June 4, 1914 (lot 1, G. D. Hanna); and 2 specimens June 8, 1914 (lot 8, G. D. Hanna). Lot 34 was collected toward East Rookery from village; lot 1 about fox houses and on beach among boulders along with *S. dasythrix*;

and lot 8, near village, from flowers. Recorded by Cole (Proc. Calif. Acad. Sci., 4th Ser., vol. 11, Nov. 1921, p. 173) from St. George Island, July 1 (G. D. Hanna).

This species differs from *nubifera* Coquillett in being larger and in the chaetotaxy of the mid and hind tibiae. Sometimes the femora are entirely reddish, and very rarely there are two or three long hairs present on center of pteropleura.

Scatophaga furcata Say.

Pl. XIV, figs. 22 and 23.

Pyropa furcata, Say, Jour. Acad. Sci. Phila., vol. 3, p. 98, 1823.

Scatophaga squalida Meigen, Syst. Besch. Zwief. Ins., vol. 5, p. 252, 1826.

Scatophaga nigricans (Macquart) Meigen, l. c. vol. 7, p. 342, 1838.

Cordylura fuscipennis Zetterstedt, Ins. Lapp., p. 733, 1840.

Cordylura fuscinervis Zetterstedt, Dipt. Scand., vol. 5, pp. 1973, 1975; 1845.

Scatophaga apicalis Curtis, Appendix to Narrative of 2d Voyage in Search of Northwest Passage, p. 76, 1835.

Cleigastra suisterci Townsend, Can. Ent., vol. 23, p. 153, 1891.

The fifth ventral segment of the male and the hypopygium are shown in Plate 14, figures 22 and 23.

This species was first described by Say from specimens obtained in Missouri. It occurs throughout North America, extending its range well into the Arctic portions, and is quite as common in Europe as in America. There is very considerable variation in size and color in this species, which has probably caused some confusion on the part of different authors. I have dissected many examples of different sizes and of varied shades of color in an attempt to find structural differences but have failed to find any that would justify me in separating even the most extreme forms. I know that the nature of the pabulum of the larvae affects the appearance of the resultant imagines, those that have had an abundance of nutritious food being large, brightly colored, and very hairy, while those that have had a supply of rather dry and poor food are smaller, darker, and less hairy.

The normal food of the larvae of this species is manure.

In the present collection there are 83 specimens with data as follows:

St. George Island.

- 1 specimen, April 24, 1914 (G. D. Hanna).
- 1 specimen, May 6, 1914 (G. D. Hanna).
- 1 specimen, June 16, 1914 (lot 35, G. D. Hanna).
- 1 specimen, June 17, 1914 (lot 42, G. D. Hanna).
- 4 specimens, June 24, 1914 (lot 46, G. D. Hanna).
- 4 specimens, June 25, 1914 (lot 47, G. D. Hanna).
- 14 specimens, June 27, 1914 (lot 49, G. D. Hanna).
- 1 specimen, July 4, 1914 (lot 52, G. D. Hanna).
- 1 specimen, July 8, 1914 (lot 55, G. D. Hanna).

St. Paul Island.

- 11 specimens, August 16, 1914 (G. D. Hanna).
- 15 specimens, August 1, 1914 (E. A. Preble).
- 35 specimens, August 19, 1914 (E. A. Preble).
- 3 specimens, Summer, 1914 (E. A. Preble).
- 14 specimens, 1916 (G. D. Hanna).

Only lot 55 is mentioned definitely as having been taken on the shore; the others are recorded as from "toward East Rookery"; "uplands near Staraya Artel"; "toward North Rookery," and "toward Zapadni."

Recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, Nov. 1921, p. 173) from St. Paul Island, June 21 to August 10, 1920, and St. George Island, June 30 (G. D. Hanna).

Scatophaga crinita Coquillett.

Pl. XIV, fig. 19.

Scatophaga crinita, Coquillett, Proc. U. S. Nat. Mus., vol. 23, p. 612, 1901.

The fifth ventral abdominal segment of the male is as in Plate 14, Figure 19.

This species was originally described from specimens obtained on Bering Island. The series of specimens in the present collection shows a very considerable variation both in the size of the different specimens and in the color of the hairs on the body, the latter varying from yellowish white to deep orange. As indicated under the previous species there very probably is some connection between these conditions and the nature of the larval pabulum.

There are 89 specimens in the collection with data as follows:

St. Paul Island.

- 1 specimen, May 23, 1914 (lot 154, A. G. Whitney).
- 3 specimens, June 11, 1913 (lot 44, A. G. Whitney).
- 1 specimen, July 3, 1913 (lot 60, A. G. Whitney).
- 1 specimen, July 22, 1913 (lot 94, A. G. Whitney).
- 1 specimen, Summer, 1914 (E. A. Preble).
- 1 specimen, August 16, 1915 (G. D. Hanna).
- 5 specimens, June-Aug. 1916 (G. D. Hanna).

St. George Island.

- 2 specimens, Sept. 3, 1913 (G. D. Hanna).
- 2 specimens, Sept. 6, 1913 (G. D. Hanna).
- 2 specimens, May 6, 1914 (G. D. Hanna).
- 3 specimens, June 4, 1914 (lot 1, G. D. Hanna).
- 1 specimen, June 8, 1914 (lot 8, G. D. Hanna).
- 1 specimen, June 10, 1914 (lot 9, G. D. Hanna).
- 6 specimens, June 14, 1914 (lot 18, G. D. Hanna).
- 1 specimen, June 14, 1914 (lot 19, G. D. Hanna).
- 16 specimens, June 16, 1914 (lot 34, G. D. Hanna).
- 9 specimens, June 16, 1914 (lot 26, G. D. Hanna).
- 1 specimen, June 16, 1914 (no number, G. D. Hanna).

- 7 specimens, June 17, 1914 (lot 38, G. D. Hanna).
- 4 specimens, June 24, 1914 (lot 46, G. D. Hanna).
- 10 specimens, June 27, 1914 (lot 49, G. D. Hanna).
- 15 specimens, July 4, 1914 (lot 52, G. D. Hanna).
- 1 specimen, July 8, 1914 (lot 55, G. D. Hanna).

The specimen of lot 60 was taken on Otter Island at the same time as the specimen of *S. dasythrix* bearing the same number. Lots 44 and 94 were taken on peninsulas on St. Paul Island. The specimen bearing the Hanna lot number 8 appears to have been taken on flowers (see also under *S. rubicunda*). Judging from the data pertaining to the collection this species is found both along the shore and on the uplands, many examples being obtained towards East Rookery, at Garden Cove, and towards Zapadni.

Scatophaga dasythrix Becker.

Pl. XIV, fig. 18.

Scatophaga dasythrix Becker, Berl. Ent. Zeitschr., vol. 39, p. 173. 1894.

The fifth ventral abdominal segment of the male is shown in Plate 14, Figure 18.

This species was originally described from specimens in the collections of Loew and Schnabl, obtained from Bering Straits. Subsequently Coquillett recorded its occurrence on Bering Island.

In the present collection there are 108 specimens with data as follows:

St. George Island.

- 1 specimen, August 16, 1913 (G. D. Hanna).
- 2 specimens, May 17, 1914 (G. D. Hanna).
- 62 specimens, June 4, 1914 (lot 1, G. D. Hanna).
- 1 specimen, June 10, 1914 (lot 9, G. D. Hanna).
- 10 specimens, June 16, 1914 (lot 34, G. D. Hanna).
- 1 specimen, July 4, 1914 (lot 52, G. D. Hanna).

St. Paul Island.

- 1 specimen, April 13, 1913 (lot 7, A. G. Whitney).
- 1 specimen, May 16, 1913 (lot 28, A. G. Whitney).
- 2 specimens, June 24, 1913 (lot 57, A. G. Whitney).
- 1 specimen, July 6, 1913 (lot 63, A. G. Whitney).
- 1 specimen, July 6, 1913 (lot 64, A. G. Whitney).
- 1 specimen, July 6, 1913 (lot 66, A. G. Whitney).
- 2 specimens, July 18, 1913 (lot 80, A. G. Whitney).
- 2 specimens, July 22, 1913 (lot 94, A. G. Whitney).
- 3 specimens, summer, 1914 (E. A. Preble).
- 2 specimens, August 19, 1914 (E. A. Preble).
- 1 specimen, August 1, 1914 (E. A. Preble).
- 2 specimens, August 16, 1915 (G. D. Hanna).
- 11 specimens, July–August, 1916 (G. D. Hanna).

Otter Island (6 miles from St. Paul Island).

- 1 specimen, July 3, 1914 (lot 60, A. G. Whitney).

Sealion Rock, or "Sivutch" Island.

- 10 specimens, June 29, 1914 (lot 182, A. G. Whitney).

This species appears from the number of examples and the recorded data to be the most common of those in the collection. Several examples were taken in copula and three with prey. The prey represents 3 species: *Fucellia antennata*, *Leria fraterna*, and *Leria leucostoma*. The specimens in lot 182 were taken on the grassy summit of Sea-lion Rock at a height of 60 feet.

D. W. Coquillett records from the Pribilofs (in Schwarz, E. A., in *The Fur Seals and Fur-Seal Islands of the North Pacific Ocean*, Part 3, pp. 550-552, 1899) one species in addition to those listed in the present paper, which, however, may be only nominally distinct: *Scatophaga diadema* Wiedemann.—W. L. M.

Family HELOMYZIDAE.

The species of Helomyzidae are usually found upon carrion or decaying vegetable matter, though certain species of the genus *Leria* have been recorded as frequenting caves where they feed upon fungi and droppings of bats. The species recorded as frequenting caves are not specialized in any manner that adapts them to this habitat and are found in other situations also. A species of the genus *Heteromyza* that has been found in caves, I have found on carrion in an open field in Scotland. The members of the genus *Eccoptomera* are found in the larval and pupal stages in underground nests of moles, and I have found the imagines there also, but I have sometimes taken the latter by sweeping the undergrowth in Scotch woods.

The family is not well represented by species in the material before me but there are a large number of specimens.

A single male of each species in the collection was taken as the prey of *Scatophaga dasythrix*. These are recorded under that species.

Aldrich and Darlington have published an extensive paper on the family.¹⁵

Genus *Leria* Robineau-Desvoidy.

Leria fraterna Loew.

Scoliocentra fraterna Loew, Berl. Ent. Zeitschr., p. 27, 1863.

Leria fraterna (Loew), Coquillett, Proc. Wash. Acad. Sci., vol. 2, p. 457, 1900.

Leria fraterna Aldrich and Darlington, Trans. Amer. Ent. Soc., vol. 34, p. 79, 1908.

This species, which was originally described from Sitka, Alaska, by Loew, is represented by 147 specimens in the present collection from the following localities:

St. George Island.

31 specimens, April-May, 1914 (G. D. Hanna).

23 specimens, June 4, 1914 (lot 1, G. D. Hanna).

6 specimens, June 8, 1914 (lot 8, G. D. Hanna).

¹⁵ Trans. Amer. Ent. Soc., vol. 34, 1908.

- 18 specimens, June 16, 1914 (lot 34, G. D. Hanna).
- 1 specimen, June 16, 1914 (lot 35, G. D. Hanna).
- 3 specimens, June 14, 1914 (lot 19, G. D. Hanna).
- 1 specimen, June 27, 1914 (lot 49, G. D. Hanna).
- 2 specimens, July 4, 1914 (lot 52, G. D. Hanna).
- 6 specimens, June 24, 1914 (lot 46, G. D. Hanna).
- 1 specimen, June 14, 1914 (lot 23, G. D. Hanna).
- 3 specimens, June 17, 1914 (lot 42, G. D. Hanna).
- 1 specimen, June 10, 1914 (lot 9, G. D. Hanna).

St. Paul Island.

