PART I.

MAMMALS.

ANALYSIS.

THE FISHERIES AND FISHERY INDUSTRIES OF THE UNITED STATES.

MAMMALS.

A.—THE WHALES AND PORPOISES.

1. THE SPERM WHALE.

DISTRIBUTION.—The Sperm Whale, *Physeter macrocephalus* Linn., was first described by Clusius in 1605 from specimens cast up on the coast of Holland in 1598 and 1601. It is the Cachalot of the French, the Pottfisch of the Germans, Potvisch or Kazilot of Holland, Kaskelot or Pottisk of Scandinavia, and one of the most valuable of cetaceans. Sperm Whales occur in every ocean, and though preferring warmer waters, are to be found at times close to the limits of the arctic regions. In the Pacific they have been taken off Cape Ommany, Alaska, latitude 56° 12′, and in the Atlantic as far north as Scotland and Orkney, and perhaps even Greenland. In both Pacific and Atlantic they range below the southern tips of the continents and are believed to pass freely from ocean to ocean, around Cape Horn, though they are said never to round the Cape of Good Hope. Murray states that they have been seen and captured in almost every part of the ocean between latitude 60° south and 60° north. He mentions that they have been recorded as found off the north of Scotland but no further, though he gives some credence to ancient authors who mentioned their having been seen off Greenland.

Beale, writing in 1836,[1] gave a list of their favorite resorts. It is interesting to compare the range of the species as then understood with their present range as indicated by the locations, and this comparison has been carefully made by Mr. A. Howard Clark, in the chapter on THE WHALE FISHERY, in a subsequent section of this report. In discussing the facts before him, Murray[2] expresses the opinion that almost every place which has been mentioned as a favorite resort of the Sperm Whales, although out of soundings, has claims to be considered the site of submerged lands. The islands of Polynesia, which are their special feeding ground, are the beacons left by the submerged Pacific continent. "They are also to be seen," he continues, "about the equinoctial line in the Atlantic Ocean, but they would seem to be either straggling 'schools' which have rounded Cape Horn, or unprospering colonies. It is from these that the specimens which have been occasionally met with in the North Atlantic or in the English seas have wandered. They have been now and then cast ashore, and then they are usually in an emaciated condition. They seem to be unprepared for, or not to be adapted for, shallow seas. Accustomed (perhaps not individually, but

[1] 1836. BEALE, THOMAS: Natural History of the Sperm Whale. London, 1836, p. 180.
[2] 1866. MURRAY, ANDREW: The Geographical Distribution of Mammals. London, 1866, p. 212.

by hereditary practice or instinct) to swim along the coral islands of the Pacific, within a stone's throw of the shore, they cannot understand, their instinct is not prepared to meet, shallow coasts and projecting headlands."

Murray's views, though suggestive, are, perhaps, not entirely well founded. It is certain, however, that the favorite haunts of the species have always been in the warmer seas, within or upon the verge of the tropics.

ABUNDANCE IN FORMER DAYS ON THE COAST OF THE UNITED STATES.—There is no reason to doubt that Sperm Whales were at one time, nearly two centuries back, as abundant in the North Atlantic as in more recent years in the North Pacific. The vigorous prosecution of the whale fishery since the early part of the eighteenth century by American vessels has had much to do with their present scarcity. The traditions of the American whale fishery all point to their considerable abundance near the eastern coast of the United States.

Macy, the historian of Nantucket, narrates that the first Sperm Whale known to that settlement was found dead and ashore on the southwest part of the island, and that the first taken by Nantucket whalemen was captured about the year 1712 by Christopher Hussey, who, "cruising near the shore for Right Whales, was blown off some distance from the land by a strong northerly wind, where he fell in with a school of that species of whale, and killed one and brought it home."[1] That Sperm Whales cannot at that time have been rare near the shore, may be inferred from the fact that the Nantucket Sperm Whale fleet which was then fitted out, and which three years later consisted of six sloops, producing oil to the value of $5,500 annually, were usually absent only six weeks, during which time they procured the blubber of one or two whales.[2] The Boston "News Letter" of October 2, 1766, stated: "Since our last a Number of Vessels have arrived from Whaling. They have not been successful generally. One of them viz: Capt. Clark on Thursday morning last discovered a Spermaceti Whale near George's Banks, mann'd his Boat, and gave Chase to her & she coming up with her Jaws against the Bow of the Boat struck it with such Violence that it threw a son of the Captain (who was forward, ready with his Lance) a considerable Height from the Boat, and when he fell the Whale turned with her devouring Jaws opened, and caught him. He was heard to scream, when she closed her Jaws, and part of his Body was seen out of her Mouth when she turned and went off."[3]

The log of the whaling sloop "Betsey," of Dartmouth, records that on August 2, 1761, her crew saw two Sperm Whales and killed one in latitude 45° 54′, longitude 53° 57′: this would be in the gully between the Grand Bank and Green Bank, about fifty miles west of Whale Deep, in the Grand Bank, and sixty miles south of the entrance to St. Mary Bay, Newfoundland. August 9, this vessel and her consort killed two to the south and west of the Grand Bank in latitude 42° 57′. In 1822 Captain Atwood was on the "Laurel," of Provincetown, which took a Sperm Whale on the sixth day out, on the course to the Azores, just east of the Gulf Stream, and less than 500 miles from Cape Cod. The nearest grounds upon which Sperm Whales now regularly occur are those to the north and east of Cape Hatteras, the "Hatteras Ground," and a ground farther south known as the "Charleston Ground." The last one observed on the New England coast was very young, only sixteen feet long, and was taken near New Bedford, Mass., March 29, 1842.[4]

In Douglass' "North America," published in 1755, it is stated that Spermaceti Whales "are to be found almost everywhere, but are most plenty upon the coast of Virginia and Carolina."

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[1] MACY, ZACCHEUS: History of Nantucket, p. 36.

[2] STARBUCK, ALEXANDER: in Report U. S. Fish Commission, part iv, 1878, p. 20.

[3] STARBUCK, *op. cit.*, p. 46–47.

[4] 1845. JACKSON, J. B. S.: Boston Journ. Nat. Hist., 1845, p. 138, pl. 16, fig. 1 (the stomach).

A Sperm Whale came ashore in 1668 in Casco Bay, and the circumstance seems not to have been regarded as unusual in those days.[1]

A person writing in 1741 discourses as follows: "Some Years since, there strauded on the Coast of New England a dead Whale, of the Sort which, in the Fishers Language, is called Trumpo, having Teeth like those of a Mill; it's Mouth at a good Distance from and under the Nose, and several Partitions in the Nose, out of which ran a thin oily Substance that candy'd, the Remainder being a thick fat Substance, being scraped out, was said to be the Sperma Ceti; it was said so, and I believe that was all. Whales were often caught formerly between New-England and New-York, and if the Sperma Ceti had really been in the Nose of that, it must have been more common, and more cheap, than Experience tells us, it has been even since this Discovery, and at this present time. As to the Whale Fishery, 'tis now almost as much a Rarity in New as Old England; the Fishery of Cod is at this time very great here, tho' still far short of that of Newfoundland."[2]

OCCURRENCE ON THE COAST OF EUROPE.—In the Eastern Atlantic, also, the occurrence of this species has been by no means unusual. Fleming, in "British Animals," 1828, states that "the Spermaceti Whale often comes ashore in Orkney."[3] In 1788, twelve males ran ashore in the English Channel.[4] Other instances of their stranding on the English coast occurred in February, 1689,[5] 1795,[6] 1766,[7] February 16, 1829,[8] in 1825,[9] and 1863,[10] while others were obtained on the coast of Brittany in 1784,[11] and in the Mediterranean, at St. Nazaire, in 1856,[12] and on other occasions for which dates are not given.

OCCURRENCE ON THE CALIFORNIA COAST.—Although Sperm Whales have occasionally been taken off the California coast for the past thirty years, it would appear that few have been seen in those waters since 1874. Captain Scammon has cited in his book no instances of individuals personally observed by him.

SIZE AND COLOR.—The sexes differ greatly in size and form, the female being slenderer and from one-fifth (Beale) to one-third or one-fourth (Scammon) as large as the male. The largest males measure from eighty to eighty-four feet in length, the head making up about one-third of the whole. In the head is the cavity known as the "case," from which is obtained the spermaceti and a quantity of oil. The youngest Sperm Whale on record is the one measuring sixteen feet, already mentioned as having been taken near New Bedford in 1842; its weight was 3,053 pounds.

The Sperm Whale is black or brownish-black, lighter on the sides, gray on the breast. When old it is gray about the nose and top of the head.

HABITS OF ASSOCIATION, MOTION, BLOWING, ETC.—Sperm Whales are gregarious and are often seen in large schools, which are, according to Beale, of two kinds, (1) of females accompanied by the young and one or two adult males, (2) of the young and half-grown males; the adult males always go singly. Their manner of motion is well described by Scammon as follows:

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[1] In 1668 a Spermaceti Whale of 55 foot long was cast up in Winter Harbor, near Casco Bay. The like hath happened in other places of the country at several times, when, for want of skill to improve it, much gain hath slipped out of the hands of the finders.—Hubbard's History of New England, From the Discovery to 1680. Boston, 1848, p. 642.

[2] British Empire in America. London, 1741, vol. i, pp. 188–189.

[3] FLEMING: British Animals, 1828, p. 29.

[4] GRAY: Catalogue of Seals and Whales, 1866, p. 203.

[5] SIBBALD: Phalainologia, 1773, p. 33, pl. 1.

[6] MOLYNEUX: Phil. Trans., xix, 1795, p. 508.

[7] RUTTY: *fide* Gray, *op. cit.*

[8] HUNTER and WOODS: Mag. Nat. Hist., ii, 1829, p. 197.

[9] THOMPSON: Mag. Nat. Hist., ii, 1827, p. 477.

[10] GRAY: *op. cit.*, p. 204.

[11] BLAINVILLE: Ann. fr. et étr. d'Anatomie et de Physiologie, ii, p. 235.

[12] GERVAIS: Comptes-Rendus, 1864, p. 876.

"Among the whole order of cetaceans there is none which respires with the same regularity as the Cachalot. When emerging to the surface, the first portion of the animal seen is the region of the hump; then it raises its head, and respires slowly for the space of about three seconds, sending forth diagonally a volume of whitish vapor like an escape of steam; this is called the 'spout,' which, in ordinary weather, may be seen from the mast-head at a distance of three to five miles. In respiring at its leisure, the animal sometimes makes no headway through the water; at other times it moves quietly along at the rate of about two or three miles an hour; or if 'making a passage' from one feeding ground to another, it may accelerate its velocity. When in progressive motion, after 'blowing,' hardly an instant is required for inspiration, when the animal dips its head a little, and momentarily disappears; then it rises again to blow as before, each respiration being made with great regularity. * * * * With the largest bulls, the time occupied in performing one inspiration is from ten to twelve seconds, and the animal will generally blow from sixty to seventy-five times at a rising, remaining upon the surface of the sea about twelve minutes. As soon as 'his spoutings are out' he pitches headforemost downwards; then 'rounding out,' turns his flukes high in the air, and, when gaining nearly a perpendicular attitude, descends to a great depth, and there remains from fifteen minutes to an hour and a quarter.

"When the Cachalot becomes alarmed or is sporting in the ocean, its actions are widely different. If frightened, it has the faculty of instantly sinking, although nearly in a horizontal attitude. When merely startled, it will frequently assume a perpendicular position, with the greater portion of its head above water, to look and listen; or, when lying on the surface, it will sweep around from side to side with its flukes to ascertain whether there is any object within reach. At other times, when at play, it will elevate its flukes high in the air, then strike them down with great force, which raises the water into spray and foam about it; this is termed 'lob-tailing.' Oftentimes it descends a few fathoms beneath the waves; then, giving a powerful shoot nearly out of the water, at an angle of 45° or less, falls on its side, coming down with a heavy splash, producing a pyramid of foam which may be seen from the masthead on a clear day, at least ten miles, and is of great advantage to the whaler when searching for his prey. * * * * When individually attacked it makes a desperate struggle for life, and often escapes after a hard contest. Nevertheless, it is not an unusual occurrence for the oldest males to be taken with but little effort on the part of the whaler. After being struck, the animal will oftentimes lie for a few moments on the water as if paralyzed, which affords the active man of the lance opportunity to dart his weapon effectually and complete the capture."[1]

Owing to the peculiar shape and position of the mouth, the Sperm Whale has to turn upon its side to seize large objects between its jaws, and when one of them attacks a boat, it is in a reversed position, holding its lower jaw above the object it is trying to bite, as is shown in many pictures of whaling adventure.

FOOD.—The food of this species consists of squids and of various kinds of fish. Couch tells of a young one, twenty feet long, taken on the coast of Cornwall, which had three hundred mackerel in its stomach. Captain Atwood states that when struck by the harpoon they eject from the stomach quantities of large squids.

REPRODUCTION.—They are said to breed at all seasons of the year. Scammon states that the time of gestation is supposed to be ten months, that the number of cubs is rarely two, never more, and that they are about one-fourth the length of their mother. In suckling the female reclines upon her side in the water.

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[1] SCAMMON, CHARLES M.: The Marine Mammals of the Northwestern Coast of North America, described and and illustrated, together with an account of the American Whale Fishery. San Francisco, 1874, pp. 74–84.

USEFUL PRODUCTS.—The peculiar products of the head of this cetacean, the *sperm oil* and the *spermaceti*, render its capture particularly profitable. According to Captain Atwood about one-fifth of the yield of oil may be generally set down as the amount of spermaceti afforded by a Sperm Whale. The *teeth* are used by ivory cutters, and the *ambergris* is a substance valuable to druggists and perfumers. The parts of the body are to be described in the chapter on oil making, where the manner of cutting away the blubber will be discussed. The great lower jaws with their rows of bristling teeth are often brought home as trophies by whalers, and in Provincetown, New Bedford, or Nantucket may be seen gateways spanned by arches made of these bones.[1]

The following statement of yield of oil from whales taken by New Bedford whalers was furnished by Capt. Benjamin Russell in 1875:

Capt. C. Allen captured one Sperm Whale, which tried out 150 barrels.

Captain Tilton captured one Sperm Whale, which tried out 154 barrels.

Captain Spooner captured one Sperm Whale, which tried out 130 barrels.

Captain Knowles captured one Sperm Whale, which tried out 127 barrels.

A number of captains report Sperm Whales yielding from 80 to 120 barrels each.

THE PORPOISE SPERM WHALE.—A small cetacean rather closely allied to the Sperm Whale, and called by certain authors the Porpoise Sperm Whale, occurs in the warmer parts of the Pacific. A specimen nine feet long was taken at Mazatlan, and was described by Professor Gill under the name *Kogia Floweri*.[2] It is of no economic importance. Nothing is known of its habits. A sketch of the animal and its jaw are preserved in the National Museum.

2. THE BLACKFISHES OR PILOT WHALES.

DISTRIBUTION.—The Blackfish, *Globicephalus intermedius* (Harlan) Gray, is one of the most important and most abundant of the small whales of the east coast. It occurs in great numbers to the northeast of the Grand Bank, and off the New England and Middle States. How far south it ranges is not certainly known. A closely related species is the Pilot Whale or Caing Whale of Europe, *G. scineval* (Lac.) Gray, also called Black Whale, Social Whale, Blowing Whale, and Bottlehead, the Svine-hval of Scandinavia; abundant in the North Sea and the northeastern

[1] In Douglass's North America (Boston and London, 1755, vol. i, p. 57), the products of the Sperm Whale are thus discoursed upon:

"Sperma ceti Whales are to be found almost everywhere, they have no bone, so called; some may yield 60 to 70 barrels oil called viscous oil, the fittest for lamps or a burning light. It is from this whale that we have the parmacitty or spermaceti (very improperly so called). The ancients were at a loss whether it was an animal or mineral substance; Schroder, a celebrated Pharmacopoeia writer about the middle of last century, calls it Aliud genus bituminis quod sperma ceti officinae vocant, he describes it Pinguedo furfurosa producta exhalatione terrae sulphureae. We now find that any part of its oil, but more abundantly the head-matter, as the whalers term it, if it stand at rest and in the sun will shoot into adipous fleaks resembling in some manner the chrystalisation of salts: instead of sperma ceti, it ought to be called adeps ceti, in the materia medica. This same whale gives the ambergrease, a kind of perfume, as is musk: anciently it was by the natural historians described as a kind of bitumen, hence the name *Ambra grisea*. Dale, a noted author, in his pharmacologia not long since publishes it as such. It is now fully discovered to be some production from this species of whale, for some time it was imagined some peculiar concreted juice lodged in a peculiar cystis, in the same manner as is the castoreum of the beaver or *Fiber Canadensis*, and the zibethum of the civit-cat or hyena, in cystis's both sides of the Ani rima; thus, not long since, some of our Nantucket whalers imagined that in some (very few and rare) of these male or bull whales, they had found the gland or cystis in the loins near the spermatick organs: late and more accurate observations seem to declare it to be some part of the ordure, dung, or alvine excrement of the whale; squid-fish, one of the Newfoundland baits for cod, are sometimes in Newfoundland cast ashore in quantities, and as they corrupt and fry in the sun they become a jelly or substance of an ambergrease smell; therefore as squid bills are sometimes found in the lumps of ambergrease, it may be inferred, that ambergrease is some of the excrement from squid-food, with some singular circumstances or dispositions that procure this quality, seldom concurring; thus the Nantucket whalers for some years last, have found no ambergrease in their whales. The Sperma ceti Whale has no bone or baleine in his mouth, but fine white teeth; they are most plenty upon the coast of Virginia and Carolina."

[2] GILL: Sperm-Whales, Giant and Pigmy, <American Naturalist, iv, p. 738, fig. 167.

Atlantic. Another species is the Blackfish of the Eastern Pacific, G. Scammonii Cope, once abundant, according to Scammon, on the coast of Lower California, but now usually found off Guatemala, Ecuador, and Peru, though occasionally ranging to high northern and southern latitudes.

SIZE.—The ordinary length of the New England Blackfish is fifteen to eighteen feet, though they sometimes grow larger. The largest ever seen by Capt. Caleb Cook, a veteran oil maker of Cape Cod, measured twenty-five feet and yielded five barrels of oil. The weight of a fifteen-foot Blackfish is estimated at 800 to 1,000 pounds.

MOVEMENTS.—They swim in large schools, sometimes several hundred together. They make little commotion at the surface of the water as they swim, not rolling like their little kindred, the Porpoises, but come up often to spout, the jet of spray rising three or four feet, and emitted with a *low, deep, snorting sound. When at the surface they often remain in sight several minutes.* Usually their movements are sluggish, though at times energetic enough, as can testify any one who has seen a school of them driven up on the beach. They feed upon schooling fish, menhaden, mackerel, herring, and squids. Blackfish are in great terror of the Killer Whales, which drive them about mercilessly. In September, 1878, I saw a school of them which had for some days been hovering around the entrance to Provincetown Harbor fleeing tumultuously before two large whales with high back-fins.

REPRODUCTION.—They breed in summer about Cape Cod. Out of one hundred and nineteen driven ashore at Dennis in August, 1875, fully eighty were females with young, or recently born calves of seven or eight feet. A fœtus cut from a gravid Blackfish of eighteen feet was nearly seven feet long. All the females were yielding milk, and as the fishermen cut into their sides the warm fluid poured out in copious streams.

Watson records, in the case of a female on the British coast suckling its young, that the calf was four feet six inches long in December and seven feet in January. Scammon thinks that in the Pacific they breed at all seasons. He found mothers with young calves off the Gulf of Dulce, Guatemala, in February, 1853.