- 5 specimens, May 17, 1912 (M. C. Marsh).
- 13 specimens, May 16, 1913 (lot 26, A. G. Whitney).
- 2 specimens, May 16, 1913 (lot 24, A. G. Whitney).
- 6 specimens, May 19, 1913 (lot 132, A. G. Whitney).
- 8 specimens, May 23, 1913 (lot 156, A. G. Whitney).
- 1 specimen, May 23, 1913 (lot 154, A. G. Whitney).
- 1 specimen, July 11, 1913 (lot 70, A. G. Whitney).
- 2 specimens, Aug. 1, 1914 (E. A. Preble).
- 6 specimens, summer, 1914 (E. A. Preble).
- 1 specimen (see under *Scatophaga dasythrix*, lot 64, A. G. W.).

The collections were made in various portions of the islands, some of them about fox houses and on beaches, while others were made amongst grass and herbage. No indication is given as to more exact habitats.

Aldrich and Darlington give the following localities for this species:

- Moscow, Idaho.
- St. Anthony Park, Minn.
- Montreal, Canada.
- Ungava Bay, Labrador.
- Hudson Bay Territory.

It has also been recorded by Coquillett as occurring in Alaska, British Columbia, and on Mount Washington, N. H. A female specimen in the collection of the Illinois State Laboratory of Natural History does not differ materially from the specimens before me; the data on this specimen is Algonquin, Ill., March 21, 1894.

Leria leucostoma Loew.

Blepharoptera leucostoma Loew, Berl. Ent. Zeitschr., p. 28, 1863.

This species, which also was originally described from Alaska by Loew, is represented by 18 specimens, as follows:

St. George Island.

- 2 specimens, September 2, 1913 (G. D. Hanna).
- 2 specimens, April 12, 1914 (G. D. Hanna).
- 1 specimen, June 16, 1914 (lot 35, G. D. Hanna).
- 2 specimens, June 8, 1914 (lot 8, G. D. Hanna).
- 5 specimens, July 4, 1914 (lot 52, G. D. Hanna).
- 1 specimen, June 27, 1914 (lot 49, G. D. Hanna).

St. Paul Island.

August 19, 1915 (G. D. Hanna).

June 29, 1914 (lot 182, A. G. Whitney).

July 6, 1914 (lot 66, A. G. Whitney).

July 27, 1914 (E. A. Preble).

August 1 and 19, 1914 (E. A. Preble).

(See under *Scatophaga dasythrix*, lot 63, A. G. W.)

Aldrich and Darlington record this species from Hampton, N. H.; White Mountains, N. H.; and Mount Constitution, Wash.; Coquillett has recorded it from Alaska and White Mountains, N. H.

Leria pectinata Loew has been recorded by Coquillett from the Pribilofs (in Schwarz, E. A., in *The Fur Seals and Fur Seal Islands of the North Pacific Ocean*, pt. 3, 1899, pp. 550-552).

Leria crassipes Loew has been recorded by Cole (*Proc. Calif. Acad. Sci.*, 4th ser., vol. 11, p. 173, Nov., 1921), from St. Paul Island, July 4 and August 10 (G. D. Hanna). However, it is doubtful if this species occurs in North America; the specimens recorded are almost without doubt *leucostoma* Loew.

Leria sp.

A female recorded by Cole (*Proc. Calif. Acad. Sci.*, 4th Ser., vol. 11, p. 173, Nov., 1921), as "near *iners* Meigen" from St Paul Island, June 10 (G. D. Hanna).

Family BORBORIDAE.

The species comprising this family live in the larval state in manure, fungi, carrion, and decaying vegetable matter. One species has been recorded as living in ants' nests and another in water collected in epiphytic bromeliads. From the data accompanying the specimens in the present collection I assume that the species conform to the most general mode of life, i. e., pass the larval stage in decaying vegetable matter or in manure.

Genus *Borborus* Meigen.

This genus is represented by two species: *annulus* Walker and *subapterus* n. sp. The former has the normal borborid habitus but the latter has the wings much abbreviated and is thus readily separated from any described species occurring in North America. To facilitate the identification of *annulus*, which is rather poorly described by Walker, it is redéscribed herewith.

Cole records (*Proc. Calif. Acad. Sci.*, 4th ser., vol. 11, p. 173, Nov., 1921), two species of this family from the Pribilof Islands, "one a *Copromyza* (*Borborus*) and the other a *Leptocera*, but the specimens are in poor condition for identification."

Borborus annulus Walker.

Borborus annulus Walker, List Ins. Brit. Mus., Diptera, pt. 4, p. 1129, 1849.

Male and female.—Black, shining, with a slight olivaceous tinge. Head black, frontal triangle and orbits slightly shining, brownish pruinulent, center stripe opaque black, anteriorly reddish, face brown, reddish or yellowish at base of vibrissae, distinctly brownish pruinulent; antennae black or slightly brownish. Mesonotum with yellowish pruinulence which does not obscure the shining black ground color. Abdomen glossy black. Legs black, yellow on apices of coxae, trochanters, extreme bases of femora, bases of tibiae (broadly), apices of tibiae (narrowly), and entire tarsi. In addition to these yellow markings there is generally a similarly colored narrow band near the apices of the middle and hind femora which is not mentioned in the original description. Wings slightly yellowish, veins brown, crossveins broadly infuscated. Halteres brownish yellow.

Frons as broad as its length at center; orbits each with two slender bristles directed outward over eyes; center stripe with numerous setulose hairs, especially on anterior portions of opaque areas; antennae of moderate size, third joint rounded anteriorly; arista with sparse but distinct pubescence, entire length of arista about twice that of anterior width of frons; face concave in profile, distinctly produced between antennae and with a rounded central keel; labrum distinctly protruded; proboscis large and fleshy; vibrissa long, buccal bristle shorter than vibrissa, upwardly directed. Mesonotum with 3 pairs of dorso-centrals and between these 4 longitudinal rows of short setulose hairs; scutellum with 4 marginal bristles. Abdomen broad and short, first visible segment elongated; male hypopygium of moderate size, protuberant, its surface with numerous short hairs. Legs rather long, fore and mid femora slightly thickened and perceptibly bent; mid femora with 3 bristles near apex on the anterior surface; mid tibiae with a series of 6-7 short bristles from base to apex on antero-dorsal surface; hind tibiae with an outstanding setulose hair on the antero-ventral surface beyond middle, a distinct but slender preapical dorsal bristle and a rather weak apical thorn-like spur; basal joint of hind tarsi thickened and about two-thirds as long as second. Distance from humeral cross-vein to end of first vein about one-third as long as next costal division and slightly longer than third; inner cross-vein slightly before middle of discal cell; last section of fourth vein slightly longer than preceding section; outer cross-vein upright; fifth vein not extending to margin of wing. Length 3.5-4 mm.

Originally described from "York Factory and St. Martin Falls," Canada. Aldrich states that the last named locality is now known

as Martin's Falls and is located "in longitude 86.30, latitude 51.30, in other words, about 200 miles north of the northern arch of Lake Superior" (Cat. Dipt. N. Amer., p. 66). Coquillett has since recorded the species from Popof Island, Alaska, and Schwarz lists it from Pribilof Islands. The species is represented in the material before me by 32 specimens with data as follows:

St. George Island.

- 2 specimens, April 17, 1914 (G. D. Hanna).
- 13 specimens, June 4, 1914 (lot 2, G. D. Hanna), Taken on very wet soggy ground near Village landing.
- 3 specimens, June 14, 1914 (lot 23, G. D. Hanna), Garden Cove.
- 4 specimens, June 16, 1914 (lot 36, G. D. Hanna), Toward East Rookery from village.
- 2 specimens, same date as last (lot 35, G. D. Hanna).

St. Paul Island.

- 3 specimens, May 16, 1913 (lot 27, A. G. Whitney), taken in Company House bathroom.
- 4 female specimens, May 23, 1914 (lot 153, G. D. Hanna), from privy.
- 2 specimens taken in the summer of 1914, one marked lot 210, A. G. Whitney, and other collected by E. A. Preble.

Borborus subapterus, n. sp.

Pl. XV, fig. 27.

Female.—Black, shining; venter of abdomen and stems of halteres brown. Wings brown. Frons distinctly longer at center than its greatest width; frontal triangle and orbits shining, center stripe opaque; each orbit with 2 long slender bristles which are very slightly outwardly directed; center stripe with hairs much as in *annulus*; antennae rather above the average size, third joint disclike; arista very slender, distinctly but sparsely pubescent, entire length of arista about $1\frac{1}{2}$ times that of anterior width of frons; hairs on basal joint of antenna long and fine; face concave in profile, distinctly keeled; labrum much protruded, vibrissa very long and slender; buccal bristle short and hairlike, upwardly directed. Mesonotum with numerous rather long discal hairs which obscure the 3 pairs of dorso-centrals; scutellum with 4 weak marginal bristles. Basal abdominal segment not noticeably elongated; all segments with very few short hairs. Legs slightly elongated; fore and hind femora noticeably stronger than mid pair; mid tibiae with 3 bristles, a pair about one-fourth from apex, one of which is on the antero-ventral and the other on the postero-ventral surface, and one on the dorsal surface near apex; hind tibiae with weak, hairlike preapical bristle, and weak, almost straight, apical spur; basal joint of hind tarsi much dilated and over two-thirds as long as second; surfaces of all legs with numerous soft hairs. Wings abbreviated, extending to middle of fourth abdominal segment; venation as in Plate XV, Figure 27. Length 3.5 mm.

Male.—Agrees with the female in color and general structure. Differs in having the abdomen robust, and obtusely rounded at apex, with the hypopygium of moderate size.

Type locality.—St. George Island, June 16, 1914, "toward East Rookery from village." (Lot No. 36, G. D. Hanna.) Two paratypes, St. George Island, along Garden Cove Creek (G. D. Hanna).

Borborus pedestris Meigen, a European species, has the wings much shorter than the present species, scarcely longer than the scutellum, and differs also in color. *Leptocera nivalis* Haliday, a species belonging to an allied genus and also European, occurs in winter generally and has the faculty of leaping exceptionally developed.

Genus *Leptocera* Olivier.

This genus is listed as *Limosina* Macquart by Aldrich. *Leptocera* is, however, an older name for the same genus and must replace it in our lists as indicated by Coquillett in his paper on "The Type-species of North American Diptera."¹⁶ *Leptocera* was erected in 1813 and *Limosina* in 1835. There is a single species represented in the present material.

Leptocera limosa Fallen.

Copromyza limosa Fallen, Dipt. Suec., Heteromy, 8, 6 (1820).

Three specimens that evidently belong to this species were taken by G. D. Hanna on St. George Island; two bear the label Lot No. 2, and one Lot No. 11, the former being taken along with *Borborus annulus*, June 4, 1914, "on wet soggy ground near the Village landing," and the latter, June 10, 1914, "near beach at East landing."

Bremi found the larvae in confervae in Europe (Schiner).

Aldrich records the species in his Catalogue from New Jersey, White Mountains, N. H., and Montreal, Canada. I have taken the species in Illinois and it is probably of general occurrence in the United States.

Family PHYCODROMIDAE.

The members of this family resemble very closely the genus *Borborus* in general habits and have, by some of the older authors, been treated as belonging to the same family under the name Copromzidae. In addition to resembling them in appearance they also have very similar habits, feeding mainly upon decaying vegetable matter, but I have never found species of *Coelopa* away from the seashore or the shores of a tidal river while *Borborus* and other genera of that family may be met with in almost any locality where a suitable pabulum is obtainable. *Coelopa* is the only genus so far recorded

¹⁶ Proc. U. S. Nat. Mus., vol. 37, p. 559, 1910.

from North America. Of the three species recorded two are considered as identical with two of those occurring in Europe and those are the species represented in the present collection.

Genus *Coelopa* Meigen.

Coelopa frigida Fallen.

Pl. XII, fig. 1.

Copromyza frigida Fallen, Dipt. Suec., Hydrom., p. 6, 1820.

Coelopa frigida Zetterstedt, Dipt., Scand., vol. 6, p. 2472, 1847.

Coelopa simplex Haliday, Ent. Mag., vol. 1, p. 167, 1833.

This species is represented by 28 specimens in the collection. The data upon the labels are as follows:

St. Paul Island.

- 7 specimens, August 19, 1914 (E. A. Preble).
- 1 specimen, August 1, 1914 (E. A. Preble).
- 5 specimens, summer, 1914 (E. A. Preble).
- 2 specimens, summer, 1914 (lot 210, A. G. Whitney).
- 1 specimen, May 23, 1914 (lot 156, A. G. Whitney).
- 3 specimens, August 16, 1914 (G. D. Hanna).

St. George Island.

- 2 specimens, June 16, 1914 (lot 35, G. D. Hanna).
- 1 specimen, June 17, 1914 (lot 42, G. D. Hanna).
- 3 specimens, June 14, 1914 (lot 19, G. D. Hanna).
- 3 specimens, May 6, 1914 (G. D. Hanna).

Coelopa eximia Stenhammer.

Pl. XIV, fig. 25.

Copromyza eximia Stenhammer, K. vetensk, Akad. Handl., p. 318, 1854.

Coelopa frigida Haliday, Ent. Mag., vol. 1, p. 167, 1833.

This species is represented by 13 specimens in the collection. All were taken on St. Paul Island and bear the following data:

- 1 specimen, May 23 (lot 154, A. G. Whitney).
- 2 specimens, August 1 (E. A. Preble).
- 2 specimens, August 19 (E. A. Preble).
- 1 specimen, summer, 1914 (lot 210, A. G. Whitney).
- 4 specimens, August 16, 1915 (G. D. Hanna).
- 2 specimens, August 16, 1915 (G. D. Hanna).
- 1 specimen, July 7, 1917 (G. D. Hanna).

There has been considerable confusion in this genus because of misidentification by various authors in the early part of the nineteenth century. Schiner probably had his synonymy more exact than any previous author and his names have been accepted by the present writer.

Coquillett recorded *frigida* and *nitidula* Zetterstedt from Alaska.¹⁷ This *nitidula* is the species I record as *eximia*. Hagen has recorded *frigida* from Massachusetts,¹⁸ and Coquillett has recorded it from

¹⁷ Proc. Washington Acad. Sci., vol. 2, p. 460, 1900.

¹⁸ Can. Ent., vol. 17, p. 140, 1885.

the Commander Islands.¹⁹ Cole records (Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 174, Nov. 1921), *C. parvula* Haliday from St. Paul Island, June 8 and 21, 1920 (G. D. Hanna). This also is the species listed here as *eximia*.

A key for the separation of the three North American species is given herewith as there is no previous synopsis available to students which includes all three.

Key to North American species of *Coelopa*.

- | | | |
|--|-------|--------------------|
| 1. Males | ----- | 2. |
| Females | ----- | 4. |
| 2. Legs without strong bristles, covered with long woolly hairs, those on hind tibiae very conspicuous; cheeks rather densely covered with soft hair, not bristly | ----- | <i>eximia</i> . |
| Femora and tibia with numerous strong bristles; cheeks with numerous bristles which are shorter posteriorly | ----- | 3. |
| 3. Mid tibiae with numerous strong bristles on entire surface except ventrally, the ventral surface with moderately long soft hairs; hind tibiae with slightly stronger bristles than mid pair; bristles on hind femora extending to base | ----- | <i>frigida</i> . |
| Mid tibiae with very long woolly hairs especially on ventral surface, only 2-3 bristles present on apical half of anterior surface; hind tibiae with very conspicuously stronger armature than mid pair, the bases of bristles slightly tuberculate; bristles on hind femora confined to apical half (Cresson, Calif.) | ----- | <i>vanduzeei</i> . |
| 4. Fore and hind femora and tibiae with conspicuous bristles | ----- | <i>vanduzeei</i> . |
| Fore and hind femora and tibiae without conspicuous bristles | ----- | 5. |
| 5. Cheeks and fore femora with uniform soft hairs | ----- | <i>eximia</i> . |
| Cheeks bristly; fore femora with soft hairs, conspicuous among which are several longer, moderately strong bristles on the antero-dorsal surface | ----- | <i>frigida</i> . |

Family SCIOMYZIDAE.

There is one species in the collection that in certain respects resembles some of the species in the family Helomyzidae, but which because of the absence of the vibrissae and of the costal spines must be placed in the Sciomyzidae. It agrees with no described genus in the latter family, so that I am forced to erect a new genus for its reception.

The larvae of the Sciomyzidae, so far as I know them, are aquatic or live in damp earth, usually on the margins of streams or ponds, and feed upon decaying vegetable matter. There is nothing in the records pertaining to the present material that indicates the larval habits of the species, as they bear only the date of collection.

Genus *Pseudosciomyza*, n. gen.

Generic characters.—Frons broad; orbits with 3-4 bristles; post vertical bristles divergent; second antennal joint much shorter than

¹⁹ Rept. on Fur Seals and Fur Seal Islands, pt. 4, p. 345, 1899.

third; third joint distinctly longer than broad (arista missing). face receding toward mouth margin; eye small, round, barely higher than cheek. Thorax with the following bristles: 1 humeral, 2 notopleural, 1 presutural, 2 pairs dorso-central, 1 prealar, and 2 postalar. scutellum with 4 bristles; propleurum with a bristle; stigmal bristle absent; mesopleura unarmed; sternopleura with numerous long hairs none of which can be considered as bristles. Legs hairy, without distinct bristles except those at apices of mid and hind tibiae, the former stronger than the latter and noticeably curved. Costa unspined; inner cross vein before apex of first vein, sixth vein reaching margin of wing. Genotype, the following species.

Pseudosciomyza hannai Cole.

Dryomyza hannai Cole, Proc. Calif. Acad. Sci., vol. 11, p. 174, 1921.

Male.—Brownish black, subopaque, head yellowish brown; vertex and occiput with dense grayish pruinescence; frons orange brown, darker posteriorly; orbits pruinescent; face and cheeks testaceous yellow; third antennal joint slightly brownish. Thorax with rather dense yellowish gray pruinescence. Abdomen more brownish than thorax, the surface slightly shining and with but little pruinescence; apices of segments narrowly yellowish. Legs reddish brown; femora slightly darkened. Wings faintly yellowish, noticeably so on each side of humeral vein and between apices of auxiliary vein and first; cross veins with very indistinct yellowish marginal suffusion. Halteres pale yellow.

Frons slightly over half the width of head; orbits slightly differentiated, each with 3-4 bristles which are directed slightly outward; center stripe with numerous black, setulose hairs; antennae rather short, not descending much below level of eyes; face slightly carinate, upper mouth margin arched; labrum small, protruded tongue-like; proboscis fleshy; palpi rather broad, hairy; disc of thorax with numerous long setulose hairs among which it is difficult to distinguish the bristles; sternopleurum with long hairs on its entire surface. Abdomen with long and rather strong hairs on all segments; hypopygium rather large, knob-like. Legs stout, the femora noticeably so, hairy; tarsal claws long. Wings elongate, their length exceeding that of insect from head to tip of abdomen, and equal to 3 times their greatest width; first costal division about 1.5 that of second, the two combined exceeding in length that of third; second vein ending well in front of wing tip; third vein ending very close to apex of wing; inner cross vein about three sevenths from apex of discal cell; last section of fourth vein about 1.5 that of penultimate section.

Female.—See Cole's description (op. cit.).

Length, 5 mm. St. Paul Island, 4 specimens, August 19, 1914 (E. A. Preble); 1 specimen, August 1, 1914 (E. A. Preble).

This genus has the clypeus well developed and protuberant, and because of this character, runs to the subfamily Dryomyzinae in Melander's recent key to the genera of Tetanoceridae²⁰. It is separable from *Helcomyza* Curtis by the absence of costal spines and the mid tibial bristling and from the other two genera by the lack of posterior bristles on mid tibiae, and bristling of scutellum and dorsum of thorax.

This genus and species have been in manuscript since 1915, but the species was described by Cole from material collected on St. Paul Island August 20, 1920. The author of the species indicated that its position in the genus *Dryomyza*, in which he placed it, was doubtful, which is correct.

Family TRYPETIDAE.

The species comprising this family are phytophagous in the larval stage; feeding in stems, roots, leaves, flowers, or fruits, and giving little or no indications of their presence, while others make their presence evident by the formation of galls upon the roots or stems, or by causing large blotches upon the leaves within which they feed. There is in the collection before me one species which appears to be undescribed. Loew has recorded *Spilographa flavonotata* Macquart, and *Tephritis angustipennis* Loew from the Yukon River, Alaska; and Coquillett in addition to describing *Trypeta flaveola* from Commander Islands has recorded species from Canada and northern and western States of the Union, some of which may occur in Alaska, but it is very improbable that any of them will be found on the islands covered by the present investigation because of their connection with certain food plants which do not occur on these islands.

Genus *Acidia* Robineau-Desvoidy.

The genera *Acidia* and *Spilographa* are in my opinion not validly separable. The only difference between the genotypes, which I have examined, lies in the arrangement of the thoracic dorsocentral bristles. In *Acidia* the four bristles in front of the scutellum are more nearly in a transverse line than they are in *Spilographa*. The very faint distinction between the wing markings of the two so-called genera is too trivial to warrant their generic separation.

I retain the generic name *Spilographa* in the references to species in the following paragraph as it is under that name that the species have been recorded in the literature.

The European *Spilographa alternata* Fallen lives in rose hips, some of the genus live in fruits of *Berberis*, while *S. zoe* Meigen and *S.*

²⁰ Ann. Ent. Soc. Amer., vol. 13, p. 307, 1921.

artemisiae Fabricius in the larval stages mine in leaves of *Artemisia* and allied plants. The North American species *electa* Say, is found in the larval stage in berries of *Solanum carolinense*. The larval habit of the species before me is not known but it is undoubtedly a phytophagous species.

Acidia uncinata Coquillett.

Pl. XV.

Puparium (Pl. XV, fig. 37).—Length 4.5 mm., diameter at middle 2.25 mm. Color, pale yellowish white, slightly shining. Surface of segments very minutely transversely rugulose, appearing except under a high magnification as entirely smooth. Dorsal thoracic segments as in Plate XV, Figure 33, the second and third with small scalelike setulae on their anterior margins arranged in short, slightly curved, transverse series. All segments each with a slightly irregular transverse series of very small, rounded, raised areas which are rather widely separated and each of which is armed at apex with a weak hair. Apex of abdomen as in figure 35; spiracles slightly elevated, each with 3 rather conspicuous, black, slits (Pl. XV, fig. 35).

Imago.—*Male*: Brownish testaceous, shining. Head including antennae and palpi pale yellowish testaceous, center stripe of frons opaque, darker than face, lower orbits subopaque, upper orbits and triangle shining. Thorax and abdomen distinctly shining, the former with slight yellowish pruinescence; humeri paler than disc of thorax; postnotum with a large blackish spot on each side. Legs yellowish testaceous. Wings with blackish or brownish markings as follows: A brown spot beyond humeral vein, a similarly colored spot filling the space between apex of auxiliary vein and apex of first vein and extending posteriorly as far as second vein but not connecting on the disc with the fusiform spot covering the inner cross vein, the latter extending in an almost straight line to costa, filling the entire cell to apex of second vein and distinctly indicated along the anterior margin of the cell between second and third veins, apex of wing infuscated, outer cross vein enclosed in a brown suffusion. Hairs and bristles black.

Upper frontal orbits elongated, their lower extremities extending beyond apex of ocellar triangle; lower orbits each with 3 bristles; eye about 1.5 times as high as long; cheek about one-sixth the height of eye. Thoracic chaetotaxy normal. Fore femora with ventral bristles, the other pairs unarmed; hind tibiae without dorsal setulae, only a few weak hairs present. First and third wing-veins setulose, the latter with setulae extending well beyond inner cross vein; apex of third vein very noticeably curved backward; inner cross vein at less than one-third from apex of discal cell.