STRANDING OF THE BLACKFISH SCHOOLS.—*As will be told more in detail in another chapter,* hundreds, and often thousands, of them are stranded yearly on the shores of Cape Cod. They occasionally run ashore at Nantucket, and instances have occurred of their being driven in at Cape Breton. Although there have been similar instances in Europe, especially at the Orkneys, I cannot learn that such occurrences are sufficiently common anywhere else to be counted on by the people as a regular source of income. A Cape Cod fisherman occasionally wakes up in the morning to find two or three of these animals stranded in his back yard. "A pretty windfall," remarked one of them to me. Cape Cod, projecting far out to sea, with its sloping, unbroken sandy shores, seems like a trap or weir naturally adapted for their capture, and the Indians took advantage of this circumstance long before the European settlement. The Pilgrims, in 1620, found Indians on the shore at Wellfleet cutting up a Grampus, and in the shell-heaps of the surrounding region are yet to be found many evidences of their use of the smaller cetaceans for food. It is doubtful whether the Blackfish, stupid as they seem, would ever run ashore if not frightened by such enemies as the Killer. In fact a large share of those which become stranded are purposely driven up out of shoal water, into which they have strayed, by men in boats.

Little can be said about the time when they are most abundant. It seems to depend on the supply of suitable food. Captain Cook believes that they feed mostly or entirely upon squids, and if this be the case their appearance must be regulated by the abundance of these animals. They are never seen earlier than June or later than December. Thirty years ago they were most

plentiful in August. Before 1874 they had never been seen before July. In July, 1875, a school of 120 came ashore at North Dennis. Those taken in the fall are usually the fattest.

CAPTURE OF BLACKFISH.—Many years ago several Cape Cod whalers made a business of pursuing the Blackfish on the whaling grounds east of the Grand Bank. This enterprise, described in the chapter on the whale fishery, has been abandoned, but it is not uncommon for ordinary whalemen to kill them from their boats to obtain supplies of fresh meat, and of oil to burn on shipboard. That the flesh is not unpalatable the writer maintains, and can summon as witnesses a number of persons who tasted one at the Smithsonian Institution in 1874. There is a fishery for them at the Faroe Islands, and in the Pacific, says Scammon, small vessels are occasionally fitted out for their capture. "Sperm whalers," he writes, "do not lower their boats for Blackfish when on Sperm Whale ground, unless the day is far spent and there is little prospect of 'seeing whales.' The northern polar or whale-ships pay but little attention to them, except, perhaps, when passing the time 'between seasons,' cruising within or about the tropics."

USEFUL PRODUCTS.—The yield of oil from a Blackfish varies, according to the size and fatness of the animal, from ten gallons to ten barrels. This is dark in color, and is classed with the ordinary "body oil" or "whale oil." The blubber varies from one to four inches in thickness, and is nearly white. The jaws yield a fine quality of machine oil, known as "porpoise jaw-oil", of which however, a limited quantity suffices to supply the market. The value of a stranded Blackfish in Cape Cod varies from $5 to $40.

As is related elsewhere, Blackfish are often taken by whaling vessels when on a cruise, to obtain oil for burning and a supply of fresh meat. The brains are made by the ship's cook into "dainty cakes," as the whalemen call them, and the livers are said to be delicate and appetizing.[1]

Blackfish are harpooned by the Grand Bank cod-fishermen to be cut up and used for bait.

3. THE GRAMPUSES OR COWFISHES.

DISTRIBUTION.—Associated with the Blackfish on our east coast, though not so common, and rarely stranded, is the Cowfish, *Grampus griseus* (Lesson) Gray, also found in Europe, south to the British channel or farther, and there known as the "Grampus."

COLOR AND SIZE.—Its slate-colored sides are curiously variegated with white markings, very irregular in size, shape and direction, evidently the results of accidental scratches in the epidermis.

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[1] 1635, July 25 (on the Newfoundland Banks).—On Friday, in the evening, we had an hour or two of marvellous delightful recreation, which also was a feast unto us for many days after, while we fed upon the flesh of three huge porpoises, like to as many fat hogs, striked by our seamen, and hauled with ropes into the ship. The flesh of them was good meat, with salt, pepper and vinegar; the fat, like fat bacon, the lean like bull-beef; and on Saturday evening they took another also.—Richard Mather's Journal. Young's Chronicles of the First Planters of Mass. Bay Colony. Boston, 1846, p. 466.

I cannot refrain from quoting the following passage from the journal of the Rev. Richard Mather, one of the earliest of the Massachusetts colonists:

"1635, June 27, 28.—The first Sabbath from Milford Haven, and the sixth on shipboard; a fair, cool day; wind northerly, good for our purpose. I was exercised in the forenoon, and Mr. Maud in the afternoon. This evening we saw Porpoises about the ship, and some would fain have been striking, but others dissuaded because of the Sabbath; and so it was let alone.

"Monday morning, wind still northerly; a fair, cool day. This morning, about seven of the clock, our seamen struck a great Porpoise, and hauled it with ropes into the ship; for bigness, not much less than a hog of 20 or 25 shillings apiece, and not much unlike for shape, with flesh fat and lean, like in color to the fat and lean of a hog; and being opened upon the deck, had within his entrails, as liver, lights, heart, guts, &c., for all the world like a swine. The seeing of him hauled into the ship, like a swine from the sty to the trestle, and opened upon the deck in view of all our company, was wonderful to us all, and marvellous merry sport, and delightful to our women and children. So good was our God unto us, in affording us the day before spiritual refreshing to our souls and this day morning also delightful recreation to our bodies, at the taking and opening of this huge and strange fish."—Young's Chronicles of the First Planters of Mass. Bay Colony. Boston, 1846, p. 460.

Captain Cook thinks that these are the marks of the teeth made by the animals in playing with each other. It attains the length of fifteen or twenty feet, but is slenderer than the Blackfish. Its jaws are esteemed by the makers of fine oil.

HABITS.—Regarding this species, Captain Cook writes: "About the same time that the Blackfish made their appearance in our waters, there was another of the whale kind made their appearance also, called by the fishermen Cowfish. These whales are very much in shape of the Blackfish, only smaller, not so fat, and not so dark colored. These fish have only made their appearance in our waters three or four times for the last forty years, or about once in ten years. Probably not more than fifty have been taken in this period. The method of taking them is the same as that used for Blackfish."

Several specimens, old and young, were obtained by the Fish Commission in 1875, November 29, November 30, and December 2, and their casts are in the National Museum. That this animal was known to the early colonists of New England appears probable from allusions in the early records.[1]

PRODUCTS.—The oil of the Cowfish, particularly that of its jaws, is highly prized, though probably no better than that of the Blackfish. The "Barnstable Patriot" of November 7, 1828, has this item: "A quantity of oil from the Grampus lately caught at Harpswell has been sold at Bath at $18 per barrel." It is very possible, however, that the Barnstable people of 1828 designate the Blackfish and the Grampus by the same name. Douglass' "North America," published in 1755, remarks: "Blackfish, *i. e.* Grampus, of six to ten barrels oil, Bottlenose of three or four barrels, may (like sheep) be drove ashore by boats."

THE CALIFORNIA GRAMPUS.—On the California coast occurs the Whiteheaded or Mottled Grampus, *G. Stearnsii* Dall, described by Scammon as growing to the average length of ten feet. "They are gregarious," he writes, "and congregate frequently in large schools; at times two or three, or even a solitary individual will be met with, wandering about the coast or up the bays in quest of food, which consists of fish and several varieties of crustaceans. It is rarely taken, as it is extremely shy." He refers also to four other forms, unknown to zoologists, but familiar to whalemen: chief among these is the "Bottlenose," which grows to be twenty-five feet long, and has occasionally been taken, though with much difficulty owing to its great strength and speed. Its oil is reputed to be equal in quality to that of the Sperm Whale.

4. THE HARBOR PORPOISES OR HERRING HOGS.

DISTRIBUTION.—On the Atlantic coast occurs most abundantly the little Harbor Porpoise, *Phocæna brachycion* Cope, known to the fishermen as "Puffer," "Snuffer," "Snuffing Pig," or "Herring Hog." The Bay Porpoise of California, *P. vomerina* Gill, and the Common Porpoise or Marsuin of Europe, are very similar in size, shape, and habits: with the latter in fact it is probably specifically identical. The Atlantic species occurs off Nova Scotia and probably farther northward, and ranges south at least to Florida. The California species, according to Scammon, has been found at Banderas Bay and about the mouth of the Piginto River, Mexico (latitude 20° 30′), and north to the Columbia River (latitude 46° 16′). In the winter these Porpoises are seen off Astoria and in Cathlamet Bay twenty miles above, but in spring and summer, when the river is fresh to its mouth, they leave the Columbia. The Atlantic Porpoise also ascends rivers. They go

[1] Belknap's American Biography has the following account of one of the journeys of the first settlers of Massachusetts in 1620:

"The next morning, Thursday, December 7, they divided themselves into two parties, eight in the shallop, and the rest on shore, to make farther discovery of this place, which they found to be 'a bay, without either river or creek coming into it.' They gave it the name of Grampus Bay, because they saw many fish of that species."—Belknap's American Biography, New York, 1846, vol. ii, p. 318.

up the Saint John's in Florida to Jacksonville, and about 1850 one was taken in the Connecticut at Middletown, twenty miles from brackish water. In Europe they ascend the Thames, the Weser, and other streams.

SIZE AND MOVEMENTS.—They rarely exceed four or four and a half feet in length. Every one has seen them rolling and puffing outside of the breakers or in the harbors and river mouths. The western Atlantic species swim in droves of from ten to one hundred, but Scammon says that those of California are never found associated in large numbers, though six or eight are often seen together. In England, according to Couch, seldom more than two are seen at once. They never spring from the water like Dolphins, but their motion is a rolling one and brings the back-fin often into sight, this always appearing shortly after the head has been exposed and the little puff of spray seen and the accompanying grunt heard. The rolling motion is caused by the fact that to breathe through the nostrils, situate on the top of the snout, they must assume a somewhat erect posture, descending from which the body passes through a considerable portion of a circle.

REPRODUCTION.—The breeding season is in summer, in August and September, in Passamaquoddy Bay, perhaps also at other times. The new-born young of an English Porpoise fifty-six inches long, measured twenty-six inches, and was sixteen inches in circumference.

FOOD.—They feed on fish, particularly on schooling species like the herring and menhaden, and are responsible for an enormous destruction of useful food material.

USES.—Though frequently taken in the pounds and seines along both coasts and off Massachusetts in the gill-nets set for mackerel, they are of little importance except to the Indians of Maine and our Northwestern Territories, who carry on an organized pursuit of them, shooting them from their canoes. This industry will be described in the chapter upon ABORIGINAL FISHERIES.

DESTRUCTIVENESS.—The Porpoise is pugnacious as well as playful. A fisherman in Florida told me that he once tried to pen a school of them in a little creek by anchoring his boat across its entrance. When they came down the creek they sprang over the boat against the sail, through which they tore their way and regained the river. A correspondent, whose name has been mislaid, writes: "A very unusual event occurred at Far Rockaway on Tuesday morning, about four o'clock, in front of the Nelson House. A school of Drumfish were chased into shallow water by a school of Porpoises. The Drumfish tried their best to get away, but the Porpoises pursued them so hotly that a number of the former were driven ashore. The people of the hotel were awakened by a great splashing and a noise somewhat similar to but less distinct than the grunt of a frightened hog. Looking out of the windows they saw the Porpoises striking the Drumfish with their tails. Soon after the Porpoises turned and left. The porters at the hotel and some of the fishermen secured with boat-hooks about twenty-five dead Drumfish, and a large number are still floating around Jamaica Bay. The Drumfish secured weighed from thirty to seventy pounds each. Some were sent to Canarsie for exhibition and others to Fulton Market for sale."

The Drum being an enemy of the Oyster, it is possible that the Porpoise by destroying them is a benefactor. It would be no more curious than the experience of the Canadian Government in decreasing their Salmon fishery in the St. Lawrence by destroying the White Whales which preyed upon the seals, the enemies of the Salmon. The story about the Porpoises killing drum seems incredible, but is supported by Sir Charles Lyell's account of a battle between the Porpoises and the Alligators in Florida: "Mr. Couper told me that in the summer of 1845 he saw a shoal of Porpoises coming up to that part of the Altamaha where the fresh and salt water meet, a space about a mile in length, the favorite fishing ground of the Alligators, where there is brackish water, which shifts its place according to the varying strength of the river and the tide. Here were seen about fifty Alligators, each with head and neck raised above water, looking down the stream at

their enemies, before whom they had fled terror-stricken and expecting an attack. The Porpoises, not more than a dozen in number, moved on in two ranks, and were evidently complete masters of the field. So powerful indeed are they that they have been known to chase a large Alligator to the bank, and, putting their snouts under his belly, toss him ashore."[1]

The authority referred to, Mr. Hamilton Couper, of Hopeton, Ga., was a gentleman of some prominence as a geological observer.

5. THE DOLPHINS.

HABITS.—The Dolphins constitute a large group of cetaceans, represented by many species, and abundant everywhere in temperate and tropical seas. They are often seen in mid-ocean sporting in large schools, pursuing the pelagic fishes, but are still more common near the coast. They are from five to fifteen feet long, gracefully formed, and very swift. Nowhere are they the objects of organized pursuit, though frequently caught in nets or harpooned from the bows of vessels at sea. Many cod schooners fishing on the Grand Banks, especially those from Cape Cod, depend chiefly for bait upon the Porpoises they can kill and the birds they can catch. The best known species on the Atlantic coast are the "Skunk Porpoise" or "Bay Porpoise," *Lagenorhynchus perspicillatus* Cope, and related forms. Large schools are often seen in the sounds and along the shore. They are easily distinguished from the little Harbor Porpoise, just spoken of, by the broad stripes of white and yellow upon their sides. When schools of a hundred or more can be surrounded and driven ashore by the fishermen, as is often done on Cape Cod, a large profit is made from the sale of their bodies to the oil-makers, though they are not so much prized as the Blackfish, so much larger and fatter. A closely related species is the Common Porpoise of California, *Lagenorhynchus obliquidens* Gill. "They are seen," writes Captain Scammon, "in numbers varying from a dozen up to many hundreds tumbling over the surface of the sea, or making arching leaps, plunging again on the same curve, or darting high and falling diagonally sidewise upon the water with a spiteful splash, accompanied by a report which may be heard to some distance. In calm weather they are seen in numerous shoals, leaping, plunging, lobtailing and finning, while the assemblage moves swiftly in various directions. They abound more along the coasts where small fish are found. Occasionally a large number of them will get into a school of fish, frightening them so much that they lose nearly all control of their movements, while the Porpoises fill themselves to repletion."

The Right Whale Porpoise, *Leucorhamphus borealis* (Peale) Gill, is found in the Pacific from Bering Sea to Lower California, though not so abundantly as the last. The Right Whale Porpoise of the Atlantic, often spoken of by our whalers, is a related species, perhaps *L. Peronii* (Lac.) Lilljeborg, abundant in the South Atlantic and Pacific, but not yet recorded by naturalists for our waters. Several species of the true Dolphins occur in the North Atlantic, but only one, *Delphinus clymenis*, has been found with us, Cope having secured it in New Jersey. Baird's Dolphin *D. Bairdii* Dall, a species six or seven feet long and weighing 100 to 175 pounds, is frequent in California. The Cowfish of California, *Tursiops Gillii* Dall, is a sluggish species known to the whalemen of the lagoons,[2] and an allied species, *T. erebennus* (Cope) Gill, is known on the Atlantic coast. New forms of this group are constantly being discovered. All are of commercial value when taken.

[1] LYELL: Second Visit to the United States, vol. i, 1849, p. 252.

[2] The habits of the Cowfish, as observed on the coasts of California and Mexico, are strikingly different from those of the true Porpoises. It is often remarked by whalemen that they are a "mongrel breed" of doubtful character, being frequently seen in company with Blackfish, sometimes with Porpoises, and occasionally with Humpbacks, when the latter are found in large numbers on an abundant feeding ground. They are met with likewise in the lagoons along the coast, singly or in pairs, or in fives and sixes—rarely a larger number together—straggling about in a vagrant manner through the winding estuaries, subsisting on the fish that abound in these circumscribed waters. At times they are seen moving lazily along under the shade of the mangroves that in many places fringe the shores, at other times lying about in listless attitudes among the plentiful supplies of food surrounding them.—SCAMMON: *op. cit.*, p. 101.

6. THE KILLER WHALES OR ORCAS.

HABITS AND DISTRIBUTION.—The Killer Whales are known the world over by their destructive and savage habits. Although their strength and speed render it almost impossible to capture them, they are of importance to the fisherman as enemies of all large sea animals, often putting them to flight at inconvenient times. The Atlantic species, *Orca gladiator* (Bonnaterre) Gill, was first brought to notice in 1671 in Martens' "Voyage to Spitzbergen." It is often seen on the New England coast in summer, driving before it schools of the blackfish or otherwise all whales: it is a special enemy of the tunny or horse mackerel: Captain Atwood tells of the consternation shown by these enormous fishes when a number of them have gathered in Provincetown Harbor and the Killers come in. They are a great annoyance to the Cape Cod people when they are trying to drive a school of blackfish ashore, and on the other hand often drive these ashore when they would not be accessible to the fishermen. They prey largely, too, upon the white whale in northern seas. In the Pacific there are two species at least, the Low-finned Killer, *Orca atra* Cope, and the High-finned Killer, *Orca rectipinna*. The latter, though rarely more than twenty feet long, has an enormous dagger-shaped fin, six feet high, upon its back, which towers above the surface when the animal swims high. In fact the Killer Whales all have these high back-fins, by which they may be recognized at any distance.

DESTRUCTIVENESS.—Captain Scammon, in his "Marine Mammals of the Northwestern Coast," gives a long account of their habits, and of their fierce attacks upon the largest whales. The stories of the combats of the swordfish and the thresher shark upon whales have probably originated in such combats as these, witnessed at a distance and imperfectly understood. Captain Scammon writes: "The attacks of these wolves of the ocean upon their gigantic prey may be likened in some respects to a pack of hounds holding the stricken deer at bay. They cluster about the animal's head, some of their number breaching over it while others seize it by the lips and haul the bleeding monster under water; and when captured, should the mouth be open, they eat out its tongue. We saw an attack made by three Killers upon a cow whale and her calf in a lagoon on the coast of Lower California, in the spring of 1858. The whale was of the California gray species, and her young was grown to three times the bulk of the largest Killers engaged in the contest, which lasted for an hour or more. They made alternate assaults upon the old whale and her offspring, finally killing the latter, which sunk to the bottom, where the water was five fathoms deep. During the struggle, the mother became nearly exhausted, having received several deep wounds about the throat and lips. As soon as their prize had settled to the bottom, the three Orcas descended, bringing up large pieces of flesh in their mouths, which they devoured after coming to the surface. While gorging themselves in this wise the old whale made her escape, leaving a track of gory water behind."[1]

ANNOYANCE TO WHALEMEN.—Instances are given where whales which had been killed by whalemen and were being towed to the ship have been forcibly carried away by bands of Killers. They are also obnoxious as destroyers of the young fur seal, and often remain for a long time in the vicinity of the seal islands. Eschricht says that thirteen porpoises and fourteen seals were found in the stomach of an Atlantic Killer, sixteen feet in length. They are particularly abundant in the bays and sounds of British Columbia and Alaska, in search of seals and porpoises feeding there upon small fish. They even attack the full-grown walrus and rob it of its young.

USES.—Their range is cosmopolitan. They are never attacked by whale ships, and their only pursuers in America are the Makah Indians of Washington Territory, who, according to Scammon,

[1] SCAMMON: *op. cit.*, pp. 89-90.

occasionally take them about Cape Flattery, considering their fat and flesh luxurious food. Their jaws, studded with strong conical teeth, are often sold in our curiosity shops.