Length, 4.75 mm.

Locality.—St. Paul Island, 1 male, spring 1913 (A. G. Whitney, Lot 35); 1 male and empty puparium, May 23, 1914 (A. G. Whitney, Lot 163); and 1 puparium, fall 1913 (A. G. Whitney, Lot 103). Recorded by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, Nov. 1921, p. 175) from St. Paul Island, August 10 and 12, 1920 (G. D. Hanna). Originally described from Fort Wrangel, Alaska.

Lot 35 in list is given as "Found dead on moss and liverwort specimens from Tolstoi Hill." Lot 163, "Grassy bankside near Village wells. One cocoon and fly. These yellow, ribbed cocoons found everywhere in lower part of moss beds and among their roots; a moist location." Lot 103 "On *Coelopleurum*. These pupae common everywhere under and amid thick damp moss on tundra all through the summer season."

The cocoons referred to are the puparia of this trypetid. It seems remarkable that the puparia should be so very common as stated above and that only 2 flies are in the collection.

The puparium of this species has a very well defined lateral fusiform area, a character that one might in a measure associate with the family Ortalidae if Bank's paper on the larvae of Diptera were used as a guide to the identity of this stage.²¹ It is therefore pertinent to point out that the paper in question provides only characters for the identification of such species as might reasonably be expected to occur in the stomach of man as accidental introductions with food and is not intended to cover the entire Muscoidea. A number of species in Ortalidae have no clearly defined lateral fusiform areas and the anal stigmatal areas are not noticeably elevated, while some Trypetidae have both distinct lateral fusiform areas and more or less elevated anal stigmatal areas.

Family SEPSIDAE.

The members of this family so far as they are known live in decaying animal or vegetable matter or in preserved foods or meats. The only genus represented in the present collection is *Piophila*.

Genus *Piophila* Fallen.

Of the species in this genus one at least is of economic importance because of its common occurrence in cheese and preserved meats. The larvae are able to leap short distances and the species is popularly known as the Cheese Skipper (*Piophila casei*). This species, which probably originated in Europe, has been found in human graves and is distributed throughout the whole of Europe, and North America from Alaska to Mexico. Several other European species occur in North America. One of the species in the present collec-

²¹ U. S. Dept. Agric., Bur. Ent., Tech. Ser. 22, 1912.

tion was found in the skull of a dead seal, and in this connection it may be of interest to record that several species are found in carcasses of dogs and other animals that are not uncommon on the shores of rivers, especially near the sea, in Britain. One species I have taken in such situations I have met with nowhere else.

Piophilala anomala, n. sp.

Pl. XV.

Larva.—Not preserved. Cephalopharyngeal skeleton as in Plate 15, Figure 36; dissected from puparium.

Puparium (Pl. XV, fig. 31).—Length, 3.5–4 mm. Reddish brown, slightly shining. Surface with fine transverse rather irregular rugae (fig. 31). Anterior respiratory organs very small. Segmentation rather indistinct. Posterior spiracles with 3 rather indistinct slitlike openings; apex as in Plate XV, Figure 32. The entire body without distinguishable hairs or setulae.

Imago.—Male and female.—Glossy black. Head, with the exception of the upper portion of frons, the occiput and posterior portion of cheeks, reddish yellow; palpi yellow; third antennal joint brownish. Legs black, yellow on extreme bases and apices of all femora, the bases of all tibiae and basal 3 joints of mid and hind tarsi. Wings clear, veins yellowish. Calyptrae whitish. Halteres yellow.

Male.—Frons distinctly narrowed anteriorly; orbits each with 2 bristles, the anterior one weaker than the posterior; disc of frons with a few weak hairs; second antennal joint with a rather long apical dorsal hair, third joint rounded; arista indistinctly pubescent; vibrissa as long as arista; cheek nearly half as high as eye. Mesonotum with 2 dorso-centrals; scutellum with 4 bristles. Hypopygium small. Legs rather stout, fore tarsi not appreciably thickened. Venation normal.

Female.—Agrees in color with the male. Ovipositor long and slender.

Length, 3.75 mm.

Type.—St. George Island, July 4, 1914 (Lot 52, G. D. Hanna); toward Zapadni Rookery. Allotype and puparium, St. Paul Island (Lot 176, A. G. Whitney). The data attached to this lot is as follows: "Near Village. One fly and several pupa cases. The pupa cases were found June 14 in the interstices of the nasal bones of a fur seal skull on the 'killing field.' From these one fly hatched out June 20." Paratypes, St. George Island, 2 specimens, August 4, 1914 (G. D. Hanna); St. Paul Island, 1 specimen, August 19, 1914 (E. A. Preble).

This species differs essentially from others in the genus in having the frontal orbits each with 2 distinct bristles. *P. casei* Linnaeus usually has the frons much darker and only exceptionally have the

orbits any hairlike setulae. The disc of thorax in *anomala* is glossy black, with a slight bluish tinge, and the surface has rather uniform short hairs. In this respect the species agrees closely with *nigriceps* Meigen, but the latter has the face blackened and the scutellum flattened and transversely rugulose. The scutellum in *anomala* is convex and smooth. *P. casei* differs from both *anomala* and *nigriceps* in having the thorax subopaque, with 3 slight longitudinal grooves in which there are a series of short hairs, the remainder of disc being bare and with a slight olivaceous tinge.

The foregoing notes are drawn from a comparison with North American specimens of *casei* and *nigriceps* named by Coquillett. I have no European examples of the species.

Since the completion of the manuscript of this paper a revision of the family has appeared by A. L. Melander and A. Spuler.²² The species described herein will run down to *oriens* Mel. and Spul. in their key to species of *Piophila*, but the legs are differently colored in my species, the fore coxae in *anomala* being mostly black and the mid and hind tibiae largely blackened, whereas in *oriens* the fore coxae and mid tibiae are entirely yellow and the hind tibiae and the tarsi less broadly blackened, all of the mid tarsi and the basal 4 joints of the hind pair being yellow.

There is a narrow dorso-central stripe on abdomen of *anomala* which is transversely rugose; no mention is made of this in description of *oriens*.

Cole records *Piophila oriens* (Proc. Calif Acad. Sci., 4th ser., vol. 11, Nov. 1921, p. 176) from St. Paul Island, August 10, 1920 (G. D. Hanna). *Oriens* was described from New York and Massachusetts.

Piophila sp.

A female taken by G. D. Hanna, June 16, 1914 (lot 36), on St. George Island, differs from the foregoing in having the antennae black; the cheeks higher, rugose posteriorly; the humeri and center of scutellum slightly reddish; and the legs darker. Unfortunately there is but one poorly preserved example, so I refrain from giving it a name.

In several respects the specimens agree fairly well with the description of *pilosa* Staeger, a species recorded from Greenland. The male of *pilosa* is distinguished from allied species by the rather conspicuous short pilosity, which is especially noticeable on the abdomen, and by the black antennae and very dark legs. The female is less noticeably pilose. *Nigerrima* Lundbeck, a species described from Greenland, differs from all others so far described in being entirely black.

²² Bull. 143, Washington Agri. Exp. Sta., 1917.

Family EPHYDRIDAE.

The species of this family are aquatic in habit, the larvae being found in liquids or in mud. Some few species are met with in the larval stage as miners in stems or leaves of aquatic or marsh plants. The species in the present collection are similar to those that frequent moist ground, and in all probability the larvae will be found in the wet mud or water about which the adults occur. Many of the species are flower frequenters in the adult stage.

Genus *Scatella* Robineau-Desvoidy.

This genus contains a large number of species which are met with even more commonly in the Old World than in the New. The great majority of the species so far described have the wings either with dark spots on a clear ground or clear spots on a dark ground. The species in the present collection differs from these groups in having the wings unspotted. *Scatella setosa* Coquillett and *S. stagnalis* Fallen, the two species recorded from Alaska, belong to the group with clear spots on the wings.

Scatella brunnipennis, n. sp.

Male and female. Subopaque brown. Face, yellowish brown, much paler than frons, the latter greenish anteriorly in well preserved specimens, cheeks and lower part of back of head slightly gray dusted. Thorax slightly shining on disc anteriorly in well preserved specimens with bluish or greenish luster, entirely opaque on pleura; mesonotum without distinct vittae, abdomen brown, slightly shining at base, becoming glossy on second segment and noticeably polished towards apex, the whole with a distinct bronzy reflection. Legs, brownish black, femora with slight grayish pruinescence. Wings subfuscous, unspotted; veins, dark brown. Halteres brown or yellow.

Frons seen from above over 3 times as wide as either eye; 2 strong orbital bristles on each side; center stripe above and orbits with a number of short setulose hairs; third antennal joint barely longer than broad; arista short, scarcely exceeding length of antenna, its pubescence very short; face very decidedly convex, with numerous short bristles, those on mouth margin and on a line with eye margin but some distance from it, most distinct; no string bristle on cheek. Humeral area with a few setae; notopleural bristles 2 in number; dorso-centrals 3, the anterior and middle pairs less widely separated than posterior pair, acrostichals in 2 regular, complete rows; dorso-central line filled in between bristles with short setulae; mesopleura

with 1 strong bristle and a number of hairs, those on posterior margin directed backward and those on upper margin directed upward; sternopleurum with 1 strong bristle; scutellum subtriangular, flattened on disc, anterior pair of bristles not very much shorter than posterior pair. Abdomen with sparse, short, surface hairs. Legs normal. Wings slightly longer than entire insect; distance from humeral vein to end of first vein barely more than one-fourth as great as next costal division; both costal breaks distinct; venation similar to that of *stagnalis*.

Length, 2-3 mm.

Type locality.—St. Paul Island, August 16, 1915, 60 specimens (G. D. Hanna). Other paratypes as follows:

St. Paul Island.

11 specimens, August 1, 1914 (E. A. Preble).

15 specimens, August 19, 1914 (E. A. Preble).

St. George Island.

8 specimens, June 4, 1914 (lot 2, G. D. Hanna).

1 specimen, June 16, 1914 (lot 32, G. D. Hanna).

This species strongly resembles *quadrissetosa* Becker, differing, however, in the yellow instead of gray face and the absence of the strong metallic color of the lower part of the frons. *Quadrissetosa* is a Norwegian species that has not been recorded from this side of the Atlantic, except by Cole (Proc. Calif. Acad. Sci., 4th ser., vol. 11, Nov. 1921, p. 176) and of his specimens, which came from St. Paul Island June 21 and August 10, 1920 (G. D. Hanna) he says they "seem to answer the description of this form."

Genus *Parydra* Stenhammer.

A genus which is well represented in Europe and North America; the larvae live in stagnant water, and the adult flies are found in marshy situations.

Parydra metallica Cole.

Pl. XV, fig. 26.

Parydra metallica Cole, Proc. Calif. Acad. Sci., 4th ser., vol. 11, p. 176, Nov. 1921.

This species was in manuscript for several years in this paper, but has been described by Cole as above.

It is an aberrant species and may reasonably be removed from *Parydra*, but I do not consider it pertinent to do so in this paper.

Originally described from St. George Island, June 28, 1920 (G. D. Hanna). In the present collection it is represented by three specimens from the same island, June 4 and 16 (lots 2 and 36, G. D. Hanna).

Family DROSOPHILIDAE.

The known larvae of the species of this family feed upon decaying vegetable matter, exuding sap of trees, in fermenting liquids, and rarely in leaves of living plants.

There is a single species in the present collection.

Genus *Drosophila* Fallen.*Drosophila graminum* Fallen.

Drosophila graminum Fallen, Geomyzides, p. 8, 1823.

A female of this species taken on St. Paul Island, August 16, 1915 (G. D. Hanna), has the thoracic stripes well defined and in every respect agrees with the dark forms occurring in the United States.

Family AGROMYZIDAE.

There is but a single species of this family in the collection. It belongs to the genus *Phytomyza*, the species of which are, so far as known, phytophagous in the larval stage, usually mining in the leaves of various plants, or living in the froth of Cercopidae.

Phytomyza obscurella Fallen.

Phytomyza obscurella Fallen, Phytomyzides, 4, 1823.

I have considerable doubt about the identity of this species. Melander has had an opportunity of comparing Alaskan and European examples of this species and considers the forms *ilicicola* Loew and *nigra* Meigen as varieties of *obscurella*, listing both as occurring in Alaska. The recorded food plants of the varieties suggest confusion of species—*ilicicola* on holly, *obscurella* on honeysuckle and elder, and *nigra* on *Primula veris* and *Heracleum sphondylium*. In view of the facts that I have no European examples of *obscurella* for comparison and that I have no record of the food plant of the Alaskan species and have not had opportunity to compare the larvae and pupae of the different forms, I leave the matter as it is, merely calling attention to the element of doubt in the matter of the recorded occurrence of *obscurella* in Alaska and the sinking of *ilicicola* and *nigra*, as varieties of *obscurella*.

There are 7 examples that I place under this species name provisionally. The data are as follows:

St. George Island.

3 specimens, June 16, 1914 (lot 32, G. D. Hanna).

4 specimens, August 16, 1915 (G. D. Hanna).

Agromyza parvicella Coquillett.

This species was originally described from St. Paul Island,²³ but no specimens were found in the present collection.

Immature Stages of Diptera.

Suborder Orthorrhapha.

DIVISION NEMATOCERA.

Family CHIRONOMIDAE.

There are a few specimens of larvae of Chironomidae in alcohol, brief descriptions of which are appended.

Genus *Chironomus* Meigen.

Chironomus sp. I.

Length, 10-12 mm. Color in life red. Head about $1\frac{1}{2}$ times as long as broad, tapered anteriorly, eye spot duplicated; antennae 5-jointed, basal joint about 4 times as long as its diameter, second joint as long as diameter of basal, third joint about as broad as long, much shorter than fourth and subequal in length to apical joint; labrum with 4 long hairs on each side of center anteriorly, the downward projecting margin with fine teeth; transverse comb consisting of 9 rather large rounded teeth; mandibles with 3 large dark teeth and a subapical dorsal and median paler pair; labrum similar to that of *decorus* Johannsen. Anal ventral blood gills absent; anterior and posterior pseudopods well developed; dorsal anal papillae large; each armed with about 6 long hairs.

St. Paul Island, 11 specimens, August 10, 1913 (lot 98, A. G. Whitney).

The data for this lot are as follows:

About 10 larvae from mud of dried-up pond where *Leucosticte* had been scratching for them. This pond about one-quarter mile long and 18 inches deep was dry from August 5 to mid-September. During this time its whole mud bottom was scratched over by turnstones to get at these larvae which were abundant. Color of the larvae ruby-red.

Genus incertus.

There are several larvae in the collection that I do not know the genus of. They differ from any larva known to me in having the apical abdominal segment armed with several concentric series of stout hooks, the area so armed being but slightly elevated and resembling that present on larvae of Simuliidae. The head, however, is of the normal Chironomid type and there is no possible doubt as to its relationship with that family. The head is short and broad, slightly tapering anteriorly; the antennae are of moderate length, the basal joint short and stout, not twice as long as its diameter, the

²³ Coquillett, D. W., Journ. New York Ent. Soc., vol. 10, p. 189, 1902.

second very slender, about one-third as thick as basal and about one-third longer than it, apical portion consisting either of one joint or 2 very closely fused, the length of which is about equal to the diameter; apex of basal joint with a stout process which tapers appreciably apically and is as long as second joint; mandibles with 5 teeth; labium with a large rather irregularly rounded central tooth and a much smaller rounded one on each side; labrum with 2 pairs of stout protruded ventral processes.

Length, 4-6 mm.

St. Paul Island.

7 specimens, March 23, 1913 (lot 5, A. G. Whitney).

1 specimen, April, 1913 (lot 10, A. G. Whitney).

The specimens in lot 5 were found in the bottom of a bag in which willows and mosses had been collected. It is possible that this is the larva of *Smittia* but more data are necessary before a reliable opinion can be expressed.

Family LIMNOBIIDAE.

Among the alcoholic material in the collection there is a larva that has puzzled me considerably. The head is complete and in most respects resembles that of members of the Mycetophilidae, having the typical very short antennae, apically subtruncate, toothed mandibles, and tapering dorsal cephalic plate. Were I judging from the head alone I should undoubtedly place the species in the Mycetophilidae but the respiratory system to all appearance is confined to prothoracic and anal spiracles, the apical abdominal segment has 4 distinct finger-like protuberances, and the whole of the body is covered with soft decumbent hairs, characters that associate it in my mind with Trichocera of the Limnobiidae, usually considered a subfamily of the Tipulidae.

In the absence of pupae and imagines of this species it is not possible for one to place it definitely, as our knowledge of the early stages of the order, although increasing slowly, is not such that we can identify more than a mere fraction of the species in the larval stage.

St. Paul Island: 1 specimen, March 23, 1913 (lot 5, A. G. Whitney).

Found along with some chironomid larvae in the bottom of a bag in which willows and mosses had been collected.

Suborder Cyclorrhapha.

DIVISION SCHIZOPHORA.

Family CALLIPHORIDAE.

A single example of a large calliphorid puparium is in the collection. As no examples of the adults of this family are before me I

can not attempt to associate it with any species. Muscids are treated in the paper following.

Length, 11.5 mm. Reddish testaceous. Cephalic and caudal extremities slightly tapering; segments well differentiated; anterior margins of segments with very short spines; lateral fusiform area narrow; spiracles with straight slits which open almost directly laterad, dislike basal elevation not distinguishable; margin of spiracular area elevated so that the spiracles are in a cavity; spiracular field with 12 distinct tubercles on margin, 6 above, the largest being the inner and outer pair in top row and the 2 outer on each side of bottom row; anal opening with a large conical protuberance on each side.

St. Paul Island: May 1, 1913 (lot 17, A. G. Whitney).

EXPLANATION OF PLATES XII-XV.

Plate XII.—Flies (Cyclorrhapha).

Fig. 1. *Coelopa frigida* (male).

Fig. 2. *Pogonota kincaidi* (male).

Plate XIII.—Details of Flies and Midges (Nematocera and Brachycera).

Fig. 3. *Sciara glacialis*, hypopygium of male, apical portion of one side.

Fig. 4. *Sciara* sp. Same as Figure 3.

Fig. 5. *Smittia arctica*, hypopygium of male, one side.

Fig. 6. *Chironomus obtusilobus*. Same as Figure 5.

Fig. 7. *Smittia arctica*, antennae of male.

Fig. 8. *Smittia arctica*, antenna of female.

Fig. 9. *Allodia subelata*, hypopygium of male, one side.

Fig. 10. *Orthocladus obumbratus*, hypopygium of male, apex of dorsal plate.

Fig. 11. *Tanytarsus similatus*. Same as Figure 10.

Fig. 12. *Smittia arctica*, wing of male, with more enlarged section of costa.

Fig. 13. *Chironomus conformis*, hypopygium of male, superior process and apex of lateral arm.

Fig. 14. *Etechia casta*, hypopygium of male, one side.

Fig. 15. *Rhamphomyia opacithorax*, hypopygium of male, lateral view.

Fig. 16. *Chironomus deviatu*s, hypopygium of male, one side; a, apex of superior process.

Plate XIV.—Details of Flies (Cyclorrhapha).—Figures 17-21, apical ventral abdominal plate of males; Figures 23-25, hypopygia.

Fig. 17. *Scatophaga stercoraria*.

Fig. 22. *Scatophaga furcata*.

Fig. 18. *Scatophaga dasythrix*.

Fig. 23. *Scatophaga furcata*.

Fig. 19. *Scatophaga crinita*.

Fig. 24. *Scatophaga stercoraria*.

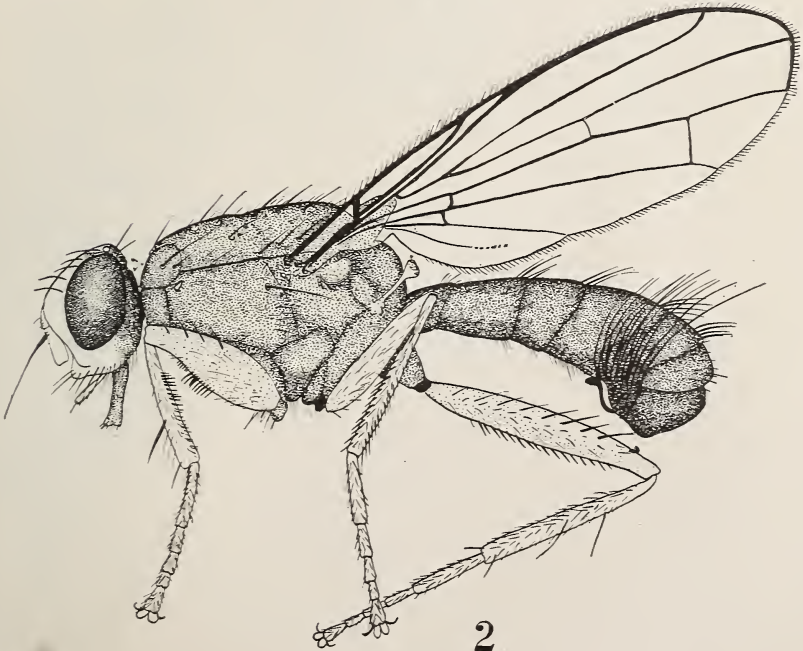
Fig. 20. *Scatophaga rubicunda*.

Fig. 25. *Coelopa erimia*.

Fig. 21. *Scatophaga islandica*.



1



2

FLIES (CYCLORRHAPHA).

Fig. 1. *Coelopa frigida*, male. Fig. 2. *Pogonota kincaidi*, male.



3



4



5



6



7



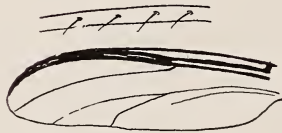
9



8



10



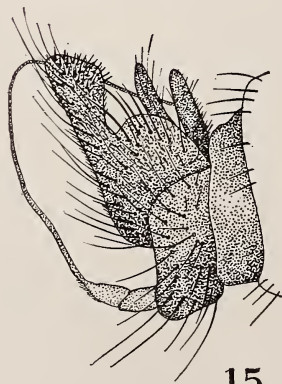
12



13



11



15



16

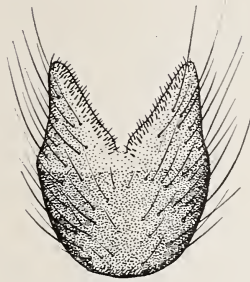


14

DETAILS OF FLIES AND MIDGES (NEMATOCERA AND BRACHYCERA).
(Explanation on page 226.)



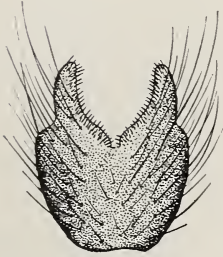
17



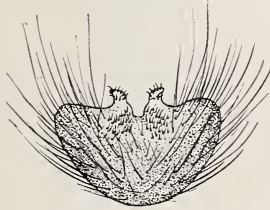
18



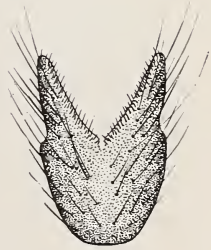
19



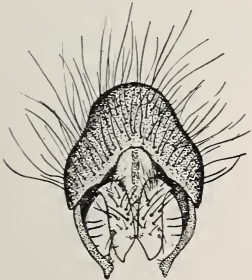
20



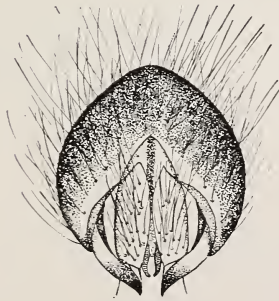
21



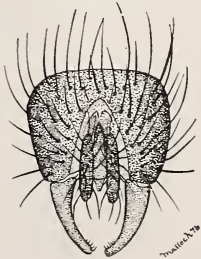
22



23



24



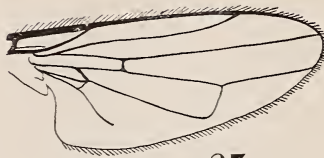
25

DETAILS OF FLIES (CYCLORRHAPHA).