7. THE SPERM WHALE PORPOISE.

CAPTURE OF TWO INDIVIDUALS IN NEW ENGLAND.—A specimen twenty-five feet long of this animal, *Hyperoodon bidens* Owen, was found on the beach at North Dennis, Mass., January 29, 1869; another was obtained in 1866 or 1867 at Tiverton Stone Bridge, R. I. I am indebted to Mr. J. H. Blake for an outline of this cetacean, and the following notes, taken by him at the time, he having visited Dennis and obtained the skeleton for the Museum of Comparative Zoology: "When found," he writes, "the blood was still warm. It was twenty-five feet long, six feet high, and the tail was six feet across. The flippers were twenty-nine inches long, the snout twenty inches. The hump on the back was three or four inches high, thick at the base and narrowing toward the tip. *The blubber was two and a half to four inches thick, and sold for $175. Squid-beaks enough* to fill two water-buckets were taken from the stomach."

8. THE WHITE WHALE.

DISTRIBUTION.—The White Whale, *Delphinapterus catodon* (Linn.) Gill, first described in 1671 in Martens' "Voyage to Spitzbergen," resembles in form the other members of the Dolphin family, slender and graceful, with a small head and powerful tail. The adult, which attains a length of fifteen or sixteen feet, is creamy white in color; the young, five or six feet long when newly born, is lead-colored, passing through a period of mottled coloration before assuming the mature appearance. The species is abundant in the North Atlantic, North Pacific, and Arctic Oceans. Stragglers *have been seen in the Frith of Forth, latitude 56°, while on the American coast several have been* taken within the past decade on the north shore of Cape Cod. They are slightly abundant in New England waters, but in the Saint Lawrence River and on the coast of Labrador are plentiful, and the object of a profitable fishery. They abound in the Bering and Okhotsk Seas, and ascend the Yukon River, Alaska, to a distance of 700 miles. The names in use are Beluga and Whitefish among whalers, Porpoise, Dauphin Blanc, Marsuin or Marsoon in Canada, and Keela Luak with the Greenland Eskimos.

HABITS.—The species is familiar to many from having been recently exhibited in several aquariums, and also by traveling showmen. When in captivity they feed on living eels, of which a grown individual consumes two or three bushels daily. They are also known to subsist on bottom fish, like flounders and halibut, on cod, haddock, and salmon, squids and prawns. They are, in their *turn, the food of larger whales, such as the killer or orca. They swim in small schools,* entering shallow sounds and rapid rivers in swift pursuit of their food. They spout inconspicuously, and are not easily distinguished when swimming.

The few which have been taken recently along our Atlantic coast have been sold to aquariums or to natural history museums, yielding good prices to their captors. The fishery in the river Saint Lawrence is of considerable importance.

HISTORICAL NOTE.—The first allusion to the occurrence of this cetacean in our waters was printed by Josslyn in 1675, in his "Account of Two Voyages to New England": "The *Sea-hare* is as big as Grampus or Horrin-hog, and as white as a sheet; There hath been of them in Black-point Harbour, & some way up the river, but we could never take any of them, several have shot sluggs at them, but lost their labour."

CAPTURES IN MASSACHUSETTS.—"About the year 1857," writes Captain Atwood, "a species of cetacean twelve or fourteen feet long was killed in Provincetown Harbor, off Long Point, which no

one knew. I examined it and found it to differ from all the others then known here. Not long after it was announced that there was a White Whale on exhibition at the Aquarial Gardens in Boston; that Mr. Cutting had brought alive from the River Saint Lawrence a species that had never been seen south of that river. Soon after I visited Boston and called to see it. I pronounced it to be identical with the unknown species taken at Provincetown. In 1875 or 1876 another was seen in the harbor, but the boats could not get it."

October 11, 1875, two individuals, a cow about ten feet long and weighing 700 pounds approximately, and a calf nearly as large as its mother, weighing about 500 pounds, were taken in the Yarmouth River by Capt Benjamin Lovell. They were sold to the Boston Society of Natural History.[1]

USES.—Certain oil manufacturers from Cape Cod have agencies in Canada, from which they obtain the materials for the manufacture of an excellent machine oil, sold under the name of "Porpoise-jaw oil." A large White Whale yields from eighty to one hundred gallons of ordinary oil, besides the more precious head oil. Porpoise leather is made from the skins, a leather of almost indestructible texture, and peculiarly impervious to water. From this the Canadian mail-bags are made, and, to some extent, tourists' walking shoes. On our Alaska coast they are not unfrequently taken, chiefly by the natives, but the fishery has not yet become of commercial importance. In Eastern Siberia, according to Scammon, there are extensive fisheries carried on by the natives from June to September, with nets and harpoons. They eat the flesh and sell the oil, a considerable portion of which is no doubt secured by American whale ships.[2]

9. THE NARWHAL.

DISTRIBUTION.—The Narwhal, *Monodon monoceros* Linn., whose long spiral tusk has always been an object of curiosity, and gave rise to the stories of the imaginary creature known as the Unicorn, is now found in only one part of the United States—along the northern shores of Alaska. It is still abundant in the Arctic Ocean, and many tusks are brought down yearly by American and European whalers, obtained from the natives of Greenland and Siberia. It has long since ceased to appear on the coasts of Great Britain, the last having been seen off Lincolnshire in 1800. There is a record of one having been seen in the Elbe at Hamburg in 1736.

SIZE, USES, ETC.—The Narwhal is ten to fourteen feet long, somewhat resembling the white whale in form, is black, and in old age mottled or nearly white. The tusk, a modified tooth, grows out of the left side of the upper jaw, to the length of eight or ten feet. All its teeth, except its tusks, are early lost, and it is said to feed on fish and soft sea-animals. The Eskimos utilize it in many ways. Its ivory, however, is the only product of value to civilized man, this being made

[1] Yesterday morning Capt. Benjamin Lovell captured two fine specimens of the White Whale in the weir at Yarmouth, which is probably the first time this kind of fish has been taken in the waters of the United States on the Atlantic seaboard. The specimens captured are a cow and calf, the former about ten feet long, perfectly white, and weighing about 700 pounds, and the latter some two feet less in length, of a dark gray color, and about 500 pounds weight, both being quite fat.—Evening Standard, New Bedford, October 12, 1875.

[2] At a meeting, in 1860, of the Polytechnic Association of the American Institute, in New York, a paper was read, prepared by D. H. Tetu, of Kamouraska, Canada, on the White Whale of the Saint Lawrence. The Canadians call it a Porpoise; it is found for a distance of 200 miles between Saint Roch and Father Point, also in the rivers emptying into Hudson's Bay. Since the discovery of Canada, an article of commerce, but the oil not very good and little use found for the skin; lately M. Tetu has succeeded in purifying the oil and tanning the skin. The oil is equal to the best sperm oil. The average price of the animal ten years ago was $40, now it is $150. The average weight is 2,500 pounds; the largest weigh 5,000 pounds, and are worth $200. The average length is twenty-two feet, and circumference fifteen feet. M. Tetu caught the whale in nets near the river Saguenay.

The skin does not make good sole-leather, being too pliable. Ordinary tanning processes are employed, except that the lining is omitted, and the "training" takes more time on account of the closeness of the fiber of the skin. The leather is very durable, and the skin of a whale is equal to the skins of twelve to twenty-four calves. The leather is chiefly used in the British army.

into canes and other articles of ornament. The supply in this country is chiefly imported from Denmark. In New York City in 1880 a good tusk sold for $50.

10. THE GREENLAND, BOWHEAD, OR POLAR WHALE.

CONFUSION BETWEEN THE BOWHEAD AND THE RIGHT WHALE.—Much uncertainty has resulted from the manner in which the Bowhead of the arctic regions has been confused with the right whales of the adjoining temperate seas. Murray, writing in 1866,[1] made no attempt to clear up the subject; previous writers were confused as well as vague, and it is only in Scammon's writings that a clear account of the distribution and habits of the species is to be found. The materials for the following biographical sketch are derived in the main from the statements of this author, and quotation marks are omitted only because the facts are arranged in a new sequence.[2]

DISTRIBUTION.—The range of the true *Balæna mysticetus* extends west from Nova Zembla to the coast of Eastern Siberia. Its northern limits yet remain undefined: it is seldom seen in Bering Sea south of the fifty-fifth parallel, which is about the southern extent of the winter ice, though in the Sea of Okhotsk it ranges south to the parallel of 54°. It was formerly found to the north of Spitzbergen, but it has been shown by Eschricht and Reinhardt that its habitat is, and always has been, confined to the polar seas, and that it has no claim to a place in the fauna of Europe.[3]

Everything tends to prove that the Bowhead is truly an "ice-whale," for its home is among the scattered floes or about the borders of the ice-fields or barriers. It is true that these animals are pursued in the open water during the summer months, but in no instance has their capture been recorded south of where winter ice-fields are occasionally met with. In the Okhotsk Sea they are found throughout the season after the ice disappears, nevertheless they remain around the floes till these are dispelled by the summer sun, and they are found in the same localities after the surface of the water has again become congealed in winter.

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[1] MURRAY: Geographical Distribution of Mammals, pp. 207–208.

[2] In "A Digression concerning Whaling," written in 1748, published in Douglass' North America, Boston and London, 1755, vol. i, p. 56, is the earliest discrimination I have met with of the Bowhead and the Right Whale of the extra-polar regions. Some interesting facts are given:

"The New-England whalers distinguish 10 or 12 different species of the whale-kind; the most beneficialis the black whale, whale-bone whale, or true whale, as they call it; in Davis's-straits in N. lat. 70 D. and upwards they are very large, some may yield 150 puncheons being 400 to 500 barrels oil, and bone of 18 feet and upwards; they are a heavy loggy fish, and do not fight, as the New-England whalers express it, they are easily struck and fastened, but not above one third of them are recovered; by sinking and bewildering themselves under the ice, two thirds of them are lost irrecoverably; the whalebone whales killed upon the coast of New-England, Terra de Labradore, and entrance of Davis's-straits, are smaller, do yield not exceeding 120 to 130 barrels oil, and 9 feet bone 140 lb. wt.; they are wilder more agile and do fight.

"The New England whalers reckon so many ct. wt. bone, as bone is feet long; for instance, 7 foot bone gives 700 wt. bone: New England bone scarce ever exceeds 9 feet; and 100 barrels oil is supposed to yield 1000 wt. of bone; whales killed in deep water, if they sink, never rise again."

A few paragraphs below, however, he proceeds to mix the subject up again, speaking of the Finback, when it is quite evident that the Whale he has in mind is not the right-whale but the "Right Whale."

"The fin-back, beside two small side-fins, has a large fin upon his back, may yield 50 to 60 barrels oil, his bone is brittle, of little or no use, he swims swifter, and is very wild when struck. The Bermudians some years catch 20 of these whales, not in sloops, but in whale-boats from the shore as formerly at Cape-Cod. The governor of Bermudas has a perquisite of 10£. out of each old whale.

"Whales are gregarious," he continues, "and great travellers or passengers; in the autumn they go south, in the spring they return northward. They copulate like neat cattle, but the female in a supine posture. The true or whalebone whale's swallow is not much bigger than that of an ox, feeds upon small fish and sea insects that keep in sholes, has only one small fin each side of his head of no great use to him in swimming, but with a large horizontal tail he souls himself in the water. The North Cape (in N. Lat. 72 D. in Europe) whales, are of the same small kind as are the New-England, and entrance of Davis's-straits: here we may again observe, that the high European latitudes are not so cold as the same American latitudes, because 72 D. is the proper N. Lat. in Davis's-straits for the large whales, and the Dutch fish for them longside of fields or large islands of ice, they use long warps, not drudges as in New-England."

[3] ESCHRICHT & REINHARDT: Om Nordhvalen, 1861.

REPRODUCTION.—The time and place of breeding are not certainly known, but it is supposed that the young are born in the inaccessible parts of the Arctic Ocean. In Tchantar Bay are found small whales called "Poggys," which resemble the Bowhead, and are by many believed to be their young.

The Bowheads of the Arctic are classed by Scammon as follows: (1) the largest whales of a brown color, average yield of oil 200 barrels; (2) smaller, color black, yield 100 barrels; (3) smallest, color black, yield 75 barrels, and to these should perhaps be added (4) the "poggy," yield 20 to 25 barrels. Those of the third class are generally found early in the season among the broken floes, and have been known to break through ice three inches thick that had been formed over water between the floes. This they do by coming up under and striking it with the arched portion of their heads. Hence they have been called "ice-breakers."

ECONOMIC IMPORTANCE.—The Bowhead is the most valuable of the whalebone whales, not so much by reason of its size, for it rarely exceeds fifty feet in length, never sixty-five, but because it yields so large an amount of oil and whalebone. It is short, bulky, and bloated in appearance. Like the sperm whale, it has a head the length of which is nearly one-third of the total, and which is its most striking feature. The caudal fin is immense, being sixteen to twenty feet in extent from tip to tip, and correspondingly thick and broad.

SIZE.—Scammon gives measurements of two individuals. One, from the Arctic Ocean, August, 1867, was forty-seven feet long, and yielded eighty barrels of oil. The other, from the same ocean, in 1870, was forty-five feet long, yielded sixty barrels of oil and 1,050 pounds of bone. Capt. David Gray, of Peterhead, also gives measurements of an individual taken in Greenland. Some of the most important dimensions of these three whales are presented here, in order to impart to the reader an idea of their proportions:

	Scammon, "Captain Poole's whale."	Scammon, "Captain Smith's whale."	"Captain Gray's whale."
	Feet. *in.*	*Feet.* *in.*	*Feet.* *in.*
Length	47 0	45 0	47 0
Length of head—nose to eye			17 8
Breadth of body between fins			11 0
Girth in largest place		28 0	
Length of pectorals	8 0	7 3	
Breadth of tail	19 0	16 0	20 0
Length of longest bone	10 6	9 6	10 1
Thickness of blubber	11	9	
Breadth of lip			5 0
Gape of mouth			10 8

MOVEMENTS.—When not disturbed the animal remains up, generally to respire, from one and a half to two minutes, during which time it spouts from six to nine times, and then disappears for the space of ten to twenty minutes. The volume of vapor is similar to that ejected by the right whale. Sometimes, when engaged in feeding, it remains down for twenty-five minutes or more. When struck by the whalemen they have been known to remain on the muddy bottom, at a depth of fifty fathoms or more, for the space of an hour and twenty minutes. Their movements and the periods of time they remain above or below the surface are, however, irregular. When going gently along or lying quietly, they show two portions of the body—the spout-holes, and a part of the back.

BALEEN.—The baleen, or "whalebone," of the Greenland and the Right Whales, being of so much importance commercially, it cannot be amiss to explain, by means of diagrams and a description,

how it is attached to the mouth of the animal, and for what purposes it is used, even at the risk of being a trifle too elementary for many of the readers of this chapter.

It is wrongly called "whalebone," since it is not bone, but a substance, resembling equally hair and horn, which grows in the mouth of the animal as a substitute for teeth,[1] being, as anatomists generally admit, a peculiar development of hair growing upon the palate.[2] This substance is developed into a sieve-like apparatus, consisting of extensive rows of compact, flexible, closely set plates or blades, growing from the thick gum at the circumference and palatal surface of the upper jaw, hanging down upon both sides of the tongue.

Capt. David Gray, of the whaling ship "Eclipse," of Peterhead, Scotland, has recently made a number of important observations upon these whales, one of the most important of which was the ascertainment of the manner in which the Baleen Whales operate the powerful sieve-like organs within their jaws. He has also published some very interesting diagrams of the interior of the mouth of the Greenland Whale.[3]

"*Along the middle of the crown-bone,*" writes Captain Gray, "*the blades of whalebone* are separated from each other by three-quarters of an inch of gum, but the interval decreases both towards the nose and the throat to a quarter of an inch. The gum is always white; in substance it resembles the hoof of a horse, but softer. It is easily cut with a knife, or broken by the hand, and is tasteless. The whalebone representing the palate is lined inside the mouth with hair, for the purpose of covering the space between the slips, and prevents the food on which the Whale subsists from escaping. This hair is short at the roof of the mouth, but is from twelve to twenty inches long at the points of the whalebone. This it requires to be, because when the mouth is *opened the bone springs forward, and the spaces are greatest at the points.* I counted the number of blades of whalebone in a whale's head last voyage, and found 286 on the left, and 289 on the right side of the head.

"Hitherto it has been believed that the whale bone had room to hang perpendicularly from the roof of the mouth to the lower jaw, when the mouth was shut, but such is not the case. The bone is, however, arranged so as to reach from the upper to the lower jaw when the mouth is open; were it otherwise the whale would not be able to catch its food; it would all escape underneath the points of the whalebone. The whale has no muscular power over its whalebone, any more than other animals have over their teeth. When the animal opens its mouth to feed, the whalebone springs forward and downward, so as to fill the mouth entirely; when in the act of shutting it again, the whalebone being pointed slightly towards the throat, the lower jaw catches it and carries it up into a hollow in front of the throat."[4]

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[1] The unborn Greenland Whale has undeveloped teeth ("sixty to seventy dental pulps on each side of each jaw"), but they never cut the gum, but are reabsorbed into the system.

[2] Buckland remarks: "Aristotle first remarked this fact: '*Mysticetus etiam pilas in ore habet vice dentium suis setis similes*'—the whale has hairs in his mouth, instead of teeth, like the hairs of a pig." Professor Owen has also *remarked* that "*to a person looking into the mouth of a stranded whale, the concavity of the palate would appear to* be beset with coarse hair."

[3] Land and Water, December 1, 1877, p. 468.

[4] Capt. David Gray's observations upon the position of the whalebone in the mouth of the Greenland Whale are quite novel, and of great interest. They arose, as the captain tells me in a letter just received, in consequence of a conversation which we had together a few years ago, while looking at the skeleton of the large Whale mounted in the Museum of the College of Surgeons. I asked if he could explain, what had always been to me, as to others who have never had Captain Gray's opportunities of observation, a great puzzle, viz, how the whalebone could be so much longer than the space which it occupied in the animal's mouth, supposing the blades to be placed, as usually represented, at right angles with the long axis of the jaws. This difficulty occurred in looking at all the authentic figures, such as Scoresby's, in which the height of the head is far too small for the length assigned to the whalebone on the supposition stated above, and equally in looking at the actual bony frame-work of the head. Captain Gray's explana*tion that the slender ends of the whalebone blades fold backwards when the mouth is shut, the longer ones from the*

FOOD.—The food of the Bowhead consists of floating animals, classed by the whalemen under the names "right whale feed" and "brit." Many kinds of invertebrates are, of course, included under these general terms, one of the most abundant of which is, perhaps, a kind of winged or pteropod mollusk, the *Clio borealis*, which occurs in northern seas, floating in great masses. When the Bowhead is feeding it moves with considerable velocity near the surface, its jaws being open to allow the passage of currents of water into the cavity of the mouth and through the layers of baleen at the sides. All eatable substances are strained out by the fringes of the baleen and are swallowed.

FEEDING HABITS.—The manner of feeding is well described by Captain Gray: "When the food is near the surface they usually choose a space between two pieces of ice, from three to four hundred yards apart, which we term their beat, and swim backwards and forwards, until they are satisfied that the supply of their food is exhausted. They often go with the point of their nose so near the surface that we can see the water running over it just as it does over a stone in a shallow stream; they turn round before coming to the surface to blow, and lie for a short time to lick the food off their bone before going away for another mouthful. They often continue feeding in this way for hours, on and off, afterwards disappearing under the nearest floe, sleeping, I believe, under the ice, and coming out again when ready for another meal. In no other way can this sudden reappearance at the same spot be accounted for.

"Very often the food lies from ten to fifteen fathoms below the surface of the water. In this case the whales' movements are quite different. After feeding they come to the surface to breathe and lie still for a minute. One can easily see the effort they make when swallowing. They then raise their heads partially out of the water, diving down again, and throwing their tails up in the air every time they disappear. Their course below the water can often be traced from their eddy. This is caused by the movement of the tail, which has the effect of smoothing the water in circles immediately behind them.

"More whales have been caught when feeding in this way than in any other; they lie longer on the surface, often heading the same way every time they appear, which is very important to whale fishers, because whales must be approached tail-on to give any certainty of getting near enough to have a chance of harpooning them, and the harpooner has a better idea where to place his boat to be in readiness to pull on to them whenever they come to the surface.

"Like all the other inhabitants of the sea, whales are affected by the tides, being most numerous at the full and change of the moon, beginning to appear three days before, and disappearing entirely three days after, the change. Often this will go on for months with the utmost regularity, unless some great change in the ice takes place, such as the floes breaking up on the ice being driven off the ground; in either case they will at once disappear.

"No doubt whales are seen, and often taken at any time of the tides; but if a herd is hunted

middle of the jaw falling into the hollow formed by the shortness of the blades behind them, as seen in the side view, is perfectly clear and satisfactory. It shows, moreover, how, whether the mouth is shut or open, or in any intermediate position, the lateral spaces between the upper and lower jaw are always kept filled up by the marvelously constructed hair sieve, or strainer, which adapts itself by its flexibility and elasticity to the varying condition of the parts between which it is, as it were, stretched across. If the whalebone had been rigid and depending perpendicularly from the upper jaw when the mouth was opened, a space would be left between the tips of the whalebone forming the lower edge of the strainer, which, as Captain Gray justly remarks, would completely interfere with its use, although the stiff, wall-like lower lip, closing in the sides of the mouth below, may have the effect of remedying such a contingency to a certain extent; at least, it would do so if the whalebone were short and firm as in the finners. The function of this great lip in supporting the slender and flexible lower ends of the blades of the Greenland Whale and preventing them being driven outwards by the flow of water from within when the animal is closing its mouth, is evident from Captain Gray's drawings and explanation. The whole apparatus is a most perfect piece of animal mechanism.—FLOWER, W. H.: Land and Water, December 1, 1877, p. 470.

systematically, and they are attached to a particular feeding bank, this is their usual habit. Neither can this peculiarity in their habits be easily accounted for; their food is as abundant during the neap as it is in the spring tides.

"The principal food of the Greenland Whale consists of a small crustacean, not larger than the common house-fly, which is found in greatest abundance when the temperature of the sea is from 34° to 35°, the ordinary temperature amongst ice being 29°, the color of the water varying from dark brown to olive green and clear blue, the blue water being the coldest.

"The crustacea live upon the animalculæ which color the water. They are transparent, and the contents of their stomachs can be easily seen to be dark brown or green as the case may be."[1]

11. THE RIGHT WHALES.

DISTRIBUTION AND AFFINITIES.—There is no group of existing mammals so important as the Right Whales, concerning which so little that is satisfactory is known. Zoologists have not yet determined how many species there are, nor what are the limits of their distribution. All that can be certainly said is, that Right Whales—that is, the right kind to kill for the whalebone—occur in the North Atlantic and the North Pacific, and also in the cooler waters of the southern hemisphere. In the northern hemisphere they never cross the Tropic of Cancer, though in the south, both in the Pacific and the Atlantic, they have occasionally been known to cross that of Capricorn.

The Right Whales of the north have, until very recently, been confounded by whalemen and zoologists with the bowhead, or polar whale, to which they are closely related. There is one group of baleen-bearing whales, the rorquals, finners, or finbacks, which have a fin upon the back: the true Right Whales, however, have none. The rorquals, the largest of whales, are very swift and slender, and are believed to occur in tropical as well as temperate seas, all the world over.

The Right Whale of the Western Atlantic has been described by E. D. Cope, under the name *Eubalæna cisarctica*. This species, not remotely related to the *Eubalæna biscayensis*, of the Eastern Atlantic, was formerly abundant on the coast of New England, and, as will be shown in the chapter on the shore whale fishery of New England, its presence in such numbers about Cape Cod was one of the chief reasons for planting the early English settlements in this district. Captain Atwood informs me that they are most abundant off Provincetown, in April and May, though occasionally seen at other seasons. One was killed in Cape Cod Bay, near Provincetown, in 1867; it was forty-eight feet long, and yielded eighty-four barrels of oil, as well as 1,000 pounds of baleen, valued at $1,000. Two or three others have since then been killed in the vicinity, but years now often pass by without any being seen.[2]

A Right Whale of forty to fifty feet was killed in the harbor of Charleston, S. C., January 7, 1880, after it had been swimming about within the bar several days.[3]

In evidence of the former abundance of this species, may be mentioned the fact, that when, about the middle of the last century, whales began to be scarce along the coast, a large fleet was dispatched to Davis Straits, where none but whalebone whales occur. *E. cisarctica* occurs at least as far south as the Bermudas. A species of Right Whale is found also about the Azores.

In the North Pacific occurs the Pacific Right Whale, or "Northwest Whale" of the whalers,

[1] Land and Water, December 1, 1877, p. 470.

[2] WHALING AT PROVINCETOWN.—A Right Whale was captured in Provincetown Harbor last Thursday, by a party in three boats. Estimated to yield sixty barrels of oil.—Gloucester Telegraph, November 6, 1850.

[3] See Charleston News, January 8, 1880.

Eubalæna cullamach (Chamisso) Cope. Its distribution is not well understood. Dall gives it as occurring in the Arctic, Bering, and Okhotsk Seas, off Lower California, and, perhaps, in Japan.[1]

Scammon writes that in former years they were found on the coast of Oregon, and occasionally in large numbers; but their chief resort was upon what is termed the "Kodiak Ground," which extends northwestward from Vancouver's Island to the Aleutian Islands, and westward to the one hundredth and fiftieth meridian. They also abounded in the Okhotsk and Bering Seas, and along the Kamschatka coast. He supposes that those which have been observed on the coast of California were stragglers from the north. "Some, indeed," he writes, "have been taken (from February to April) as far south as the Bay of San Sebastian Viscarrio, and about Cedros, or Cevros, Island, both places being near the parallel of 29° north latitude; while on the northwestern coast they are captured by the whalers from April to September inclusive."[2]

None appear to have been killed on the California coast, within thirty or forty years, if we may judge from Captain Scammon's failing to mention such instances.

In the Antarctic Seas and the adjoining waters are other Right Whales. *Eubalæna australis*, the Cape Whale or Black Whale, abounds about the Cape of Good Hope, and is regarded by Murray as an inhabitant of the South Atlantic, South Pacific, and Indian Oceans.[3] *E. antipodarum* was described by Gray from New Zealand, and in Murray's map is designated as a more antarctic form than the Cape Whale, though in the text of his book he denies that this is known to be a fact.[4] Owing to the fact that the bowhead and the Right Whales have until recently been considered identical, there is a dearth of reliable observations upon habits known to refer definitely to these animals.

MOVEMENTS.—Their manner of feeding and general mode of life are, as might be expected, very similar to those of the bowhead. I quote from Scammon:

"They are often met with singly in their wanderings, at other times in pairs or triplets, and scattered over the surface of the water as far as the eye can discern from the masthead. Toward the last of the season they are seen in large numbers crowded together. The herds are called 'gams,' and they are regarded by experienced whalemen as an indication that the whales will soon leave the grounds.

"Their manner of respiration is to blow seven to nine times at a 'rising,' then, 'turning flukes' (elevating them six or eight feet out of the water), they go down and remain twelve or fifteen minutes. It is remarked, however, since these whales have been so generally pursued, that their action in this respect has somewhat changed. When frightened by the approach of a boat they have a trick of hollowing the back, which causes the blubber to become slack, thus preventing the harpoon from penetrating. Many whales have been missed, owing to the boat-steerer darting at this portion of the body. Having been chased every successive season for years, these animals have become very wild and difficult to get near to, especially in calm weather."

REPRODUCTION.—The time of gestation is fixed by Scammon at about one year. Twins are occasionally though rarely born. The time and place of calving is not known, but are supposed to be variable, as in the case of the sperm whale. These whales are said to resort to the Californian "bays" to bring forth their young, and formerly were sought for in the inland waters of these high southern latitudes, where many a ship has in past years quickly completed her cargo by "bay whaling."[5]

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[1] DALL: Catalogue of the Cetaceans of the North Pacific Ocean. <SCAMMON: Marine Mammalia, p. 305.
[2] SCAMMON: *op. cit.*, p. 67.
[3] MURRAY: Geographical Distribution of Mammals, p. 208, map.
[4] MURRAY: *op. cit.*
[5] SCAMMON: *op. cit.*, p. 67.

SIZES AND YIELD OF OIL.—The following statement of sizes of whales taken by New Bedford vessels, as indicated by their yield of oil, is very instructive. It was furnished by Capt. Benjamin Russell, in 1875. There is no means of distinguishing the bowheads from the Right Whales:

Captain Devot took one *Right Whale off Kodiac*; made *200* barrels.
Captain Devot took four Right Whales off Kodiac; made 920 barrels.
Captain Clark took one Right Whale off Kamtchatka; made 180 barrels.
Captain Wood took one Right Whale off Kamtchatka; made 230 barrels.
Captain Rice, of New London, took ten Right Whales off Kamtchatka; made 700 barrels.
Captain Winston took one Right Whale off Kamtchatka; made 270 barrels.
Captain Winston took two Right Whales off Kamtchatka; made 480 barrels.
Captain Spooner took one Right Whale off Kamtchatka; made 260 barrels.
Captain Cox took one Right Whale off Kodiac; made 225 barrels.
Captain West took two Right Whales; made 508 barrels.
Captain West took thirteen Right Whales; made 1,780 barrels.
Captain Wood took one Right Whale; made 280 barrels.
A number of captains report one each, from 80 to 200 barrels.

12. THE HUMPBACK WHALES.

DISTRIBUTION.—The Humpback Whales, also often called Bunch Whales by Europeans, occur in both Atlantic and Pacific. Captain Ross saw them as far south as latitude 71° 50′. In the Pacific they range to the Arctic Circle, and there is reason to believe that they occur also about Greenland. Our Atlantic species is *Megaptera osphyia* Cope, that of the California region *M. versabilis*. As usual, the inquirer must go to Scammon for accurate observations, little being known about the species of the Atlantic.

MIGRATIONS.—They appear to resort periodically, and with some degree of regularity, to certain localities where the females bring forth their young. Scammon found them breeding in July and August, 1852 and 1853, in the Gulf of Guayaquil, Peru; in December in the Bay of Valle de *Banderas, Mexico, latitude 20° 30′; and in* May, *1855, at Magdalena Bay, Lower California, latitude* 24° 30′. Captain Beckerman observed them at Tongataboo, Friendly Group, latitude 21° south, longitude 174° west, in August and September. Large numbers of both sexes migrate north in summer and south in winter.

SIZE.—They attain the length of twenty-five to seventy-five feet, and yield from eight to seventy-five barrels of oil. The largest taken in 1871 by Captain Beckerman was seventy-five feet long, and produced seventy-three barrels, but the average yield was forty barrels, including the entrail fat, which amounted to about six barrels. One taken off the bay of Monterey, in 1858, yielded 145 barrels.

The blubber, according to Bennett, is yellowish-white, five to fifteen inches thick, and the oil is *said to be better than that of the right whale.*

The baleen possesses a moderate commercial value. In a specimen fifty-two feet long, Scammon records 540 laminæ, the longest two feet eight inches long and nine inches broad, and elsewhere he estimates its yield at 400 pounds to 100 barrels of oil.[1]

FOOD.—Their food consists of fish and crustaceans scooped up at the surface. When feeding they are most easily captured. The time and place of breeding have already been spoken of. "In the mating season," writes Scammon, "they are noted for their amorous antics. At such times their caresses are of the most amusing and novel character, and these performances have doubtless given rise to the fabulous tales of the swordfish and thrashers attacking whales. When

[1] SCAMMON: *op. cit.*, pp. 40, 41.

lying by the side of each other, the Megapteras frequently administer alternate blows with their long fins, which love-taps may on a still day be heard at a distance of miles. They also rub each other with these same huge and flexible arms, rolling occasionally from side to side, and indulging in other gambols."

HUMPBACK WHALES IN NEW ENGLAND.—The Humpback Whale was formerly a frequent visitor to the waters of New England, but of late years has not often been seen. Captain Atwood tells me that a great many have been killed near Provincetown within his recollection: that is to say, or since 1817. One harpooned in the harbor in 1840 yielded fifty-four barrels of oil. Two were killed in the spring of 1879, with bomb-lances.

This species is the most valuable of the ordinary whales of the region, though, of course, far inferior to the right whale. In addition to the oil, the baleen or whalebone is of some worth. In past years it has sold for as much as six and one-quarter cents a pound. It rarely exceeds two feet in length and is not very elastic. The shore fishery of Cape Cod, which was quite vigorously prosecuted in the early part of the last century, was probably largely concerned with this species.

In 1879 the Humpbacks were abundant on the coast of Maine. One of the most successful whalers out of Provincetown this season is the "Brilliant," a very old pink-stern schooner of seventeen tons, which had been hunting this species off Deer Isle, Maine. Up to September 1, she had taken four whales, yielding one hundred and forty-five barrels. The "Brilliant" carries but one whale-boat and tries out the oil upon shore, towing in the whales as they are killed. On the 14th of May, 1881, twenty Humpbacks were shot with bomb-lances in Provincetown harbor.

"The Humpback," says Douglass, of the New England whales, in 1748, "has a bunch in the same part of his back, instead of a fin. The bone is not good; makes fifty to sixty barrels oil."

The oil of the Humpbacks is said by Bennett to be superior to that from the right whale, and but little less valuable than sperm oil.

13. THE SULPHUR-BOTTOM WHALES.

DISTRIBUTION AND MOVEMENTS.—The Sulphur-bottom Whale of the Pacific coast, *Sibbaldius sulfureus* Cope, is said to be the largest known cetacean.[1] Its name and that of its related Atlantic species, *S. borealis* (Fischer) Geoffroy, is derived from a yellowish tint upon the white belly. The Atlantic Sulphur-bottom, which is also called by English whalers the "Flat Back," does not grow to the immense size characteristic of the Pacific form. In the Atlantic, the Sulphur-bottom is not uncommon, though rarer than the humpback and finback. On the coast of the Californias, writes Scammon, it occurs at all seasons, and from May to September is often found in large numbers close in with the shore, at times playing about ships at anchor in the open roadsteads, near islands or capes, but, as a general rule, not approaching vessels with the same boldness as the finbacks. It glides over the surface of the ocean, occasionally displaying its entire length. When it respires its vaporous breath ascends to such a height that its immense size is evident to the observer. It is occasionally captured with a bomb-lance, but never except by aid of the bomb-lance. Being considered the swiftest of all whales, it is seldom pursued, and still more rarely taken.

The Sulphur-bottom of the Atlantic resembles the finbacks in shape and habits, and is probably often confounded with them by those who see it swimming. Captain Atwood informs me that none have been seen near Provincetown of late years. Professor Baird obtained a fine skeleton at Nantucket in 1875 (No. 16039, U. S. N. M.). Captain Atwood writes: "Like the finback, it

[1] Captain Roys, quoted by Scammon, gives the following memoranda of an individual measurement by him: Length, ninety-five feet; girth, thirty-nine feet; length of jaw-bone, twenty-one feet; length of longest baleen, four feet; yield of baleen, 800 pounds; yield of oil, 110 barrels; weight of whole animal by calculation, 294,000 pounds.

has on its back a very small dorsal fin. Being very much elongated, it is a swift runner and hurries through the water with a velocity so great that the whaleman cannot kill them in the same way that they take the other species. I have never seen it dead and know but little about it."[1]

14. THE FINBACK WHALES.

DISTRIBUTION.—The Finback Whales of the Atlantic, *Sibbaldius tectirostris* Cope, and *S. tuberosus* Cope, are closely related to the sulphur-bottoms. The former is the most common of the larger cetaceans in Massachusetts Bay, and half a dozen or more may be seen in an afternoon's cruise any sunny afternoon of summer. They become abundant in the Gulf of Maine soon after the beginning of April. They swim near the surface, often exposing the back for half its length, and I have several times seen them rise within fifty feet of the yacht on which I stood. September 12, 1879, four were swimming and spouting in Provincetown Harbor.

The skeleton obtained by the Fish Commission in 1875 (No. 16045, U. S. N. M.) belongs to the species whose name heads this paragraph. The Museum of Comparative Zoology also has a specimen, taken at Provincetown, forty-seven feet long, which yielded eighty barrels and fourteen gallons of oil.

MOVEMENTS.—Captain Atwood tells us that Finbacks are rapid swimmers and are not often attacked by the whalers. They "run" so hard that the boats "cannot tow to them," and it is impossible to get up to them to lance them. They sometimes strand on the shore, and of late years a few are occasionally killed with a bomb-lance in the spring. One was lanced one autumn, about the year 1868, by boats pursuing blackfish. It was sixty feet long, and made about twenty barrels of oil. The "bone" is shorter than that of the humpback, and is of little value.[2] When lanced, not being oily enough to float at once, they sink and remain at the bottom for a few days, during which time much of the blubber is eaten off by sharks. They yield very little oil.

ABUNDANCE IN NEW ENGLAND.—Two ran ashore some years ago in Provincetown Harbor, one of which yielded fourteen, the other twenty barrels of oil. One killed at Provincetown, though fifty-four feet long and a good fat whale of its kind, yielded only twenty barrels of oil.[3]

THE DUBERTUS.—An interesting question regarding the name by which this whale was known in the early days of the American colonies has recently been discussed.

The charter of Rhode Island and Providence Plantations, granted in 1663 by Charles II, provides, among more important rights and privileges:

"*And ffurther*, for the encouragement of the inhabitants of our sayd collony of Providence Plantations to sett upon the businesse of takeing whales, itt shall bee lawefull ffor them, or any of them, having struck whale, DUBERTUS or other greate ffish, itt or them to pursue unto any parte of that coaste, and into any bay, river, cove, creeke or shoare belonging thereto, and itt or them upon the sayd coaste, or in the sayd bay, cove, creeke or shoare belonging thereto, to kill and order to the best advantage, without molestation, they makeing noe wilfull waste or spoyle, anything in these presents conteyned, or any other matter or thing, to the contrary notwithstanding."

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[1] Bulletin Museum Comparative Zoology, vol. viii, p. 204.

[2] A large Finback Whale, forty feet in length, got aground on the flats near the light-house at Wellfleet, on Wednesday, by the fall of the tide, and he was killed by cutting a hole in him and then using an oar as a spade. When the tide is out people can walk around the whale.—Semi-Weekly Advertiser, Boston, February, 27, 1872.

On the 2d of May, 1828, a whale was cast ashore at Whale Reach, Swampscott, measuring sixty feet in length, and twenty-five barrels of oil were extracted from it.—LEWIS & NEWHALL: History of Lynn, p. 391.

1755. A whale, seventy-five feet in length, was landed on King's Reach, on the 9th of December. Dr. Henry Burchsted rode into its mouth, in a chaise drawn by a horse; and afterwards had two of his bones set up for gate-posts at his house in Essex street, where they stood for more than fifty years. [Opposite the doctor's house, the cot of Moll Pitcher, the celebrated fortune-teller, stood. And many were the sly inquiries from strangers for the place where the big whale-bones were to be seen.]—*Ibid.*, p. 330.

[3] Bulletin of the Museum of Comparative Zoology, vol. viii, p. 204, and in letters.

In answer to a letter of inquiry from Professor Baird, *Professor* Trumbull wrote as follows:

HARTFORD, *February* 1, 1880.