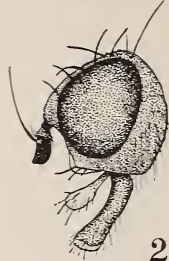
(Explanation on page 226.)



26



27



28



29



31



32



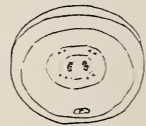
30



33



34



35



36



37

DETAILS OF FLIES (CYCLORRHAPHA).
(Explanation on page 227.)

Plate XV.—Details of Flies (Cyclorrhapha).

- Fig. 26. *Parydra metallica*, head.
Fig. 27. *Borborus subapterus*, wing.
Fig. 28. *Allomyella brevipennis*, head.
Fig. 29. *Helina hannai*, anal opening of puparium.
Fig. 30. *Helina hannai*, apex of puparium, end view.
Fig. 31. *Piophila anomala*, puparium, dorsal view.
Fig. 32. *Piophila anomala*, end view.
Fig. 33. *Acidia uncinata*, puparium, dorsal view of thoracic segments and respiratory organs; *a*, opening of latter enlarged; *b*, spines of segments, enlarged.
Fig. 34. *Hydrophoria alaskensis*, abdomen of male, lateral view.
Fig. 35. *Acidia uncinata*, apex of puparium, end view, and spiracular slits enlarged.
Fig. 36. *Piophila anomala*, larval head parts.
Fig. 37. *Acidia uncinata*, puparium, lateral view.

DIPTERA.

Suborder Cyclorrhapha.

DIVISION SCHIZOPHORA.

Family CALLIPHORIDAE.

By W. R. WALTON, *In Charge Cereal and Forage Insect Investigations,*
Bureau of Entomology.

Cynomyia hirta Hough.

This species was originally described from St. Paul Island by Hough. It has also been recorded from Popof Island and Kodiak, Alaska, by Coquillett. It closely resembles *C. mortuorum* Linn. of Europe, but is evidently distinct.

The specimens before me exhibit a considerable variation in size, i. e., 10–16 mm. They were collected on both St. George and St. Paul Islands from June 24 to August 26.

Calliphora vomitoria Linnaeus.

This species has been recorded by Coquillett as occurring in Alaska as follows: Sitka, Kukuk Bay, Popof Island, and Seldovia. This is the species mentioned in the list of Diptera as *Calliphora obscoena* Esch. in the report on the Fur Seal Islands.

It inhabits also northern Europe, Canada, and the northeastern portion of the United States. Specimens were collected on both St. George and St. Paul Islands, from July 3 to September.

The tachinid *Muscopteryx obscura* was described by D. W. Coquillett (New Diptera from North America, Proc. U. S. Nat. Mus., vol. 25, p. 116, Sept. 12, 1902) from St. Paul Island, and afterwards made the type of a new genus, *Alaskophyto*, by C. H. T. Townsend (Can. Ent., vol. 47, no. 9, p. 285, Sept. 1915).—W. L. M.

Cole records (Proc. Calif. Acad. Sci., 4th Ser., vol. 11, p. 171, 1921) *Didyma pullata* van der Wulp from St. Paul Island. There is no such species, but evidently *pullula* van der Wulp is intended. Van der Wulp's species, which is not a *Didyma*, is recorded from Mexico; and Coquillett's record of it from Alaska is erroneous. In all probability, therefore, the species does not occur in the Pribilofs.—J. R. M.

HYMENOPTERA.

By HENRY L. VIERECK, *Assistant Biologist, Bureau of Biological Survey.*

In the following list, records of the species with a reference letter²⁴ are taken from published reports and those without a reference letter are here published for the first time. Where the type locality of a species is in these islands the species is preceded by an asterisk (*).

Suborder Chalastogastra.

SUPERFAMILY TENTHREDINOIDEA.

Family XYELIDAE.

Megaxyela?

Determined by S. A. Rohwer. One head from St. Paul Island, from the stomach of *Arquatella ptilocnemis*, No. 14119.

Family TENTHREDINIDAE.

* *Amauronematus isolatus* Kincaid. (b)

Determined by S. A. Rohwer. ♀, St. Paul Island, June, 1913. A. G. Whitney, Lot 55.

* *Amauronematus whitneyi* Rohwer.

Type.—St. Paul Island, Bering Sea, April 15, 1914. 1 ♀, A. G. Whitney, Lot 122.

Amauronematus sp.

Determined by S. A. Rohwer. Probably the same as the preceding. St. Paul Island, May 27, 1915, from the stomach of *Stercorarius longicaudus* (No. 135031, Biological Survey stomach collection).

Pachynematus gotarus Kincaid.

Determined by S. A. Rohwer. 3 ♀ 4 ♂, St. George Island, June 27, 1914 (G. Dallas Hanna), 2 ♂, both Lot 49; and 2 ♀, one, Lot 49; one, Lot 21.

Pachynematus sp.

One male "does not seem to be described." Determined by S. A. Rohwer. St. George Island, June 14, 1914 (G. Dallas Hanna).

²⁴ The reference letters have relation respectively to (a) Ashmead, W. H., *Hymenoptera of Alaska*, Proc. Washington Acad. Sci., vol. 4, pp. 117-274, May 29, 1902; and (b) Kincaid, T., *Tenthredinoidea of the Expedition*, same journal, vol. 2, pp. 341-346, Nov. 24, 1900. The sawflies here listed with Rohwer as author were described in Proc. U. S. Nat. Mus., vol. 57, pp. 212, 216, 1920.

Pteronidea melanostoma Rohwer.

Type.—St. George Island, Bering Sea, June 14, 1914. 1 ♀
G. D. Hanna (Lot 21; Lot 12 according to original description).

Dolerus konowi MacGillivray.

Determined by S. A. Rohwer. St. Paul Island, summer, 1914.
A. G. Whitney, Lot 202, 1 ♀.

Dolerus sp.

Determined by S. A. Rohwer. 1 ♀, St. Paul Island, summer, 1914.
(E. A. Preble.)

Suborder Clistogastra.

SUPERFAMILY ICHNEUMONOIDEA.

Family VIPIONIDAE.

**Apanteles* (*Protapanteles*) *alticola* Ashmead. (^a)

**Apanteles* (*Protapanteles*) *congestiformis*, n. sp.

Type locality.—St. Paul Island, May 29, June 20, 1913 (A. G. &
E. G. Whitney, lot No. 50), cocoons collected May 29, 1913.

Female.—Length 2.5 mm. Related to *A. (P.) carduicola* (Packard) and may prove to be at most a race of *A. (P.) congestus* (Nees.), from which it differs in its mostly black fore femora. Shiny, partly polished, partly pale sericeous; head above mostly polished, indistinctly sculptured, face almost polished, finely indistinctly punctured, without a median welt, labrum blackish, basal half of mandibles black, the apical half mostly reddish, antennae black throughout except for the pale joint between the pedicel and flagel, palpi dark stramineous; thorax mostly closely punctured, the punctures shallow and adjoining or nearly adjoining, scutel almost impunctate, polished, sparsely punctured, posterior half of mesopleura mostly polished, impunctate, wings with a faint brownish tinge, almost colorless, stigma brownish stramineous, veins dull stramineous with a smoky tinge, transverse cubitus a little longer than the first abscissa of the radius, tegulae black, legs black or blackish except for the distal trochanter of the fore legs, the apical fourth of fore tibiae and all of the remaining tibiae and most of the tarsi which are rather pale brownish stramineous, end joints of the tarsi blackish as are the penultimate and antepenultimate tarsal joints of the fore and mid legs, metapleura with the anterior half mostly polished, the posterior half not nearly so coarsely reticulated as propodeum; propodeum shiny, rather coarsely reticulated and with a distinct median longitudinal carina; abdomen with its first and second plates more or less sculptured, the first plate finely wrinkled, partly indistinctly punctured, partly longitudinally striate, second plate not so definitely

sculptured, the succeeding tergites highly polished, abdomen black throughout, ovipositor hardly exerted.

Allotopotype.—Essentially as in the type, except that the legs are black or blackish throughout except for the yellowish annulus near the base of the tibiae. Cocoons imbedded in a mass of pale lemon-tinted floss.

Family ALYSIIDAE.

**Gyrocampa alaskensis* Ashmead.^(a)

Family BANCHIDAE.

Enizemum tibiale (Cresson).^(a)

Family BRACONIDAE.

Ichneutes reunitor Nees.

Two specimens from St. George Island, June 14, 16, 1914, (G. Dallas Hanna, lots 22 and 36.)

Family ICHNEUMONIDAE.

**Monoctonus paulensis* (Ashmead) ^(a) (= *Aphidius*).

Many specimens from St. George Island. One, April 7, 1914 (emerged apparently from an empty aphid skin preserved with this specimen) (A. G. Whitney, lot 120); the remaining specimens were collected June 4, 10, 16, 1914, and are labeled, respectively, G. Dallas Hanna, lots 2, 11, 28, and 32.

**Aphidius propinquus* Ashmead ^(a) = (*A. frigidus* Ashmead).

Five specimens from St. George Island, June 10, 16, 1914, August 16, 1915 (G. Dallas Hanna, lots 11, 12, and 32).

**Praon alaskensis* Ashmead.^(a)

**Catastenus alaskensis* Ashmead.^(a)

Catastenus trifasciatus Ashmead.^(a)

Mesochorus frontalis Ashmead.^(a)

Campoplegidea laticinctus Cresson.^(a)

**Hypocryptus variegatipes* Ashmead.

Cteniscus clypeatus Cresson.^(a)

**Polyblastus glacialis* Ashmead.^(a)

Mesoleius stejneri Ashmead.^(a)

**Calliphururus minor* Ashmead.^(a)

**Calliphururus affinis* Ashmead.^(a)

**Calliphururus clypeatus* Ashmead.^(a)

**Tryphon alaskensis* Ashmead.^(a)

Stenomacrus borealis Ashmead.^(a)

Stenomacrus sp.

Two specimens from St. George Island, June 16, 17, 1914 (G. Dallas Hanna, lots 32, 37).

Stenomacrus sp.

One specimen from St. George Island, July 8, 1914 (G. Dallas Hanna, lot 55).

**Orthocentrus nigrinus* Ashmead.^(a)

Atmetus insularis Ashmead.^(a)

Deleter flavifrons Ashmead.^(a)

**Neuroteles dubiosus* Ashmead.^(a)

**Hypoleptus alaskensis* Ashmead.^(a)

**Synoplus pleuralis* Ashmead.^(a)

**Synoplus brevipennis* Ashmead.^(a)

**Lissonota alaskensis* Ashmead.^(a)

**Gelis obesus* Ashmead = (*Pezomachus*).

Gelis sp.

One female from St. Paul Island, August 31, 1914, from the stomach of *Pisobia aurita* (No. 134907, Biological Survey stomach collection).

**Gelis nigrellus* Ashmead^(a) = (*Pezomachus*).

Atypical females representing at most perhaps only a dark variety of this species were collected as follows: St. George Island, June 8, 10, 1914 (G. Dallas Hanna, Lot Nos. 8 and 11, respectively); St. Paul Island, August 16, 1915 (G. Dallas Hanna).

Gelis sp.

One female from St. Paul Island, August 31, 1914, from the stomach of *Pisobia aurita* (No. 134907) represents a species presumably related to *G. posthumus* Foerster.

**Mesoleptus kincaidi* Ashmead^(a) = (*Exolytus*).

Mesoleptus niger Ashmead^(a) = (*Exolytus*).