DEAR PROFESSOR BAIRD: Your query of January 29 just now comes to hand. Isn't that troublesome *Dubertus rhodinsulensis* satisfactorily disposed of yet? More than twenty-one years ago (in November, 1858) the Rev. S. C. Newman, of Pawtucket, questioned Professor Agassiz on the subject. His reply was that having looked in the only work *in which* he supposed the desired information was likely to be found—Nemnich's *Polyglottes Lexicon*—he could only say that it did not even contain the name "Dubertus." The correspondence, so far unsatisfactory, was printed in the "Providence Journal," December 9. The next day the Hon. Albert G. Greene wrote to the "Journal" that "before and at the time of the granting of the charter of Rhode Island, 'Dubertus' was the word used to distinguish the *sperm* whale from the *common or right* whale," and referred for his authority to the description given by *Sir Thomas Browne* "of the spermaceti whale," which "mariners (*who are* not the best *nomenclators*) called a *Jubartas*, or rather *Gibbartus*." Mr. Greene came very near being right, and undoubtedly was right in identifying the "Dubertus" of the charter with the "Jubartas" or "Gibbartas" of the old whale fishermen; but he was wrong on the main point that either "Jubartas" or "Dubertus" was a *distinctive* name of the *sperm* whale, except by a "vulgar error" of the Norfolk mariners, who, as *Sir Thomas* Browne understood, "are not the best nomenclators." The "*Jubartas*," "*Gibbartas*," or "Gubartas"—as the name which, by an error of the engrossing clerk, appears as "Dubertus" in the Rhode Island charter, was variously written by naturalists in the seventeenth century—was a *Finback*, the "*Balæna Novæ Angliæ*," as Klein calls it, the "*Jupiterfisch*" of the Dutch whalers, *Balænoptera Jubartes* of *Lacépède*. (The last name I heard for it was, I think, *Gibbaldius tuberosus*; but this was a year or two ago, and it may have been rechristened a dozen times since then.) The name, however, has been applied to more than one species of *Finback*, for naturalists, when dealing with cetacea, were not, in the last century, much better "nomenclators" than the English mariners; but it has always been restricted to the *Balænopteridæ*, and has never designated any species of either *sperm* or *right* whales.

The history of the name is curious. *Rondelet* ("De Piscibus" lib. xvi, p. 482) gives a figure of a "*Balæna Vera*" (drawn from life, he says) which "the whale fishers of Saintonge call *Gibbar*, a Gibbero Dorso, that is, raised in a hump, on which is the fin." From this provincial name came *Gibbartas*, *Gubartas*, *Jubart*, *Jubartes*, *Jupiter*, and half a dozen other corruptions, introduced first among mariners, and afterwards adopted or recognized as synonyms by naturalists, and distributed among three or four different species.

Lacépède, under *Balænoptera Jubartes*, includes *Balæna boops* (Gmelin), and "probably the *sulphur-bottom* of the west coast of North America," the *Jubartes* of Klein, and the *Jupiter Fisch*, described by Anderson, as well as *Baleine Jubarte* of Bonnaterre (*Encyc. Méth.*).

Klein ("Misc. Pisc.," 11, 13) says that the whale catchers *have* corrupted the name of the *Jupiter*, or Piscis Jovis, to *Jubartes*, which is reversing the *actual process* of corruption. He calls this the "Whale of New England."

Anderson, cited by Lacépède, in "*Nachrichten* von Island, Grönland, etc.," p. 220, describes "the *Jupiter* or Jupiterfisch" as a *kind* of fin-fish, saying that its name, without doubt, comes *from* that of *Gubartes* or *Gibbartas*, which has been given it by *others, and which* is itself a corruption *of* the Biscayan *Gibbar*.

But Lacépède makes "*Balæna nodosa*," "Humpback Whale of the English," and *Balæna gibbosa*," the Whales of New England, and refers to Bonnaterre, who separates *le Gibbar*, Engl. *Fin-fish*, from *la Jubarte B. boops*. Between *Gibbar* and *Gibbosa*, *Jupiter* and *Gubartus*, the things get rather mixed.

Cranz, in his history of Greenland (Engl. transl., vol. i, p. 110) describes "the Jupiter Whale, which the Spanish whale fishers call more properly *Gubartas*, or *Gibbar*, from a protuberance, *gibbero*, which grows towards the tail, besides the fin."

Returning to the "Dubertus" of the charter, Senator Anthony will see how easy it was for an engrossing clerk to mistake the initial "G," in seventeenth century chancery-hand, for a "D," in an unfamiliar name. A more troublesome mistake was made by the engraver of the seal of the Massachusetts Bay Company, which obliged Governor Winthrop always to describe himself, in official papers, as governor of the Company of *Mattachusetts* Bay, etc.

J. HAMMOND TRUMBULL.

THE PACIFIC FINBACK.—The Finback of the Pacific, *Balænoptera velifera* Cope, also called the Oregon Finner, is common in Oregon and California, and is the rival of the sulphur-bottom in swiftness. Like the Atlantic Finbacks, it can be taken only with the bomb gun. Scammon gives the measurements of an individual sixty feet long which came ashore near the Golden Gate. He states that enormous quantities of codfish have been found in their stomachs. "The habitual movements of the Finback in several points are peculiar. When it respires, the vaporous breath passes quickly through its spiracles, and when a fresh supply of air is drawn into the breathing system, a sharp and somewhat musical sound may be heard at a considerable distance, which is quite distinguishable from that of other whales of the same genus. (We have observed the intervals between the respirations of a large Finback to be about seven seconds.) It frequently gambols about vessels at sea, in mid-ocean, as well as close in with the coast, darting under them, or shooting swiftly through the water on either side; at one moment upon the surface, belching forth its quick, ringing spout, and the next instant submerging itself beneath the waves as if enjoying a spirited race with the ship darting along under press of sail. Occasionally *they* congregate in schools of fifteen to twenty or less."[1]

"An instance occurred in Monterey Bay in 1865, of five being captured; a 'pod' of whales was seen in the offing, from their shore station, by the whalemen, who immediately gave chase. One was harpooned, and, although it received a mortal wound, they all 'run together' as before. One of the gunners managed to shoot the whole five, and they were all secured.

"A Finback sixty-five feet long yielded seventy-five barrels of oil. The blubber was clear white, seven to nine inches thick. The largest baleen measured twenty-eight inches in length, thirteen in width, and was provided with a long fringe."[2]

Another related form, the Sharp-headed Finner, *B. Davidsonii* Scammon, has habits similar to the Finback, but frequents more northern waters, where it is sometimes taken by the Indians of Cape Flattery.

15. THE SCRAG WHALE.

HISTORY OF THE SCRAG WHALE.—The Hon. Paul Dudley, writing in 1809 of the whales of New England, remarked upon a certain kind in these words: "*A Scrag Whale:* Is near akin to the *Fin Back*, but instead of a fin upon its back, the ridge of the after part of its back is scragged with half a dozen knobs or knuckles. He is nearest the right whale in figure and quantity of oil. His bone is white but won't split."[3]

Atwood also writes: "A species of whale known by this name, nearly allied to if not identical with the right whale, is sometimes taken here. It is the opinion of many of our whalemen that they are not a distinct species, but the young right whale that lost its mother while very young,

[1] SCAMMON: *op. cit.*, p. 35.
[2] SCAMMON: *op. cit.*, p. 34.
[3] DUDLEY, PAUL: Philosophical Transactions, xxxiii, 1809, p. 259.

and grew up without parental care, which has caused a slight modification. The most prominent feature is that in its dorsal ridge, near the tail, there are a number of small projections or bunches, having some resemblance to the teeth of a saw. It has no dorsal fin or hump on its back."[1]

Douglass, writing in 1748, also mentioned the Scrag and the humps upon its body.

Cope has formed for this whale the genus *Agaphelus*, and it stands in the lists under the name *Agaphelus gibbosus* [Erxl.] Cope.

The Scrag is of special interest on account of its influence in first developing the whaling industries of Nantucket. Macy, the historian of the island, states that in the very early days of that colony, prior to 1672, "A whale of the kind called the Scragg came into the harbor and continued there three days. This excited the curiosity of the people and led them to devise measures to prevent his return out of the harbor. They accordingly invented and caused to be wrought for them a harpoon with which they attacked and killed the whale. This first success encouraged them to undertake whaling as a permanent business; whales being at that time numerous in the vicinity of the shores."[2]

Scammon remarks: "Our observations make it certain that there is a 'Scrag' Right Whale in the North Pacific which corresponds very nearly to that of the Southern Ocean, - - - and which yields a paltry amount of oil."[3] No identification of this form has yet been made. Dieffenbach states that in the southern seas "Scrags" is the whalers' name for the young of the right whale.[4]

16. THE CALIFORNIA GRAY WHALE.

DISTRIBUTION.—The California Gray Whale, *Rhachianectes glaucus* Cope, called by whalemen "Devil-fish," "Hard Head," "Gray Back," "Rip Sack," and "Mussel Digger," though long known to fishermen, was first described in 1869, from specimens brought to the United States National Museum by Capt. W. H. Dall, of the United States Coast Survey. The only account of its habits is in Scammon's book, already often quoted. Its range is from the Arctic Seas to Lower California. From November to May it is found on the California coast, while in summer it resorts to the Arctic Ocean and the Okhotsk Sea. In October and November it is seen off Oregon and Upper California, returning to warm water for the winter.

HABITS.—They follow close along the shore, often passing through the kelp, and congregate in the lagoons of the southern coast, where they are the objects of the extensive lagoon or bay whale fishery.

ABUNDANCE.—Their abundance in former years and at present was thus discussed by Captain Scammon in 1874: "It has been estimated, approximately, by observing men among the shore whaling parties that a thousand whales passed southward daily from the 15th of December to the 1st of February, for several successive seasons after shore whaling was established, which occurred in 1851. Captain Packard, who has been engaged in the business for over twenty years, thinks this a low estimate. Accepting this number without allowing for those which passed off shore out of sight from the land, or for those which passed before the 15th of December, and after the 1st of February, the aggregate would be increased to 47,000. Captain Packard also states that at the present time the average number seen from the stations passing daily would not exceed forty. From our own observation upon the coast, we are inclined to believe that the numbers resorting annually to the coast of California from 1853 to 1856 did not exceed 40,000—probably not over 30,000; and at the present time there are many which pass off shore at so great a distance as to

[1] ALLEN: Mammalia of Massachusetts. <Bulletin of the Museum of Comparative Zoology, 8, p. 203.
[2] MACY: History of Nantucket, p. 28.
[3] SCAMMON: *loc. cit.*, p. 67.
[4] DIEFFENBACH, E.: Travels in New Zealand, i, 1843, p. 45.

be invisible from the lookout stations; there are probably between 100 and 200 whales going southward daily from the beginning to the end of the 'down season' (from December 15 to February 1). The estimate of the annual herd visiting the coast is probably not large, as there is no allowance made for those that migrate earlier and later in the season. From what data we have been able to obtain, the whole number of California Gray Whales which have been captured or destroyed since the bay whaling commenced in 1846 would not exceed 10,800, and the number which now periodically visits the coast does not exceed 8,000 or 10,000."[1]

On another page he writes: "None of our whales are so constantly and variously pursued as this; and the large bays and lagoons where these mammals once congregated, brought forth and nurtured their young, are already nearly deserted. The mammoth bones of the California Gray lie bleaching on the shores of these silvery waters, and are scattered along the broken coasts from Siberia to the Gulf of California; and ere long, it may be questioned whether this mammal will not be numbered among the extinct species of the Pacific."[2]

SIZE.—The male attains the average length of thirty-five feet, while the female grows to forty or more. A female forty-four feet long and twenty-two feet in circumference is considered large, though some still greater have been caught, yielding sixty or seventy barrels of oil. The average yield of the male is twenty to twenty-five barrels. The baleen is light brown or nearly white, coarse-grained, with a heavy, uneven fringe, the longest strips measuring from fourteen to sixteen inches. The blubber is solid and tough, reddish in color, and from six to ten inches thick.

FOOD AND REPRODUCTION.—The nature of the food of the California Gray Whale is not satisfactorily known, though it is reasonable to suppose that it consists of surface animals, strained out by the baleen.

They breed in the winter, the females entering the California lagoons, while the males remain outside. To their disturbance on their breeding grounds may be attributed the great diminution in numbers. The period of gestation is about a year. After the young are born, male and female and calf are seen working northward together, and Scammon thinks that they bear young only once in two years.

CAPTURE.—The habit of frequenting shoal bays is peculiar to this one species. They are often seen among the breakers, where they are tossed about by the groundswell, and where the water is hardly deep enough to float them. The pursuit of this whale is very dangerous, owing to their savage disposition and the shoalness of the water into which they are followed. The Eskimos and Indians of the Northwest kill many, using their flesh for food and their skins for clothing.

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[1] SCAMMON: *op. cit.*, p. 23.
[2] SCAMMON: *op. cit.*, p. 33.

B.—THE SEALS AND WALRUSES.

NOTE.—The following biographies of the Seals and Walruses are, by the permission of the author, J. A. Allen, extracted from the "Monograph of the Pinnipeds of North America." It is considered important to present in this Report, in a form convenient for reference, biographies of all the important aquatic animals of the United States; and since it is manifestly impossible to secure from any other source so complete and reliable a discussion of the Seals as that given by Allen, it has been thought allowable to reprint the biographical portion of his monograph. The material is here published in such a different form, being divested of the great mass of technical matter, interesting chiefly to zoologists, with which it was originally surrounded, that it is to all intents a fresh presentation of the subject.

The Biography of the Walruses has been condensed and rewritten by Mr. Goode, during the ill-health and absence of Mr. Allen, the discussions in the monograph being too extended for the needs of this Report. For an exceedingly interesting biography of these most interesting animals the reader is referred to Mr. Allen's more detailed work.[1]

17. THE SEAL TRIBE IN GENERAL.

The Pinnipeds, or *Pinnipedia*, embracing the Seals and Walruses, are commonly recognized by recent systematic writers as constituting a suborder of the order *Fera*, or Carnivorous Mammals. They are, in short, true *Carnivora*, modified for an aquatic existence, and have consequently been sometimes termed "*Amphibious Carnivora*." Their whole form is modified for life in the water, which element is their true home. Here they display extreme activity, but on land their movements are confined and labored.

The existing Pinnipeds constitute three very distinct minor groups or families, differing quite widely from each other in important characters: these are the Walruses, or *Odobænidæ*, the Eared Seals, or *Otariidæ*, and the Earless Seals, or *Phocidæ*. The first two are far more nearly allied than are either of these with the third, so that the *Odobænidæ* and *Otariidæ* may be together contrasted with the *Phocidæ*. The last named is the lowest or most generalized group, while the others appear to stand on nearly the same plane, and about equally remote from the *Phocidæ*. The Walruses are really little more than thick, clumsy, obese forms of the otarian type, with the canines enormously developed, and the whole skull correlatively modified. The limb-structure, the mode of life, and the whole economy are essentially the same in the two groups, and aside from the cranial modifications presented by the *Odobænidæ*, which are obviously related to the development of the canines as huge tusks, the Walruses are merely elephantine Otariids, the absence or presence of an external ear being in reality a feature of minor importance.

The Pinnipeds present a high degree of cerebral development, and are easily domesticated under favorable conditions. They manifest strong social and parental affection, and defend their young with great persistency and courage. They are carnivorous (almost without exception), subsisting upon fishes, mollusks, and crustaceans, of which they consume enormous quantities. The Walruses and Eared Seals are polygamous, and the males greatly exceed the females in size. The ordinary or Earless Seals are commonly supposed to be monogamous, and there is generally little difference in the size of the sexes. The Walruses and Eared Seals usually resort in large numbers to certain favorite breeding grounds, and during the season of reproduction leave the water, and pass a considerable period upon land. The Earless Seals, on the other hand, with the exception of the Sea Elephants, do not so uniformly resort to particular breeding grounds on land,

[1] 1880. ALLEN, JOEL ASAPH: History of North American Pinnipeds; a monograph of the Walruses, Sea Lions, Sea Bears, and Seals of North America. Washington, Government Printing Office, 1880, 800 pp., xvi, 785. Miscellaneous publications, No. 12, U. S. Geol. & Geog. Surv., F. V. Hayden, Geologist in charge.

and leave the water only for very short intervals. They usually bring forth their young on the ice, most of the species being confined to the colder latitudes. Only one of the various species of the *Pinnipedia* appears to be strictly tropical, and very few of them range into tropical waters. As a group, the Pinnipeds are distinctively characteristic of the arctic, antarctic, and temperate portions of the globe, several of the genera being strictly arctic or subarctic in their distribution. The Walruses are at present confined mainly within the Arctic Circle, and have no representatives south of the colder portions of the Northern Hemisphere. The *Otariidæ* and *Phocidæ*, on the other hand, are abundantly represented on both sides of the Equator, as will be noticed more in detail later.

18. THE WALRUSES.

Discussion of the Atlantic and Pacific species.—There are two species of Walrus, that of the Atlantic, *Odobænus rosmarus* Malmgren, and that of the Pacific, *O. obesus* (Illiger) Allen. These animals are found only in the extreme north, and it was for many years commonly supposed that there was but a single circumpolar species. Mr. Allen has confirmed the views of Pennant, expressed in 1792 and emphasized since 1870 by Elliott and Gill. Their differences are thus described:

The Pacific Walrus is similar in size, and probably in general contour, to that of the Atlantic (though possibly rather larger, and commonly described or depicted as more robust or thicker at the shoulders), but quite different in its facial outlines. The tusks are longer and thinner, generally more convergent, with much greater inward curvatures, the bristles upon the muzzle shorter and smaller. The chief external difference appears to consist in the shape of the muzzle and the size and form of the bristly nose-pad, which has a vertical breadth at least one-fourth greater than in the Atlantic species. Very important differences between the two species are exhibited in the skulls, which are fully described in Mr. Allen's book.

Distribution of the Atlantic Walrus.—The Atlantic Walrus is not now to be found within the limits of the United States, nor has it been within historic time, or during the last three hundred and fifty years, though, like the musk ox, the caribou, and the moose, it ranged during the great Ice Period much beyond the southern limit of its boundary at the time the eastern coast of North America was first visited by Europeans. During the last half of the sixteenth century they are known to have frequented the southern coast of Nova Scotia as well as the shores and islands to the northward, but this appears at that time to have been their southern limit of distribution, and to these islands New England vessels seem occasionally to have resorted to kill them for their teeth and oil.[1] In 1775 they were abundant in the Gulf of Saint Lawrence, at the Magdalen Islands, Saint John's, and Anticosti, where they congregated yearly to the number of seven or eight thousand, and where they were soon exterminated by the "Americans."[2]

In 1866 and 1869 Packard and Gilpin recorded the killing of individuals near the Straits of Belle Isle, and in 1868 one was driven ashore in Saint George Bay, Newfoundland. The last seen in the Gulf of Saint Lawrence was, according to Professor Packard, in 1841, when one was killed at Saint Augustine, Labrador. Dr. Bernard Gilpin speaks of the occurrence of their bones at Miscou, on the Bay of Chaleur, in such numbers as to form artificial sea-beaches. These were, doubtless, victims of "the Royal Company of Miscou," founded during the earlier part of the seven-

[1] A vessel that returned at that time (1641) from the Isles of Sables made a better voyage, bringing four hundred pair of Sea-horse teeth with divers tun of oil, besides much other goods of like sort which they left behind, worth £1500.—Hubbard's History of New England from the discovery to 1648, p. 379.

The Sea-Cow or Morse is plenty upon the coasts of Nova-Scotia and the Gulph of St. Laurence, particularly at the island of St. John's; it is of the bigness of a middling cow (it is not the same with the Manatee of the Gulph of Mexico), a very thick skin with hair like that of a seal.—Douglass' North America, 1755.

[2] Meaning, of course, people from the southern colonies.

teenth century by the King of France, and whose ephemeral city of New Rochelle has passed away, leaving no sign. The murdered Sea-horses have left a more enduring monument than their murderers. At the present time its distribution in the Western Atlantic seems to be limited on the south by the parallel of latitude 65°, and on the west along the arctic coast by the ninety-seventh meridian of longitude. It inhabits the shore of Hudson's Bay, Davis's Strait, and Greenland, ranging north to Repulse Bay and Prince Regent Inlet. In the Old World it is found only about the islands and in the icy seas of Eastern Europe and the neighboring waters of Western Asia. It has rarely been met with to the eastward of the Jenisei (longitude 82° E.), and has not been seen eastward of the one hundred and thirtieth meridian. As lately as 1857 a straggler was seen at Orkney and another in Nor' Isles. The distribution of this species has been thus carefully noted because its destruction has been participated in, and the time of its extermination doubtless to some extent hastened, by the efforts of American whalemen.

The Walrus is the Morse or Sea-horse of ancient writers, many quaint extracts from whom, with reproductions of their figures, are given by Mr. Allen.

DISTRIBUTION OF THE PACIFIC WALRUS.—While the Atlantic Walrus has been familiar to our race since A. D. 871, when the Norman explorer Othere brought tusks of the "Horsewhale" from the Arctic Sea to King Alfred of England, that of the Pacific was not discovered until 1648, when the Cossack adventurer Staduchin found its tusks on the arctic coast of Eastern Asia; nor was it fairly known until the time of Steller, Cook, Kotzebue, and Pallas, in the latter half of the eighteenth century. Its range is comparatively narrow, being confined on the one hand to a comparatively small stretch of the northern and eastern coasts of Asia, and to a still smaller portion of the opposite American coast. To the westward the Walrus appears not to have been traced beyond Cape Schelatskoi (157° 30′ east longitude), and to have occurred in large herds only as far west as Koljutschin Island (150° east longitude). On the eastern coast of Asia, as early as 1742, none had been seen south of latitude 60°, and of course their southern range in that direction is now still more limited. In the Arctic Sea, north of Bering Strait, they have been met with as far north as ships have penetrated, their westward range being limited only by the unbroken ice sheet. On the American coast they have been traced eastward only as far as Point Barrow. They were formerly abundant about the islands in Bering Sea, but there is no evidence that they ever ranged as far south as the outermost islands in the Aleutian chain. On the mainland they were found by Cook, at Bristol Bay, latitude 58° 42′, where now, according to Elliott, they are more numerous than at any point south of the Arctic Circle. Their immense destruction, chiefly by American whalers, renders it probable that before long they will be entirely exterminated in the territory of the United States.

SIZE.—The length of a full-grown male Atlantic Walrus is given by Dr. Gilpin at twelve feet three inches, its weight being estimated at 2,250 pounds, while Elliott gives the length of a similar Alaska specimen at twelve to thirteen feet, its girth ten to fourteen feet, and its weight 2,000 pounds, the skin alone weighing from 250 to 400, the head from 60 to 80 pounds.

HABITS.—The Walruses are at all times more or less gregarious, occurring generally in large or small companies, according to their abundance. Like the Seals, they are restricted in their wanderings to the neighborhood of shores or large masses of floating ice, being rarely seen far out in the open sea. Although moving from one portion of their feeding ground to another, they are said to be in no sense a migrating animal. They delight in huddling together on the ice floes, or on shore, to which places they resort to bask in the sun, pressing one against another like so many swine. They are also said to repair in large herds to favorable shores or islands, usually in May and June, to give birth to their young, at which times they sometimes remain constantly on land

for two weeks together, without ever taking food. They are believed to be monogamous, and to bring forth usually but a single young at a time, and never more than two. The period of gestation is commonly believed to be about nine months. The young are born from April to June, the time probably varying with the latitude. The Walrus, like the common Seal, is said to have its breathing hole in the ice. The tusks appear to be used for two purposes, to aid in landing upon icy and rocky shores, and in aid of their clumsy locomotion, and also in digging up the shell-fish and roots of marine plants upon which they feed. Their voice is a loud roaring or "hucking," and the voices of a herd may be distinguished at the distance of several miles. Although savage in appearance, they are inoffensive and harmless, except when attacked, but when enraged are fierce and vindictive, especially in defense of their young, for which they exhibit much affection. They are wary and shy, however, and difficult to approach except under cover of darkness.

The hide, the oil, and the tusks of the Walrus are of commercial value, and the walrus fishery of the Pacific is of considerable importance.

"In looking at this uncouth animal," writes a contributor to 'Scribner's Monthly Magazine,' "the most natural question at once arises, What earthly service can such an ungainly, stupid beast render? What, indeed, is the use of its existence? But the answer is swift and satisfactory: were it not for the subsistence furnished so largely by the flesh and oil of the Morse, it is exceedingly doubtful whether the Esquimaux of North America, from Bering Strait clear around to Labrador, could manage to live. It is not to be inferred that walrus meat is the sole diet of these simple people, for that is very wide of the truth; but there are several months of every year when the exigencies of the climate render it absolutely impossible for the hardiest native to go out and procure food, and then the value of the *cache* of walrus meat is appreciated, when for weeks and weeks it forms the beginning and end of every meal. The Walrus responds to as many demands of the Innuit as the camel of the Arab, or the cocoa-palm of the South Sea Islander. Its flesh feeds him; its oil illuminates and warms his dark hut; its sinews make his bird-nets; its tough skin, skillfully stretched over the light wooden frame, constitutes his famous kayak, and the serviceable oomiak, or bidarrah; its intestines are converted into water-proof clothing, while the soles to its flippers are transferred to his feet; and, finally, its ivory is a source of endless utility to him in domestic use and in trade and barter. Walrus famines among the Esquimaux have been recorded in pathetic legends by almost all of the savage settlements in the arctic. Even now, as I write (November, 1880), comes the authentic corroboration of the harsh rumor of the starvation of the inhabitants of Saint Lawrence Island—those people who live just midway between the Old World and the New, in Alaskan waters. The winter of 1879–'80 was one of exceptional rigor in the arctic, though in this country it was unusually mild and open. The ice closed in solid around Saint Lawrence Island, so firm and unshaken by the mighty powers of wind and tide that the Walrus were driven far to the southward and eastward, out of reach of the unhappy inhabitants of that island, who, thus unexpectedly deprived of their mainstay and support, seem to have miserably starved to death, with the exception of one small village on the north shore. The residents of the Poonook, Poogovellyak, and Kagallegak settlements perished, to a soul, from hunger—nearly 300 men, women, and children. I was among these people in 1874, during the month of August, and remarked their manifold superiority over the savages of the northwest coast and the great plains. They seemed then to live, during nine months of the year, almost wholly upon the flesh and oil of the Walrus. Clean-limbed, bright-eyed, and jovial, they profoundly impressed one with their happy subsistence and reliance upon the walrus herds of Bering Sea; and it was remarked then that these people had never been subjected to the temptation, and subsequent sorrow, of putting their trust in princes; hence their independence and good heart. But now it appears that it will not suffice, either, to put your trust in Walrus."

19. THE SEA LIONS AND FUR SEALS IN GENERAL.

GENERAL CHARACTERS.—The largest species of the Otaries (genera *Otaria* and *Eumetopias*) are Hair Seals, while the smallest (genera *Callorhinus* and *Arctocephalus*) are Fur Seals; but the species of *Zalophus*, although Hair Seals, are intermediate in size between the other Hair Seals and the Fur Seals. All the Hair Seals have coarse, hard, stiff hair, varying in length with age and season, and are wholly without soft underfur. All the Fur Seals have an abundant soft, silky underfur, giving to the skins of the females and younger males great value as articles of commerce. The longer, coarser overhair varies in length and abundance with season and age. All the Hair Seals are yellowish or reddish brown (in *Zalophus* sometimes brownish-black), generally darkest when young, and becoming lighter with age, and also in the same individuals toward the molting season. There is also considerable range of individual variation in representatives of the same species, so that coloration alone fails to afford satisfactory diagnostic characters. All the Fur Seals are black when young, but they become lighter with age, through an abundant admixture of grayish hairs which vary from yellowish-gray to whitish-gray. The southern Fur Seals are generally, when adult, much grayer than the northern. *There is hence a wide range of color variation with age in* the same species, as there is also among conspecific individuals of the same sex and age. While some have the breast and sides pale yellowish-gray, others have these parts strongly rufous, the general tint also showing to some extent these differences.

There is also a wonderful disparity in size between the sexes, the weight of the adult males being generally three to five times that of the adult females of the same species. There are also very great differences in the form of the skull, especially in respect to the development of crests and protuberances for muscular attachment, these being only slightly developed in females and enormously so in the males. With such remarkable variations in color and cranial characters, dependent *upon age and sex, it is not a matter of surprise that many nominal species have arisen* through a misappreciation of the real significance of these differences.

HABITS.—The Eared Seals show also a remarkable resemblance in their gregarious and polygamous habits. All the species, wherever occurring, like the Walruses and Sea Elephants, resort in great numbers to particular breeding stations, which, in sealers' *parlance*, have acquired the strangely inappropriate name of "rookeries." The older males arrive first at the breeding grounds, where they immediately select their stations and await the arrival of the females. They keep up a perpetual warfare for their favorite sites, and afterward in defense of their harems. The number of females acquired by the successful males varies from a dozen to fifteen or more, which they guard with the utmost jealousy—might being with them the law of right. The strongest males are naturally the most successful in gathering about them large harems. The males, during the breeding season, remain wholly on land, and they will suffer death rather than leave their chosen spot. They thus sustain, for a period of several weeks, an uninterrupted fast. They arrive at the breeding stations fat and vigorous, and leave them weak and emaciated, having been nourished through their long period of fasting wholly by the fat of their own bodies. The females remain uninterruptedly on land for a much shorter period, but for a considerable time after their arrival do not leave the harems. The detailed account given a century ago by Steller, and recently confirmed by Bryant and Elliott, of the habits of the northern Fur and Hair Seals during the breeding season, is well known to apply, in greater or less detail, to nearly all the species of the family, and presumably to all. As the observations by Messrs. Elliott and Bryant are presented later in this work at length, it is unnecessary to give further details in the present connection.

GEOGRAPHICAL DISTRIBUTION.—The most striking fact in respect to the distribution of the *Otariidæ* is their entire absence from the waters of the North Atlantic.

As already noticed, the Eared Seals are obviously divisible, by the character of the pelage, into two groups, which are commercially distinguished as the "Hair Seals" and the "Fur Seals," which are likewise respectively known as the "Sea Lions" and the "Sea Bears." The two groups have nearly the same geographical distribution, and are commonly found frequenting the same shores, but generally living apart. Usually only one species of each is met with at the same localities, and it is worthy of note that, with the exception of the coast of California, no naturalist has ever reported the occurrence together of two species of Hair Seals or two species of Fur Seals, although doubtless two species of Hair Seals exist on the islands and shores of Tasmania and Australia, as well as on the Californian coast.

The Hair and Fur Seals are about equally and similarly represented on both sides of the Equator, but they are confined almost wholly to the temperate and colder latitudes. Of the nine species provisionally above recognized, two of the five Hair Seals are northern and three southern; of the four Fur Seals, three are southern and one only is northern; but the three southern are closely related (perhaps doubtfully distinct, at least two of them), and are evidently recent and but slightly differentiated forms of a common ancestral stock. Of the two Eared Seals of largest size (*Eumetopias Stelleri* and *Otaria jubata*), one is northern and the other southern, and, though differing generically in the structure of the skull, are very similar in external characters, and geographically are strictly representative. *Zalophus* is the only genus occurring on both sides of the Equator, but the species are different in the two hemispheres. The Fur Seals of the north are the strict geographical representatives of those of the south. *Phocarctos Hookeri* is Australasian, and has no corresponding form in the Northern Hemisphere. No species of Eared Seal is known from the North Atlantic. Several of the southern species range northward into the equatorial regions, reaching the Galapagos Islands and the northern shores of Australia.

The distribution of the Fur Seals in the Southern Seas.—They occur not only on both the Atlantic and Pacific coasts of the South American continent, about its southern extremity, and on all the outlying islands, including not only the Falklands, the South Shetland and South Georgian, but at other small islands more to the eastward, at Prince Edward's, the Crozets, Kerguelen, Saint Paul, and Amsterdam, the southern and western shores of Australia, Tasmania, New Zealand, and at the numerous smaller islands south of the two last named. They have been found, in fact, at all the islands making up the chain of pelagic islets stretching somewhat interruptedly from Cape Horn and the Falkland Islands eastward to Australia and New Zealand, including among others those south of the Cape of Good Hope, so famous in the annals of the seal-fishery. It has been stated by Gray and others that the Cape of Good Hope Fur Seals (really those of the Crozets and neighboring islands) are far inferior in commercial value to those of other regions; but in tracing the history of the sealing business I have failed to notice any reference to the inferior quality of those from the last-named locality, or that there has been any difference in the commercial value of the fur seal skins obtained at different localities in the Southern Seas. The quality differs at the same locality, wherever the Fur Seals are found, with the season of the year and age of the animals, so that skins may come not only from the Cape of Good Hope, but from any other of the sealing places, that one "might feel convinced could not be dressed as furs," being "without very thick underfur."

20. THE SEA LION.

Geographical distribution.—The known range of this species, *Eumetopias Stelleri* (Lesson) Peters, extends along the west coast of North America from the Farallone Islands, in latitude 37° 40′ north, to the Pribylov Islands. Its northern limit of distribution is not definitely known, but

it does not appear to have been met with north of about the latitude of Saint Matthew's Island (about latitude 61°). Neither Mr. W. H. Dall nor Mr. H. W. Elliott has met with it above this point, and they have both informed me that they have no reason to suppose it extends any further northward or beyond the southern limit of floating ice. According to Steller, it existed in his time along the whole eastern coast of Kamtchatka and southward to the Kurile Islands. He found it abundant on Bering's and Copper Islands, where it is still well known to exist. If Dr. Gray's *Eumetopias elongatus*, as originally described in 1873 (the same specimen was referred by him in 1872 to *E. Stelleri*), be referable, as I believe, to the female of *E. Stelleri*, the range of this species appears to extend southward on the Asiatic coast as far as Japan.

Although the Sea Lions of the California coast that have of late years attracted so much attention appear to be the smaller species, *Zalophus Californianus*, the occurrence of the present species there is also fully established, where it is resident the whole year, and where it brings forth its young, as proven by specimens transmitted some years since by Dr. Ayres to the Smithsonian Institution.

GENERAL HISTORY.—The Northern Sea Lion was first described in 1751 by Steller, who, under the name of *Leo marinus*, gave a somewhat detailed account of its habits and its geographical range, so far as known to him.

Captain Scammon, in 1874, published a very interesting account of the Sea Lions of the Aleutian Islands, particularly as respects the methods employed in their capture, portions of which will be quoted later. His account is devoted largely, however, to the Sea Lions of the California coast, and certainly includes the history of the smaller species, if in fact this part does not relate mainly to the latter. About the same time appeared Mr. H. W. Elliott's more detailed history of the northern species, which is so full and explicit that I transcribe it almost entire.

The Sea Lion, he says, "has a really leonine appearance and bearing, greatly enhanced by the rich golden-rufous of its coat, ferocity of expression, and bull-dog muzzle and cast of eye, not round and full, but showing the white, or sclerotic coat, with a light, bright-brown iris.

"Although provided with flippers to all external view as the Fur Seal, he cannot, however, make use of them in the same free manner. While the Fur Seal can be driven five or six miles in twenty-four hours, the Sea Lion can barely go two, the conditions of weather and roadway being the same. The Sea Lions balance and swing their long, heavy necks to and fro, with every hitch up behind of their posteriors, which they seldom raise from the ground, drawing them up after the fore feet with a slide over the grass or sand, rocks, &c., as the case may be, and pausing frequently to take a sullen and ferocious survey of the field and the drivers.

"The Sea Lion is polygamous, but does not maintain any such regular system and method in preparing for and attention to its harem like that so finely illustrated on the breeding-grounds of the Fur Seal. It is not numerous, comparatively speaking, and does not 'haul' more than a few rods back from the sea. It cannot be visited and inspected by man, being so shy and wary that on the slightest approach a stampede into the water is the certain result. The males come out and locate on the narrow belts of rookery ground, preferred and selected by them; the cows make their appearance three or four weeks after them (1st to 6th June), and are not subjected to that intense jealous supervision so characteristic of the Fur Seal harem. The bulls fight savagely among themselves, and turn off from the breeding ground all the younger and weak males.

"The cow Sea Lion is not quite half the size of the male, and will measure from eight to nine feet in length, with a weight of four and five hundred pounds. She has the same general cast of countenance and build of the bull, but as she does not sustain any fasting period of over a week or ten days, she never comes out so grossly fat as the male or 'see-catch.'

"The Sea Lion rookery will be found to consist of about ten to fifteen cows to the bull. The cow seems at all times to have the utmost freedom in moving from place to place, and to start with its young, picked up sometimes by the nape, into the water, and play together for spells in the surf-wash, a movement on the part of the mother never made by the Fur Seal, and showing, in this respect, much more attention to its offspring.

"They are divided up into classes, which sustain, in a general manner, but very imperfectly, nearly the same relation one to the other as do those of the Fur Seal, of which I have already spoken at length and in detail; but they cannot be approached, inspected, and managed like the other, by reason of their wild and timid nature. They visit the islands in numbers comparatively small (I can only estimate), not over twenty or twenty-five thousand on Saint Paul and contiguous islets, and not more than seven or eight thousand at Saint George. On Saint Paul Island they occupy a small portion of the breeding ground at Northeast Point, in common with the *Callorhinus*, always close to the water, and taking to it at the slightest disturbance or alarm.

"The Sea Lion rookery on Saint George Island is the best place upon the Seal Islands for close observation of these animals, and the following note was made upon the occasion of one of my visits (June 15, 1873):

"'At the base of cliffs, over four hundred feet in height, on the east shore of the island, on a beach fifty or sixty feet in width at low water, and not over thirty or forty at flood tide, lies the only Sea Lion rookery on Saint George Island—some three or four thousand cows and bulls. The entire circuit of this rookery belt was passed over by us, the big, timorous bulls rushing off into the water as quickly as the cows, all leaving their young. Many of the females, perhaps half of them, had only just given birth to their young. These pups will weigh at least twenty to twenty-five pounds on an average when born, are of a dark chocolate-brown, with the eye as large as the adult, only being a suffused, watery, gray-blue where the sclerotic coat is well and sharply defined in its maturity. They are about two feet in length, some longer and some smaller. As all the pups seen to-day were very young, some at this instant only born, they were dull and apathetic, not seeming to notice us much. There are, I should say, about one-sixth of the Sea Lions in number on this island, when compared with Saint Paul. As these animals lie here under the cliffs, they cannot be approached and driven; but should they haul a few hundred rods up to the south, then they can be easily captured. They have hauled in this manner always until disturbed in 1868, and will undoubtedly do so again if not molested.

"'These Sea Lions, when they took to the water, swam out to a distance of fifty yards or so, and huddled all up together in two or three packs or squads of about five hundred each, holding their heads and necks up high out of water, all roaring in concert and incessantly, making such a deafening noise that we could scarcely hear ourselves in conversation at a distance from them of over a hundred yards. This roaring of Sea Lions, thus disturbed, can only be compared to the hoarse sound of a tempest as it howls through the rigging of a ship, or the playing of a living gale upon the bare branches, limbs, and trunks of a forest grove.' They commenced to return as soon as we left the ground.

"The voice of the Sea Lion is a deep, grand roar, and does not have the flexibility of the *Callorhinus*, being confined to a low, muttering growl or this bass roar. The pups are very playful, but are almost always silent. When they do utter sound, it is a sharp, short, querulous growling.