**Mesoleptus perplexus* Ashmead^(a) = (*Exolytus*).

**Xestophyes nigripes* Ashmead^(a) = (*Xestophya*).

St. Paul Island, Summer, 1914 (A. G. Whitney, Lot 205).

**Xestophyes polita* Ashmead^(a) = (*Xestophya*).

**Polyrhembia sanctipauli* Ashmead^(a) = (*Exolytus*).

Two specimens from St. Paul Island, August 31, 1914, from the stomach of *Heteroscelus incanus* (No. 134917, Biological Survey stomach collection).

Polyrhembia sp.

Three specimens from St. Paul Island, August 31, 1914, from the stomach *Pisobia aurita* (No. 134907, stomach collection).

Seleucus sp.

One female from St. Paul Island, August 27, 1914, from the stomach of *Arquatella philocnemis* (No. 126723, stomach collection). Apparently not represented in any published key to species of this genus.

Bachia nigra Ashmead.^(a)

Bachia sp.

One female from St. Paul Island, summer 1914. (E. A. Preble.) Presumably related to *Phygadeuon longigena* Thomson.

Scinacopus sp.

One male and its cocoon from St. Paul Island, near Polovina Lake, March 29, 1914 (A. G. Whitney, Lot 115), "Pupa in brown papery cocoon brought home in bunch of lichens and hatched out in vial." Presumably related to *Phygadeuon perfusor* (Gravenhorst).

Zaphleges sp.

One male from St. Paul Island, August 16, 1915 (G. Dallas Hanna). Also presumably related to *Phygadeuon perfusor* (Gravenhorst).

**Plesignathus rubrocinctus* Ashmead^(a) = (*Plesiognathus*).

Plesignathus sp.

One female from St. George Island, September 6, 1913 (G. Dallas Hanna). Presumably related to *Phygadeuon vagans* Gravenhorst.

Plesignathus sp.

One male from St. George Island, September 6, 1913 (G. Dallas Hanna). Presumably related to *Phygadeuon brachyurus* Thomson.

**Bathymetis simulator* Ashmead.^(a)

Bathymetis quadriceps Ashmead.^(a)

**Bathymetis confusa* Ashmead.^(a)

**Bathymetis simillima* Ashmead.^(a)

St. Paul Island, August 16, 1915 (G. Dallas Hanna); St. George Island, August 4, 1914 (G. Dallas Hanna.)

Bathymetis rubrocincta Ashmead.^(a)

**Bathymetis simulans* Ashmead.^(a)

**Bathymetis imitator* Ashmead.^(a)

**Bathymetis nigricornis* Ashmead.^(a)

**Stiboscopus mandibularis* Ashmead.^(a)

**Stiboscopus alaskensis* Ashmead.^(a)

**Stiboscopus sanctipauli* Ashmead.^(a)

Stiboscopus sp.

One male from St. Paul Island, August 16, 1915 (G. Dallas Hanna). Presumably related to *Phygadeuon liosternus* Thomson.

**Pezoporus trifasciatus* Ashmead^(a) = (*Microcryptus*).

Stibeutes nigrita Ashmead.^(a)

**Isochresta uncinata* Ashmead.^(a)

**Theroscopus rufipes* Ashmead.^(a)

**Habromma nigrum* Ashmead.^(a)

**Aclastus rufipes* Ashmead.^(a)

Acrolyta aciculata Ashmead.^(a)

Caenomeris? sp.

One female, St. Paul Island, August 16, 1915 (G. Dallas Hanna). Presumably related to *Aclastus minutus* (Bridgman.)

**Spinolia minuta* Ashmead.^(a)

**Centeterus dorsator* Ashmead.^(a)

Amblyteles (*Pterocormus*) *alpestriformis*, n. sp.

Type locality.—St. Paul Island, Telegraph Hill, June 22, 1913; spring and summer of 1915 (A. G. Whitney, Lot Nos. 54, 174, 208). Presumably related to *P. alpestris* (Holmgren).

Female.—Length 9 mm.; colored somewhat like *Pterocormus? disparilis* (Cresson), from the original description of which it differs as follows: Head reddish, except for the cheeks, malar space, and antennal basin, all of which are mostly black; mandibles reddish, blackish at base and apex; palpi fuscous; antennae blackish, except for the basal fourth, which is mostly reddish, without an annulus; apical third of antennae with the joints slightly faceted above; thorax with its tegulae stramineous, without a yellow line before and beneath; scutel and postscutel reddish; wings subhyaline, brownish; veins and stigma pale brownish stramineous; legs mostly reddish; coxae and trochanters mostly black; hind coxae reddish above; end joint of tarsi brownish; propodeum slightly concave posteriorly, without lateral angles; propodeal carinae well defined; areola wider in front than behind, nearly quadrate, slightly rounded, emarginate behind; areola rather indefinitely, coarsely sculptured; abdomen finely reticulated, its punctures mostly from adjoining to two puncture widths apart; second tergite apically, fifth basally, and third and fourth tergites broadly down the middle, black; second and third tergites without yellow spots; sixth and seventh tergites with a median yellow spot; post-petiole dullish, finely sculptured, almost impunctate.

Other locality.—St. George Island, August 4, 1914 (G. Dallas Hanna).

Amblyteles (*Pterocormus*?) *cervulus* Provancher.^(a)

SUPERFAMILY CYNIPOIDEA.

Family FIGITIDAE.

Alloxysta alaskensis Ashmead.^(a)

Alloxysta sp.

From St. Paul Island, August 15, 1914 (No. 126733).

**Tetrarhapta alaskensis* Ashmead.^(a)

St. Paul Island, August 16, 1915 (G. Dallas Hanna).

SUPERFAMILY CHALCIDOIDEA.

Family MYMARIDAE.

Anaphes sp.

Two specimens of a species 924 μ long and apparently related to *A. hercules* Girault, the largest North American species. St. George Island, Staraya Artel Rookery, June 17, 1914 (G. Dallas Hanna, Lot 37).

Family PTEROMALIDAE.

**Eutelus confusus* Ashmead.^(a)

"*Habrocytus capreae* Swederus."

This is probably what is intended by *Tridymus capreae* L. in Schwarz's report (Fur Seals and Fur Seal Islands, Part 3, p. 550, 1899).

Asaphes sp.

St. Paul Island, August 16, 1915 (G. Dallas Hanna).

Pterosema sp.

One male from St. Paul Island, Tolstoi Hill, spring 1913, "probably about May 20," from pupae in grass stems growing in shelter of rock crevices, emerged in warmth of laboratory (A. G. Whitney, Lot 33).

Family MISCOGASTERIDAE.

Stictomischus sp.

One female from St. Paul Island, August 16, 1915 (G. Dallas Hanna).

**Terobia vulgaris* Ashmead.^(a)

SUPERFAMILY SERPHOIDEA.

Family CERAPHRONIDAE.

**Lygocerus alaskensis* Ashmead.^(a)

Family BELYTIDAE.

**Zelotypa scutellata* Ashmead.^(a)

Zelotypa sp.

From St. Paul Island, August 15, 1914 (No. 126733).

Family SERPHIDAE.

**Serphus nigripes* Ashmead.^(a)

St. Paul Island, August 16, 1915 (G. Dallas Hanna).

Serphus sp.

St. George Island, August 4, 1914 (G. Dallas Hanna).

SUPERFAMILY APOIDEA.

Family APIDAE.

Bremus (*Bremus*) *kincaidi* Cockerell.

Many females and workers from St. Paul Island, as follows: Females, October 11, 1912 (A. G. Whitney, Lot 2); May 31, June 5, 1913 (A. G. Whitney, Lots 113 and 36, respectively); workers, July 23, 1913 (A. G. Whitney, Lot 95).

In the report on G. D. Hanna's 1920 Pribilof collection, A. D. MacGillivray describes (Proc. Calif. Acad. Sci., Fourth Ser., 11, pp. 188-192, Nov., 1921) 6 new species of sawflies under the following names: *Pontania sucta*, *P. stipata*, *P. subatrata*, *P. sublorata*, *Pachynematus venustus*, and *P. vernus*.—W. L. M.

ARACHNIDA.

By NATHAN BANKS, *Museum of Comparative Zoology.*
Harvard University.

(Plate IX, figs. 1-7—see p. 158.)

Suborder Acarina.

Family BDELLIDAE.

Bdella frigida Banks.

St. George Island, July 9.

Cyta brevirostris Koch.

St. Paul Island, April.

Family ERYTHRAEIDAE.

Erythraeus tonsus Koch.

St. Paul Island, July 19, on *Lathyrus maritima*.

Family PARASITIDAE.

Parasitus borealis Koch.

(Pl. IX, figs. 5 and 7.)

St. Paul Island, May 16 and 19; May 23, on flies; June 26.

Macrocheles arcticus Kramer and Neuman.

St. Paul Island, May 23, in moss; September 13, on chickweed.

Family IXODIDAE.

Ceratixodes putus Cambridge.

St. Paul Island, July 4, on *Rissa t. pollicaris*, also May 17 and June 30; and St. George Island, Aug. 4.

Family ORIBATIDAE.

Galumna lucens Koch.

St. Paul Island, July 17, on chickweed; Sept. 13, on chickweed.

Oribatella borealis Banks.

St. Paul Island, July.

Notaspis serrifrons, n. sp.

(Pl. IX, fig. 2.)

Yellowish, cephalothorax subtriangular, with large submedian lamellae, each ending in a long bristle, a pair of short apical bristles, superior bristles long and fine; pseudostigmatic organ short and capitate; the front margin of cephalothorax has a row of about

15 sub-equal teeth. Abdomen nearly globose, without hairs; ventral apertures nearly circular, the genital fully twice its length in front of the twice larger anal aperture; coxal plate with two lines each side; legs short, with simple hairs.

Length .5 mm.

From St. Paul Island, July (Whitney).

Scutovertex nigrofemoratus Koch.

Numerous specimens from St. Paul Island, Aug. 16.

Hermannia reticulata Thor.

St. Paul Island, July.

Nothrus sp.

Young from St. Paul Island, June.

Lohmannia scabra Koch.

(Pl. IX, fig. 4.)

St. Paul Island, April 5; October on *Erytrichium chamissonis*.

Family TYROGLYPHIDAE.

Dermacarus sp.

(Pl. IX, fig. 1.)

Hypopi from St. Paul Island, July 5, on *Sorex pribilofensis*.

Tyroglyphus whitneyi, n. sp. ,

(Pl. IX, fig. 6.)

Hypopus.—Very similar to *T. lundbecki* Trag. from Greenland. The body, however, is not, or is only a trifle broader at humeri than at the hind coxae. The hind legs are situated only a little in front of the sucker-plate, and when extended behind reach fully to tip of the body. The plate is similar to that of *T. lundbecki* except that the median pair of suckers are very much larger than the others, in fact more than twice as large as any others. (Pl. IX, fig. 6.)

Length, .2 mm.

From St. Paul Island, on *Bombus*, May 31 (Whitney coll.).

Family LISTROPHORIDAE.

Myocoptes musculus Koch.

St. Paul Island, November 16, on house mouse.

Family ANALGESIDAE.

Analges sp.

Females from St. Paul Island, April, without host.

Suborder Phalangida.

Family PHALANGIIDAE.

Leptobunus borealis Banks.

Common on both St. Paul and St. George Islands from the first of June till fall.

Suborder Araneida.

Family AGELENIDAE.

Tegenaria derhami Scopoli.

St. Paul Island, May 11, and "Summer"; St. George Island, June 27.

Family THERIDIIDAE.

Bathyphantes pogonias Kulczynski.

From St. Paul Island, July 3.

Microneta ululabilis Keyserling.

St. George Island, June 17 and September.

Erigone arctica White.

Several from St. Paul Island, summer.

Erigone psychrophila Thorell.

Several from St. George Island, July 4.

Erigone sp.

Two females from St. George Island, July 4, and August 4, another from St. Paul, August 17.