"The natives have a very high appreciation of the Sea Lion, or *see-vitchie*, as they call it, and base this regard upon the superior quality of the flesh, fat, and hide (for making covers for their skin boats, *bidarkies* and *bidarrahs*), sinews, intestines, &c.

"As I have before said, the Sea Lion seldom hauls back far from the water, generally very

close to the surf-margin, and in this position it becomes quite a difficult task for the natives to approach and get in between it and the sea unobserved, for, unless this silent approach is made, the beast will at once take the alarm and bolt into the water.

"By reference to my map of Saint Paul's, a small point, near the head of the northeast neck of the island, will be seen, upon which quite a large number of Sea Lions are always to be found, as it is never disturbed except on the occasion of this annual driving. The natives step down on to the beach, in the little bight just above it, and begin to crawl on all fours flat on the sand down to the end of the neck and in between the dozing sea-lion herd and the water, always selecting a semi-bright moonlight night. If the wind is favorable, and none of the men meet with an accident, the natives will almost always succeed in reaching the point unobserved, when, at a given signal, they all jump on their feet at once, yell, brandish their arms, and give a sudden start, or alarm, to the herd above them, for, just as the Sea Lions move, upon the first impulse of surprise, so they keep on. For instance, if the animals on starting up are sleeping with their heads pointed in the direction of the water, they keep straight on toward it; but if they jump up looking over the land, they follow that course just as desperately, and nothing turns them, *at first*, either one way or the other. Those that go for the water are, of course, lost, but the natives follow the land-leaders and keep urging them on, and soon have them in their control, driving them back into a small pen, which they extemporize by means of little stakes, with flags, set around a circuit of a few hundred square feet, and where they keep them until three or four hundred, at least, are captured, before they commence their drive of ten miles overland down south to the village.

"The natives, latterly, getting in this annual herd of Sea Lions, have postponed it until late in the fall, and when the animals are scant in number and the old bulls poor. This they were obliged to do, on account of the pressure of their sealing business in the spring, and the warmth of the season in August and September, which makes the driving very tedious. In this way I have not been permitted to behold the best-conditioned drives, *i. e.*, those in which a majority of the herd is made up of fine, enormously fat, and heavy bulls, some four or five hundred in number.

"The natives are compelled to go to the northeast point of the island for the animals, inasmuch as it is the only place with natural advantages where they can be approached for the purpose of capturing alive. Here they congregate in greatest number, although they can be found, two or three thousand of them, on the southwest point, and as many more on 'Seevitchie Cammin' and Otter Island.

"Capturing the Sea Lion drive is really the only serious business these people on the islands have, and when they set out for the task the picked men only leave the village. At Northeast Point they have a barrabkie, in which they sleep and eat while gathering the drove, the time of getting which depends upon the weather, wind, &c. As the squads are captured, night after night, they are driven up close by the barrabkie, where the natives mount constant guard over them until several hundred animals shall have been secured and all is ready for the drive down overland to the village.

"The drove is started and conducted in the same general manner as that which I have detailed in speaking of the Fur Seal, only the Sea Lion soon becomes very sullen and unwilling to move, requiring spells of frequent rest. It cannot pick itself up from the ground and shamble off on a loping gallop for a few hundred yards, like the *Callorhinus*, and is not near so free and agile in its movements on land, or in the water for that matter, for I have never seen the *Eumetopias* leap from the water like a dolphin, or indulge in the thousand and one submarine acrobatic displays made constantly by the Fur Seal.

"This ground, over which the Sea Lions are driven, is mostly a rolling level, thickly grassed and mossed over, with here and there a fresh-water pond into which the animals plunge with great apparent satisfaction, seeming to cool themselves, and out of which the natives have no trouble in driving them. The distance between the sea-lion pen at Northeast Point and the village is about ten miles, as the Sea Lions are driven, and occupies over five or six days under the most favorable circumstances, such as wet, cold weather; and when a little warmer, or as in July or August, a few seasons ago, they were some three weeks coming down with a drove, and even then left a *hundred or so along on the road.*

"After the drove has been brought into the village on the killing-grounds, the natives shoot down the bulls and then surround and huddle up the cows, spearing them just behind the fore flippers. The killing of the Sea Lions is quite an exciting spectacle, a strange and unparalleled exhibition of its kind. . . . The bodies are at once stripped of their hides and much of the flesh, sinews, intestines (with which the native water-proof coats, &c., are made), in conjunction with the throat-linings (*œsophagus*), and the skin of the flippers, which is exceedingly tough and elastic, and used for soles to their boots or '*tarbosars.*'

"As the Sea Lion is without fur, the skin has little or no commercial value; the hair is short, and longest over the nape of the neck, straight, and somewhat coarse, varying in color greatly as the seasons come and go. For instance, when the *Eumetopias* makes his first appearance in the spring, and dries out upon the land, he has a light-brownish, rufous tint, darker shades back and under the fore flippers and on the abdomen; by the expiration of a month or six weeks, 15th June, he will be a bright golden-rufous or ocher, and this is just before shedding, which sets in by the middle of August, or a little earlier. After the new coat has fairly grown, and just before he leaves the island for the season, in November, it will be a light sepia, or vandyke-brown, with deeper shades, almost dark upon the belly. The cows, after shedding, do not color up so dark as the bulls, but when they come back to the land next year they are identically the same in color, so that the eye, in glancing over a sea-lion rookery in June and July, cannot discern any noted dissimilarity of coloring between the bulls and the cows; and also the young males and yearlings appear in the same golden-brown and ocher, with here and there an animal spotted somewhat like a leopard, the yellow, rufous ground predominating, with patches of dark-brown irregularly interspersed. I have never seen any of the old bulls or cows thus mottled, and think very likely it is due to some irregularity in the younger animals during the season of shedding, for I have not noticed it early in the season, and failed to observe it at the close. Many of the old bulls have a grizzled or slightly brindled look during the shedding period, or, that is, from the 10th August up to the 10th or 20th of November. The pups, when born, are of a rich, dark chestnut-brown; this coat they shed in October, and take one much lighter, but still darker than their parents', but not a great deal.

"Although, as I have already indicated, the Sea Lion, in its habit and disposition, approximates *the Fur Seal, yet in no respect does it maintain and enforce the system and regularity found* on the breeding-grounds of the *Callorhinus.* The time of arrival at, stay on, and departure from the island is about the same; but if the winter is an open, mild one, the Sea Lion will be seen frequently all through it, and the natives occasionally shoot them around the island long after the Fur Seals have entirely disappeared for the year. It also does not confine its landing to these Pribylov Islands alone, as the Fur Seal unquestionably does, with reference to our continent, for it has been and is often shot upon the Aleutian Islands and many rocky islets of the northwest coast.

"The Sea Lion in no respect whatever manifests the intelligence and sagacity exhibited by the Fur Seal, and must be rated far below, although next, in natural order. I have no hesitation

in putting this *Eumetopias* of the Pribylov Islands, apart from the Sea Lion common at San Francisco and Santa Barbara, as a distinct animal; and I call attention to the excellent description of the California Sea Lion, made public in the April number for 1872 of the Overland Monthly, by Capt. C. M. Scammon, in which the distinguishing characters, externally, of this animal are well defined, and by which the difference between the *Eumetopias* of Bering Sea and that of the coast of California can at once be seen; and also I notice one more point in which the dissimilarity is marked: the northern Sea Lion never barks or howls like the animal at the Farralones [*sic*] or Santa Barbara. Young and old, both sexes, from one year and upward, have *only* a deep *bass growl*, and *prolonged, steady roar;* while at San Francisco Sea Lions break out incessantly with a 'honking' bark or howl, and *never roar*.

"I am not to be understood as saying that *all* the Sea Lions met with on the Californian coast are different from *E. Stelleri* of Bering Sea. I am well satisfied that stragglers from the north are down on the Farrallones, but they are not migrating back and forth every season; and I am furthermore certain that not a single animal of the species most common at San Francisco was present among those breeding on the Pribylov Islands in 1872–'73.

"According to the natives of Saint George, some fifty or sixty years ago the *Eumetopias* held almost exclusive possession of the island, being there in great numbers, some two or three hundred thousand; and that, as the Fur Seals were barely permitted to land by these animals, and in no great number, the Russians directed them (the natives) to hunt and worry the Sea Lions off from the island, and the result was that as the Sea Lions left, the Fur Seals came, so that to-day they occupy nearly the same ground covered by the *Eumetopias* alone sixty years ago. This statement is, or seems to be, corroborated by Choris, in his description of the Iles S.-George's et S.-Paul's [*sic*], visited by him fifty years ago;[1] but the account given by Bishop Veniaminov, . . . differs entirely from the above, for by it almost as many Fur Seals were taken on Saint George, during the first years of occupation, as on Saint Paul, and never have been less than one-sixth of the number on the larger island. . . . I am strongly inclined to believe that the island of Saint George never was resorted to in any great numbers by the Fur Seal, and that the Sea Lion was the dominant animal there until disturbed and driven from its breeding-grounds by the people, who sought to encourage the coming of its more valuable relative by so doing, and making room in this way for it.

"The Sea Lion has but little value save to the natives, and is more prized on account of its flesh and skin, by the people living upon the islands and similar positions, than it would be elsewhere. The matter of its preservation and perpetuation should be left entirely to them, and it will be well looked after. It is singular that the fat of the Sea Lion should be so different in characters of taste and smell from that of the Fur Seal, being free from any taint of disagreeable flavor or odor, while the blubber of the latter, although so closely related, is most repugnant. The flesh of the Sea Lion cub is tender, juicy, light-colored, and slightly like veal; in my opinion, quite good. As the animal grows older, the meat is dry, tough, and without flavor."

The food of the Sea Lion is well known to consist, like that of the other species of Eared Seals, of fish, mollusks, and crustaceans, and occasionally birds. As shown by animals kept in confinement, they require an enormous quantity. Captain Scammon states that the daily allowance of a pair kept in Woodward's Gardens, San Francisco, amounted to forty or fifty pounds of fresh fish.

"From fifteen to twenty thousand Sea Lions," says Captain Bryant, "breed annually on the Pribylov or Fur Seal Islands. They do not leave the islands in winter, as do the Fur Seals, to return in spring, but remain during the whole year. They bring forth their young a month earlier

[1] Voyage Pittoresque autour du Monde.

than the Fur Seals, landing during the months of May and June. They advance but little above high tide-mark, and those of all ages land together. The strongest males drive out the weaker and monopolize the females and continue with them till September. They go with them into the water whenever they are disturbed, and also watch over the young. When in the water they swim about the young and keep them together until they have an opportunity to land again. The females also keep near, rushing hither and thither, appearing first on one side and then on the other of the groups of young, constantly uttering a deep, hoarse growl at the intruder whenever they come to the surface. When left undisturbed they all soon land again, preferring to spend the greater portion of their time at this season on the shore. During the breeding season they visit the same parts of the shore as the Fur Seals, but the Sea Lions, by their superior size and strength, crowd out the Seals, the latter passively yielding their places without presuming to offer battle to their formidable visitors. After having been disturbed the Sea Lions continue for some time in a state of unrest, occasionally uttering a low moaning sound, as though greatly distressed. Even after the breeding season they keep close to the shore near the breeding station until the severe weather of January. After this time they are seen only in small groups till the shores are free from snow and ice in the spring."

21. THE CALIFORNIA SEA LION.

GEOGRAPHICAL DISTRIBUTION.—The exact boundaries of the habitat of *Zalophus californianus* cannot at present be given. The only specimens I have seen are from the coast of California and its islands, from San Diego and San Nicholas Island northward to the Bay of San Francisco. Captain Scammon (see *infra*, pp. 301, 302) twice alludes incidentally to its presence "along the Mexican and Californian coasts," and Dr. Veatch states that "Sea Lions" (which he calls "*Otaria jubata*," but which are, almost beyond doubt, the present species) had populous breeding stations *twenty years ago, and doubtless have still, on Cerros or Cedros Island, in about the latitude of* 28½°, off the Lower California coast. Whether they occur southward of this point at the present time I am unable to state, but should infer that such was the case from Scammon's allusion to their capture along the "Mexican" coast. In any case, it appears probable that in Dampier's time they ranged as far south as the Chametly and Tres Marias Islands, respectively in latitudes about 23° and 21°, at which points he saw "Seals" in the year 1686. In describing the Chametly Islands (the most northerly of the two groups mentioned by him under this name), situated off the west coast of Mexico in latitude 23° 11′, he says, "The Bays about the Islands are sometimes visited with Seals; and this was the first place where I had seen any of these Animals, on the North side of the Equator, in these Seas. For the Fish on this sandy Coast lye most in the Lagunes or Salt-Lakes, and Mouths of Rivers; For this being no rocky Coast, where Fish resort most, there seems to be but little Food for the Seals, unless they will venture upon Cat-Fish."[1]

He also met with Seals at the Tres Marias Islands (in latitude "21° 5′"), and consequently two degrees south of the Chametly Islands, in describing one of which islands, named by him St. George's Island, he says: "The Sea is also pretty well stored with Fish, and Turtle or Tortoise, and Seal. This is the second place on this Coast where I did see any Seal: and this place helps to confirm what I have observed, that they are seldom seen but where there is plenty of Fish."[2]

It is of course not certain that the Seals here alluded to are *Zalophus californianus*, since the Sea Elephant of the California coast also occurs at Cedros Island, and probably still further south, the two species having apparently about the same range. If they had been the latter, Dampier would probably have made some allusion to their large size.

[1] A New Voyage round the World, 5th ed., vol. i, 1703, pp. 253, 264.
[2] *Ibid.*, p. 276.

The species of *Zalophus* occurring in Japan has been by some writers considered to be the same as the Californian one; but, though doubtless closely allied, its affinities, as will be noticed later (see *infra*, p. 293), appear to be not as yet satisfactorily determined. As *Zalophus californianus* has not yet been detected on the American coast north of California, its occurrence on the Asiatic coast seems hardly to be expected.

This species has hitherto been believed to be free from any serious complications of synonymy, and to have been first brought to the notice of the scientific world by McBain in 1858. Allen has, however, shown that it was noticed in 1822 by Choris and described by Lesson under the name of *Otaria californiana*.

HABITS.—Several more or less full accounts of the habits of the Californian Sea Lions have been given by different writers, who have, however, failed to distinguish the two species occurring along the Californian coast, and consequently their descriptions are not wholly satisfactory. The large northern species certainly occurs, and rears its young, as far south as the Farallones, but probably exists there only in small numbers, while I have seen no evidence of its presence at Santa Barbara Island. Even Captain Scammon, in his account of the Sea Lions of California, has not distinctly recognized the two species occurring there, and his description doubtless refers in part to both species, but unquestionably relates mainly to the present one.[1] His "Sketch of a sealing season upon Santa Barbara Island," in 1852, presumably relates exclusively to *Zalophus californianus*, but in addition to this I quote a few paragraphs from his general account of "the Sea Lion," since it is the testimony of a trustworthy eye-witness.

"On approaching an island, or point, occupied by a numerous herd," he observes, "one first hears their long, plaintive howlings, as if in distress; but when near them, the sounds become more varied and deafening. The old males roar so loudly as to drown the noise of the heaviest surf among the rocks and caverns, and the younger of both sexes, together with the 'clapmatches,' croak hoarsely, or send forth sounds like the bleating of sheep or the barking of dogs; in fact, their tumultuous utterances are beyond description. A rookery of matured animals presents a ferocious and defiant appearance; but usually at the approach of man they become alarmed, and, if not opposed in their escape, roll, tumble, and sometimes make fearful leaps from high precipitous rocks to hasten their flight. Like all the others of the Seal tribe, they are gregarious, and gather in the largest numbers during the 'pupping season,' which varies in different latitudes. On the California coast it is from May to August, inclusive, and upon the shores of Alaska it is said to be from June to October, during which period the females bring forth their young, nurse them, associate with the valiant males, and both unite in the care of the little ones, keeping a wary guard, and teaching them, by their own parental actions, how to move over the broken, slimy, rock-bound shore, or upon the sandy, pebbly beaches, and to dive and gambol amid the surf and rolling groundswells. At first the pups manifest great aversion to the water, but soon, instinctively, become active and playful in the element; so by the time the season is over, the juvenile creatures disappear with the greater portion of the old ones, only a few of the vast herd remaining at the favorite resorts throughout the year. During the pupping season, both males and females, so far as we could ascertain, take but little if any food, particularly the males, though the females have been observed to leave their charges and go off, apparently in search of subsistence, but they do not venture far from their young ones. That the Sea Lion can go without food for a long time is unquestionable. One of the superintendents of Woodward's Gardens informed me that in

[1] That Captain Scammon confounded the two species of northern Sea Lions is evident not only from his published writings, but from his having transmitted to the National Museum specimens of *Zalophus* from Santa Barbara Island, labeled by him "*Eumetopias Stelleri*."

numerous instances they have received Sea Lions into the aquarium which did not eat a morsel of nourishment during a whole month, and appeared to suffer but little inconvenience from their long fast.

"As the time approaches for their annual assemblage, those returning or coming from abroad are seen near the shores, appearing wild and shy. Soon after, however, the females gather upon the benches, cliffs, or rocks, when the battles among the old males begin for the supreme control of the harems; these struggles often lasting for days, the fight being kept up until one or both become exhausted, but is renewed again when sufficiently recuperated for another attack; and, really, the attitudes assumed and the passes made at each other, equal the amplification of a professional fencer. The combat lasts until both become disabled or one is driven from the ground, or perhaps both become so reduced that a third party, fresh from his winter migration, drives them from the coveted charge. The vanquished animals then slink off to some retired spot as if disgraced. Nevertheless, at times, two or more will have charge of the same rookery; but in such instances frequent defiant growlings and petty battles occur. So far as we have observed upon the Sea Lions of the California coast, there is but little attachment manifested between the sexes; indeed, much of the Turkish nature is apparent, but the females show some affection for their offspring, yet if alarmed when upon the land, they will instantly desert them and take to the water. The young cubs, on the other hand, are the most fractious and savage little creatures imaginable, especially if awakened from their nearly continuous sleeping; and frequently, when a mother reclines to nurse her single whelp, a swarm of others will perhaps contend for the same favor.

"To give a more detailed and extended account of the Sea Lions we will relate a brief sketch of a sealing season on Santa Barbara Island. It was near the end of May, 1852, when we arrived, and soon after the rookeries of 'clapmatches,' which were scattered around the island, began to augment, and large numbers of huge males made their appearance, belching forth sharp, ugly howls, and leaping out of or darting through the water with surprising velocity, frequently diving outside the rollers, the next moment emerging from the crest of the foaming breakers, and waddling up the beach with head erect, or, with seeming effort, climbing some kelp-fringed rock, to doze in the scorching sunbeams, while others would lie sleeping or playing among the beds of seaweed, with their heads and outstretched limbs above the surface. But a few days elapsed before a general contention with the adult males began for the mastery of the different rookeries, and the victims of the bloody encounter were to be seen on all sides of the island, with torn lips or mutilated limbs and gashed sides, while now and then an unfortunate creature would be met with minus an eye or with the orb forced from its socket, and, together with other wounds, presenting a ghastly appearance. As the time for 'hauling-up' drew near, the island became one mass of animation; every beach, rock, and cliff, where a Seal could find foothold, became its resting-place, while a countless herd of old males capped the summit, and the united clamorings of the vast assemblage could be heard, on a calm day, for miles at sea. The south side of the island is high and precipitous, with a projecting ledge hardly perceptible from the beach below, upon which one immense Sea Lion managed to climb, and there remained for several weeks—until the season was over. How he ascended, or in what manner he retired to the water, was a mystery to our numerous ship's crew, as he came and went in the night; for 'Old Gray,' as named by the sailors, was closely watched in his elevated position during the time the men were engaged at their work.[1]

[1] "Relative to the Sea Lions leaping from giddy heights, an incident occurred at Santa Barbara Island, the last of the season of 1852, which we will here mention. A rookery of about twenty individuals was collected on the brink of a precipitous cliff, at a height at least of sixty feet above the rocks which shelved from the beach below; and our party were sure in their own minds, that, by surprising the animals, we could drive them over the cliff. This was easily accomplished; but to our chagrin, when we arrived at the point below, where we expected to find the huge beasts helplessly mutilated, or killed outright, the last animal of the whole rookery was seen plunging into the sea."