Hilaira glacialis Thorell.

(Pl. IX, fig. 3.)

From St. Paul Island, May 19; I give a figure of the male palpus.

Lepthyphantes sp.

One female St. George Island, August 4.

Ixodes arcticus, a tick parasitic upon the fur seal, was described from the Pribilof Islands by Herbert Osborn (The Fur Seals and Fur-Seal Islands of the North Pacific Ocean, Part 3, pp. 553-554, 1899).

Opinions differ as to the limits of the spider family Linyphiidae, and Dr. R. V. Chamberlin has published a paper on the "Linyphiidae of St. Paul Island, Alaska" (Journ. New York Ent. Soc., vol. 29, no. 1, pp. 35-43, pls. 3-4, March, 1921), in which he records 11 species. Five of these are described as new, in addition to 3 new genera.

These spiders are herewith listed:

Cornicularia clavicornis Emerton.

Erigone sibirica Kulczynski.

Oedothorax septentrionalis Kulczynski.

Oedothorax nesides Chamberlin.

Aigola Chamberlin.

Aigola pauliana Chamberlin.

Aigola tuberella Chamberlin.

Anitsia Chamberlin.

Anitsia abjecta Chamberlin.

Arctilaira Chamberlin.

Arctilaira bellans Chamberlin.

Tmeticus armatus Banks.

Microneta heathi Chamberlin.

Bathyphantes brevipes Emerton.

—W. L. M.

[For Plate IX (Arachnida) and explanation of plate, see page 158.]

CHILOPODA.

By RALPH V. CHAMBERLIN, *Museum of Comparative Zoology,*
Harvard University.

No diplopod has been found on the Pribilof Islands and it is not likely that any occurs there naturally. Four species of chilopods, however, are natives of the islands, two of these being apparently abundant. One of these, the geophiloid *Linotaenia*, is widespread in North America from middle latitudes in the United States northward through Canada to Alaska and the adjacent islands, and, if not identical with, is certainly extremely close to, the widespread Eurasian species *Linotaenia attenuatus* (Leach). The northern specimens present certain differences from southern forms in both hemispheres as pointed out below. The lithobiid is apparently Asiatic in origin and does not conform generically to any truly North American genus as conceived by the writer. The other two species, both geophilomorphous forms, appear to be much less common. *Pachymerium ferrugineum* is a form widespread throughout the Eurasian and North American regions, having a range very similar to that of the *Linotaenia*; but the fourth species, the *Escaryus*, is thus far known from only a single specimen taken on St. Paul Island.

Lithobiomorpha.

Family LITHOBIIDAE.

Ezembius, gen. nov.

Body conspicuously narrowed cephalad; the first dorsal plate narrower than the head but wider than the second plate.

Head with marginal interruptions. Antennae short; articles normally twenty.

Ocelli in several series; single ocellus little if any larger.

Prosternal teeth 2+2 or 3+3; sinus V-shaped; ectal spines bristle-like.

Coxal pores circular; 3, 3, 3, 3, to 6, 7, 7, 6 in number.

None of the posterior coxae laterally armed; but two or more pairs commonly dorsally armed. Anal legs each with two tarsal claws. Ventral spines of anal legs normally 0, 1, 3, 2, 0; dorsal 1, 0, 3, 1, 0. Dorsal spines of penult legs 1, 0, 3, 1, 1. Tibiae of all legs excepting the anal dorsally armed, commonly the tibiae of the first two pairs bearing a single spine, the others caudad to the antepenult pair bearing two spines.

Tarsi in fully grown specimen more or less clearly divided.

Neither anal nor penult legs of male with a definitely developed process or lobe.

Claw of female gonopods short, trilobed, the lobes normally short and inconspicuous or the lobes obsolete and the claw entire or subentire; basal spines 2+2, slender.

Small and medium sized species.

Genotype.—*Lithobius stejnegeri* Bollman.

Among other species apparently congeneric with this type form is a group of Siberian species embracing, e. g., the following described by Stuxberg: *ostiacorum*, *princeps*, *sulcipes* (see below), and *scrobiculatus*.

Ezembius stejnegeri (Bollman).

Lithobius stejnegeri Bollman, Bull. U. S. Nat. Mus., 46, p. 199, 1893.

Lithobius sulcipes Bollman, loc. cit., p. 199, 1893.

Monotarsobius arcticus Attems, Arkiv. for Zool., V. no. 3, p. 19, 1909.

Lithobius (*Archilithobius*) *haasei* Attems, 1909, op. cit., p. 22, 1909.

Lithobius sulcipes Chamberlin, Canad. Ent., p. 260, 1911.

Of this species there are in the collection sent me for study by the Bureau of Biological Survey eight specimens from St. Paul Island, four of these being adult males, two adult females, and two young females in the *immaturus* stage, apparently differing by one moult. There are also five adults from St. George Island (collected Aug. 4, 1914, by E. A. Preble). I have also studied several specimens of this form secured on St. Paul Island in 1910 by Prof. Harold Heath. In addition to the specimens from the Pribilof Islands, I have examined and compared material from Bering Island, the type locality, Copper Island, Popof Island, and other islands of the region. More recently I have received from the Bureau several additional specimens collected in the group by G. Dallas Hanna.

After a careful study I am unable to detect more than one species in the material from these localities, and am convinced that the *sulcipes* of Bollman, certainly the *Monotarsobius arcticus* of Attems, and the *Lithobius* (*Archilithobius*) *haasei* of Attems, all described from Bering Island, are one and the same as *E. stejnegeri*, which in turn may prove to be identical with *L. sulcipes* Stuxberg (1875), and likely with the much earlier *L. sibiricus* of Gerstfeldt (1858), later fixed by the description of Haase (1880). In the present note, however, I have given above only the synonymy of forms described or recorded from the islands in or adjacent to Bering Sea, and reserve the question of the Siberian species until more abundant material from that region can be studied. The *M. arcticus* of Attems is separated from *stejnegeri* for the single stated reason that the ventral spines of the anal legs of the latter species are given as 1, 3, 2, 6 instead of 1, 3, 2, 0, as in *arcticus*. The 6 in the first formula, as might

have been surmised, is clearly a misprint for 0, the types of *stejnegeri* all having the formula for anal legs 1, 3, 2, 0, so that there remains no evident ground whatsoever for maintaining *arcticus*. Attems refers his specimens to *Monotarsobius*; but the tarsi in the larger specimens of the species are quite clearly biarticulate, though in smaller individuals the division in the anterior tarsi may not be distinct or may be but partial. *Lithobius* (*Archilithobius*) *haasei* Attems was apparently based upon larger specimens of the same species. For this form the prosternal teeth are given as 3+3, a number occurring quite commonly in larger individuals from all the localities above mentioned, while the number may be 3 on one side and 2 on the other. The extra teeth appear on the border of the median sinus and are at first smaller than the others. The claw of the female gonopods is typically tripartite; but the lobes are short and often are nearly or quite obliterated as such, leaving the claw subentire or entire.

Geophilomorpha.

Family LINOTAENIIDAE.

Linotaenia chionophila (Wood).

? *Geophilus acuminatus* Leach, Trans. Linn. Soc. Lond., XI, p. 386, 1814.

Strigamia chionophila Wood, Journ. Phil. Acad., V, p. 50, 1862.

Scolioplanes acuminatus Attems, Archiv. for Zool., V, no. 3, p. 25, 1909.

Linotaenia chionophila Chamberlin, Canad. Ent., p. 260, 1911.

Of this species I have examined 22 females and 29 males collected on St. Paul Island in 1910 by Prof. Harold Heath. Specimens from Bering Island studied by Attems are by him recorded as *Scolioplanes acuminatus* (Leach), a species well known in Europe. A specimen from the same island is listed by Bollman as *L. chionophila* (Wood). Specimens from Popof and Kadiak Islands and from Sitka and Lower Inlet are likewise referable to Wood's species. There is no room for doubt that this northern form is the typical *chionophila*, of which the type specimen, a female, was taken at Fort Simpson on the Red River of the North [Fort Simpson is on Mackenzie River, near Lat. 62° E. A. P.]. If Graf Attems is right in his identification of the specimens from Bering Island, as there is not much room to doubt, then the European form is one and the same as the North American, and *attenuatus* of Leach must replace *chionophila* of Wood as the specific name. In view of the different mode in number of pairs of legs and a few other minor points, however, I believe it as well to keep Wood's name for the present and until the forms have been more intensively studied as to variation and distribution, especially since such difficulty is often met in separating closely allied species of *Linotaenia*.

Of the 22 females from St. Paul Island 16 have 45 pairs of legs and 6 have 43. Wood's type has 43 pairs. Of the 29 males from St. Paul Island 27 have 43 pairs of legs, one has 45 pairs, and one has but 41 pairs. Attems states that among his specimens from Bering Island one male had 41 pairs and one 45 pairs, the others having 43. Thus it would seem that the numbers of pairs of legs in the male is almost constant at 43, individuals with 41 or 45 being occasional; while in the female the modal number is 45, variation to 43 being frequent.

In the case of the European specimens of *L. attenuatus*, the number of pairs of legs is nearly always smaller. In Austria-Hungary Latzel found among 60 specimens studied that all the males had 39 pairs while in the females the number was either 41 or 43. Meinert gives the number of pairs of legs as constantly 41, but gives the number in the female as 41 or 47 pairs, one specimen having the latter number. In "Die Myriopoden Stiermarks" Attems states that all the males studied by him from that country had 39 pairs of legs, excepting one which had 41, while all the females had 41. The same author, however, found among specimens from Transylvania four males with 37, two males with 35, and five with but 33 pairs of legs; and of females nine with 39, one with 37, and seven with 33 pairs of legs. It will be noted then that in European specimens of *L. attenuatus* the most usual number of pairs of legs in the male is 39 and that in some regions this number seems to be nearly fixed; but that in other places variation below this number may be frequent or the rule. Similarly the modal number for the female is 41, but variation is more frequent than in the male, the number sometimes being 43, or, in sections where the variation in the number in the male in the minus direction is frequent, falling to 37 and even to 33.

In the United States specimens of *L. chionophila* differ from the northern specimens and agree with the European *L. attenuatus* in having the number of pairs of legs in the male most frequently 39. In the female the number varies from 41 to 37. Of 22 females from Ithaca, N. Y., I find six to have 41 pairs, eight to have 39, and eight to have 37 pairs.

It may be noted that the number of coxal pores in specimens of *attenuatus* from Europe and specimens of *chionophila* from the United States averages considerably higher than in the specimens from the Pribilof and other islands of the region. Of the 22 females from St. Paul Island, eight have on each side six pores, five have five, five have seven, three have eight, and one has nine; of the males, sixteen have six pores, ten have five, two have seven, and one has eight. The mode is thus six pores on each side.

Family GEOPHILIDAE.

Pachymerium ferrugineum (C. L. Koch).

Geophilus ferrugineus C. L. Koch, Deutschl. Crust., Myr., u. Arachn., Hft. 3, Tab. 2, 1835.

Pachymerium ferrugineum C. L. Koch, System der Myr., p. 187, 1847.

Mecistocephalus ferrugineus Newport, Cat. Myr. Brit. Mus., p. 81, 1856.

Mecistocephalus foveatus McNeill, Proc. U. S. Nat. Mus., vol. 10, p. 333, 1887.

Geophilus attenuatus Cook (*nee* Say), Proc. U. S. Nat. Mus., vol. 18, p. 59, 1895.

One specimen of this form was secured on St. Paul Island by the Harriman Expedition. It is probably not uncommon on the Pribilof Islands, since it is common both on the Asiatic and North American mainlands. It is a widespread and abundant species both in Europe and Asia and in North America.

Family SCHENDYLIDAE.

Escaryus albus Cook:

Esaryus albus Cook, Harriman Alaska Expedition, vol. 8, p. 77, 1904.

The type of this species, taken on St. Paul Island, is the only specimen thus far known.

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