"None but the adult males were captured, which was usually done by shooting them in the ear or near it; for a ball in any other part of the body had no more effect than it would in a Grizzly Bear. Occasionally, however, they are taken with the club and lance, only shooting a few of the masters of the herd. This is easily accomplished with an experienced crew, if there is sufficient ground back from the beach for the animals to retreat. During our stay, an instance occurred, which not only displayed the sagacity of the animals, but also their yielding disposition, when hard pressed in certain situations, as if naturally designed to be slain in numbers equal to the demands of their human pursuers. On the south of Santa Barbara Island was a plateau, elevated less than a hundred feet above the sea, stretching to the brink of a cliff that overhung the shore, and a narrow gorge leading up from the beach, through which the animals crowded to their favorite resting-place. As the sun dipped behind the hills, fifty to a hundred males would congregate upon the spot and there remain until the boats were lowered in the morning, when immediately the whole herd would quietly slip off into the sea and gambol about during the day, returning as they saw the boats again leave the island for the ship. Several unsuccessful attempts had been made to take them; but at last a fresh breeze commenced blowing directly from the shore, and prevented their scenting the hunters, who landed some distance from the rookery, then cautiously advanced, and suddenly yelling, and flourishing muskets, clubs, and lances, rushed up within a few yards of them, while the pleading creatures, with lolling tongues and glaring eyes, were quite overcome with dismay, and remained nearly motionless. At last, two overgrown males broke through the line formed by the men, but they paid the penalty with their lives before reaching the water. A few moments passed, when all hands moved slowly toward the rookery, which as slowly retreated. This maneuver is termed 'turning them,' and, when once accomplished, the disheartened creatures appear to abandon all hope of escape, and resign themselves to their fate. The herd at this time numbered seventy-five, which were soon dispatched, by shooting the largest ones, and clubbing and lancing the others, save one young Sea Lion, which was spared to see whether he would make any resistance by being driven over the hills beyond. The poor creature only moved along through the prickly pears that covered the ground when compelled by his cruel pursuers; and, at last, with an imploring look and writhing in pain, it held out its fin-like arms, which were pierced with thorns, in such a manner as to touch the sympathy of the barbarous sealers, who instantly put the sufferer out of its misery by a stroke of a heavy club. As soon as the animal is killed, the longest spires of its whiskers are pulled out, then it is skinned, and its coating of fat cut in sections from its body and transported to the vessel, where, after being 'minced,' the oil is extracted by boiling. The testes are taken out, and, with the selected spires of whiskers, find a market in China—the former being used medicinally, and the latter for personal ornaments.

"At the close of the season—which lasts about three months, on the California coast—a large majority of the great herds, both males and females, return to the sea, and roam in all directions in quest of food, as but few of them could find sustenance about the waters contiguous to the islands, or points on the mainland, which are their annual resorting places. They live upon fish,[1] mollusks,

[1] THE SEA LIONS DESTRUCTIVE OF FISH.—The Farallone Egg Company, several years ago, attempted to kill the Sea Lions which frequented those barren islands for their oil and skins. They built try works and went to considerable expense, but it was found that the oil obtained from a carcass did not pay for trying it, and the only disposition that could be made of the skins was to sell them to glue factories. The best return they got from the carcass was from bristles or whiskers and the livers. Both of these were sold to Chinamen. The former they make use of to clean their opium pipes, while the latter is chopped up, put into a mixture of alcohol and another fluid, and administered as a radical cure for many acute diseases. The company accordingly gave up the plan of sea-lion hunting, but the effect of their brief warfare upon these animals was to drive vast droves of them over to the rocks about the Cliff House and the neighborhood of the Heads. In consequence of their being protected by law in these localities, they have doubled and trebled in number within the past three years. The Sea Lions are a very expensive luxury. It is probable

crustaceans, and sea-fowls; always with the addition of a few pebbles or smooth stones, some of which are a pound in weight.[1] Their principal feathery food, however, is the penguin in the Southern Hemisphere, and the gulls in the Northern; while the manner in which they decoy and catch the *Gaviota* of the Mexican and California coasts displays no little degree of cunning. When in pursuit the animal dives deeply under water and swims some distance from where it disappeared; then, rising cautiously, it exposes the tip of its nose above the surface, at the same time giving it a rotary motion, like that of a water bug at play. The unwary bird on the wing, seeing the object near by, alights to catch it, while the Sea Lion at the same moment settles beneath the waves, and at one bound, with extended jaws, seizes its screaming prey, and instantly devours it.[2]

"A few years ago great numbers of Sea Lions were taken along the coast of Upper and Lower California, and thousands of barrels of oil obtained. The number of Seals slain exclusively for their oil would appear fabulous, when we realize the fact that it requires on an average, throughout the season, the blubber of three or four Sea Lions to produce a barrel of oil. Their thick, coarse-grained skins were not considered worth preparing for market, in a country where manual labor was so highly valued. At the present time, however, they are valued for glue-stock, and the seal hunters now realize more comparative profit from the hides than from the oil. But while the civilized sealers, plying their vocation along the seaboard of California and Mexico, destroy the *Lobo marino*, for the product of its oil, skin, testes, and whiskers, the simple Aleutians of the Alaska region derive from these animals many of their indispensable articles of domestic use. . . . ."[3]

The whiskers are carefully saved and sent to China, where they are used for cleaning opium pipes; the livers are also used in the Chinese pharmacopœia.

Mr. Elliott, in referring to the differences between the Californian and Alaskan Sea Lions, calls attention to the dissimilarity of their voices. The Northern Sea Lion, he says, "never barks or

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that they consume more fish than are caught in the bay for food, and if they continue to increase in the future as in the past, it will be but a few years before the waters of the bay will be destitute of fish. Formerly these animals seldom came within the Golden Gate, but now it is a very common thing for passengers on the Oakland boats to see their mischievous-looking heads rise from the water with a large fish in the mouth—they give it a shake, bite out a piece, drop it, and then, diving again, catch it, and rising to the surface, take another nibble until it is consumed. It is certain that something should be done to diminish their numbers. If the legislature was to offer a royalty of from 75 cents to $1 per skin, it is thought by many interested in our fish supply that it would be an economical act. As it is now, the Sea Lions are protected by law—no one being allowed to molest or kill one within a mile of the Cliff House. An effort has been made on several occasions to repeal this law, but at the first intimation of anything in that direction, the lobby in Sacramento has been re-enforced by delegations from a certain stratum of society which history tells us has had more or less influence with legislation since the days of Marc Antony. The consequence is, the law is still *upon the statute-books, and the Sea Lions continue to increase, while the fish supply proportionately decreases.*—San Francisco Call, November 13.

[1] "The enormous quantity of food which would be required to maintain the herd of many thousands, which, in former years, annually assembled at the small island of Santa Barbara, *would seem incredible, if they daily obtained* the allowance given to a male and female Sea Lion on exhibition at Woodward's Gardens, San Francisco, California, where the keeper informed me that he fed them regularly, every day, forty pounds of fresh fish. . . . ."

[That the destruction of fish by the Sea Lions on the coast of California is very great is indicated by the following item, which recently went the rounds of the newspapers: "In a recent meeting at San Francisco of the Senate Committee on Fisheries, the State Fish Commissioners, and a committee representing the fishermen of the coast, the question as to the destructive performances of the Sea Lions in the harbor was actively discussed. One of the fishermen's representatives said that it was estimated that there were 25,000 Sea Lions within a radius of a few miles, consuming from ten to forty pounds each of fish per day; the Sea Lions were protected while the fishermen were harassed by the game laws. Another witness declared that salmon captured in the Sacramento River often bore the marks of injury from Sea Lions, having barely escaped with life; but it was supposed that the salmon less frequently fell victims to the amphibian than did other fishes that cannot swim as fast."—Country, January 26, 1878.]

[2] [This account appeared originally in Captain Scammon's account of the "Islands off the West Coast of Lower California," in J. Ross Browne's "Resources of the Pacific Slope," second part, p. 130 (1869), and has been quoted by Mr. Gurney in the "Zoölogist" for 1871, p. 2762.]

[3] SCAMMON: Marine Mammalia, pp. 130-135.

howls like the animal at the Farallones or Santa Barbara. Young and old, both sexes, from one year and upward, have *only* a deep *bass growl*, and *prolonged, steady roar;* while at San Francisco Sea Lions break out incessantly with a 'honking' bark or howl, and *never roar.*"

The California Sea Lion is now a somewhat well-known animal with the public, various individuals having been at different times on exhibition at the Central Park Menagerie in New York City, and at the Zoölogical Gardens at Philadelphia and Cincinnati, as well as Woodward's Gardens in San Francisco. They have also formed part of the exhibition of different traveling shows, especially that of P. T. Barnum. They have also been carried to Europe, where examples have lived for several years at the Zoölogical Gardens of London, Paris, and elsewhere. Their peculiar "honking" bark, referred to by Mr. Elliott, is hence not unfamiliar to many who have never met with the animal in a state of nature. Their various attitudes and mode of life on the Farallones have also been made familiar to many by the extensive sale of stereoscopic views of the animals and their surroundings. The Sea Lions that have been exhibited in this country all, or nearly all, belong to the present species, although often wrongly labeled "*Eumetopias Stelleri.*" The true *E. Stelleri* has, however, at least in one instance, been exhibited in Eastern cities.

22. THE NORTHERN FUR SEAL OR SEA BEAR.

GEOGRAPHICAL DISTRIBUTION AND MIGRATION.—The Fur Seal, *Callorhinus ursinus* (Linné) Gray, is well known to have been formerly abundant on the western coast of North America, as far south as California, but the exact southern limit of its range I have been unable to determine. Captain Scammon speaks of having seen them "on one of the San Benito Islands, on the coast of Lower California," and again says, "On the coast of California many beaches were found fronting gullies, where [Fur] Seals in large numbers formerly gathered; and, as they there had plenty of ground to retreat upon, the sealers sometimes drove them far enough back to make sure of the whole herd, or that portion of them the skins of which were desirable."[1] He also states that the "Fur Seal and Sea Elephant once made the shores [of Guadalupe Island] a favorite resorting place," and refers to their former occurrence on Cedros Island, in latitude 28°.[2] Although at one time abundant on the California coast, they are by no means numerous there now, having been nearly exterminated by unrestricted destruction by the sealers. The writer above cited refers also to their capture by the Indians at the mouth of the Strait of Juan de Fuca. The Seals appear here and on the neighboring coast, he adds, "some years as early as the first of March, and more or less remain till July or August; but they are most plentiful in April and May. During these two months the Indians devote nearly all their time to sealing when the weather will permit." He reports their increase there in later years, and that while only a few dozens were annually taken there from 1843 to 1864, fully five thousand were taken in 1869.[3] Captain Bryant has given a similar report, referring especially to their abundance along the coasts of Oregon, Washington Territory, and British Columbia in 1869, as compared with former years. He says those taken "were mostly very young Seals, none appearing to be over a year old. Formerly in March and April the natives of Puget Sound took large numbers of pregnant females,[4] but no places where they have resorted to breed seem to be known off this coast." He thinks it probable, however, that they may occupy rocky ledges off shore which are rarely visited by boats.[5] In his MS. report just

[1] SCAMMON, C. M.: The Marine Mammals of the Northwestern Coast, &c., pp. 152, 154.

[2] BROWNE, J. ROSS: Resources of the Pacific Slope, second part, p. 128.

[3] SCAMMON, C. M.: The Marine Mammals of the Northwestern Coast, &c., p. 154.

[4] There are six skulls in the National Museum from Puget Sound and the neighboring coast (collected at several different points by Messrs. Scammon and Swan), *all of which are females.*

[5] Bulletin Museum Comparative Zoölogy, ii, p. 68.

received he states that a half-breed hunter told him that he found in summer, "on Queen Charlotte's Island, groups of these animals consisting of two or more beach-masters with a dozen or more females and pups, but no half-grown males."

As is well known, the Pribylov or so-called "Fur Seal Islands," off the coast of Alaska, form *the great breeding-ground of the Fur Seals, to which hundreds of thousands annually resort to* bring forth their young. The Pribylov Group consists of four small islands, known respectively as Saint Paul's, Saint George's, Otter, and Walrus Islands. The two last named are of small size, and are not used as breeding-grounds by the Seals, although Otter Island is visited by a large number of "non-breeding Seals." Saint Paul's Island is the largest, containing an area of about thirty-three square miles, and having a coast line of about forty-two miles, nearly one half of which is sand beach. Of this, sixteen and a half miles, according to Mr. Elliott, are occupied in the breeding season by the Fur Seals. Saint George's Island is somewhat smaller, with only twenty-nine miles of shore line. *It presents a bold coast, a grand wall of basalt extending continuously for ten miles, with no passageway from the sea. It has, in all, less than a mile of sand beach, and* only two and a quarter miles of eligible landing grounds for the Seals.

A few old male Fur Seals are said to make their appearance at the rookeries on these islands between the 1st and 15th of May, they acting, as it were, the part of pioneers, since their number is not much increased before the first of June. At about this date, and with the setting in of the humid, foggy weather of summer, the male Seals begin to land by "hundreds and thousands," to await the arrival of the females, which do not appear before about July first. The young are born soon after, and toward the last of this month the rookeries begin to lose their compactness and definite boundaries, but they are not fully broken up till about the middle of September. The Seals begin to leave the islands about the end of October, the greater proportion departing in *November, while some remain till the end of the following month, and even later.*

The number of Fur Seals present on Saint Paul's Island in July, 1872, was estimated by Mr. Elliott to exceed *three million,* and on Saint George's Island in July, 1873, at about one hundred and sixty-three thousand. Although these islands form by far their most populous resorts, they are said to occur in considerable numbers on some of the islands to the northward, but I am unable to find definite statements as to their numbers or favorite stations. Mr. Elliott, after examining Saint Matthew's and Saint Lawrence Islands, became convinced that they were not only not resorted to as breeding stations by the Fur Seals, but that these islands, by their constitution and climatic conditions, were unsuitable for this purpose, and adds, "*it may be safely said that no land of ours in the north is adapted to the wants of that animal, except that of Saint Paul and Saint George.*" Mr. W. H. Dall states that "they have never been found in Bering Strait, or within three hundred miles of it." In early times these animals are well known to have been abundant on Behring's and Copper Islands. According to Krascheninikow, they were so numerous upon Behring's Island about the middle of the last century as to cover the whole southern shore of the island. Their range on the Asiatic coast is given by Steller and others as extending southward along the Kamtchatkan coast to the Kurile Islands. Krascheninikow states that they appeared there, however, only in spring and in September, none being seen there from the beginning of June till the end of August, at which time he says they *return from the south* with their young. Von Schrenck speaks of their occurrence in the Ochotsk Sea and the Tartarian Gulf as far south as the forty-sixth degree of latitude, or to the southern point of Saghalien Island. The natives reported to him the occurrence of great numbers of the animals on the eastern coast of that island. Captain Scammon also refers to their abundance twenty years since on the eastern side of Saghalien.

Except during the season of reproduction, these animals appear to lead a wandering life, but the extent and direction of their migrations are not yet well known. Steller spoke of their migra-

tions as being as regular as those of the various kinds of sea-fowl, and they are recorded as arriving with great regularity at the Pribylov Islands, but where they pass the season of winter is still a matter of conjecture.

SIZE.—Mr. Elliott has given a table showing the weight, size, and rate of growth of the Fur Seal, from the age of one week to six years, based on actual weight and measurement, with an estimate of the size and weight of specimens from eight to twenty years of age. From this table it appears that the pups when a week old have a length of from twelve to fourteen inches, and a weight of six to seven and a half pounds. At six months old the length is two feet and the weight about thirty pounds. At one year the average length of six examples was found to be thirty-eight inches, and the weight thirty-nine pounds, the males and females at this time being alike in size The average weight of thirty males at the age of two years is given as fifty-eight pounds, and the length as forty-five inches. Thirty-two males at the age of three years were found to give an average weight of eighty-seven pounds, and an average length of fifty-two inches. Ten males at the age of four averaged one hundred and thirty-five pounds in weight, and fifty-eight inches in length. A mean of five examples five years old is: weight, two hundred pounds; length, sixty-five inches. Three males at six years gave a weight of two hundred and eighty pounds, and a length of six feet. The estimated average weight of males from eight years and upward, when fat, is given as four hundred to five hundred pounds, and the average length as six feet three inches to six feet eight inches. Mr. Elliott further adds that the average weight of the female is from eighty to eighty-five pounds, but that they range in weight from seventy-five to one hundred and twenty pounds, and that the five and six year old males, on their first appearance in May and June, when fat and fresh, may weigh a third more than in July, or at the time those mentioned in the table were weighed, which would thus indicate an average maximum weight of about three hundred and seventy-five pounds for the six-year-old males. According, however, to my own measurements of old males, from mounted and unmounted specimens, the length is between seven and eight feet, and of a full-grown female about four feet. Captain Bryant states that the males attain mature size at about the sixth year, when their total length is from seven to eight feet, their girth six to seven feet, and their weight, when in full flesh, from five to seven hundred pounds. The females, he says, are full grown at four years old, when they measure four feet in length, two and a half in girth, and weigh eighty to one hundred pounds. The yearlings, he says, weigh from thirty to forty pounds. The relative size of the adults of both sexes and the young is well shown in the accompanying illustration drawn by Mr. Elliott.

GENERAL HISTORY.—The northern Fur Seal was first made known to science by Steller, in 1751, under the name of *Ursus marinus*. During his visit to Kamtchatka and its neighboring islands, in 1742, he met with these animals in great numbers at Bering's Island, where he spent some time among them, and carefully studied their habits and anatomy, a detailed account of which appeared in his celebrated memoir entitled "De Bestiis Marinis," in the Transactions of the Saint Petersburg Academy for the year 1749.[1] This important essay was the source of nearly all of the accounts of this animal that appeared prior to the beginning of the present decade. The twenty-eight quarto pages of Steller's memoir devoted to this species gave not only a detailed account of its anatomy, with an extensive table of measurements, but also of its remarkable habits, and figures of the animals themselves. A little later Krascheninikow, in his History of Kamtchatka,[2] under the name of "Sea Cat," gave also a long account of its habits, apparently based

[1] Nov. Comm. Acad. Petrop., ii, pp. 331–359, pl. xv, 1751. This, as is well known, is a posthumous paper, published six years after Steller's death, Steller dying of fever November 12, 1745, while on his way from Siberia to Saint Petersburg. The description of the Sea Bear was written at Bering's Island in May, 1742.

[2] Hist. Kamtchatka (English edition), translated from the Russian by James Grieve, pp. 123–130, 1764.

mainly on Steller's notes,[1] but it embraces a few particulars not given in "De Bestiis Marinis." Steller's description of the habits of this animal has been largely quoted by Buffon, Pennant, Schreber, Hamilton, and other general writers.

Buffon, Pennant, Schreber, Gmelin, and nearly all writers on the Pinnipeds, down to about 1820, confounded the northern Fur Seal with the Fur Seals of the Southern Hemisphere, blending their history as that of a single species. Péron, in 1816, first recognized it as distinct from its southern allies, as it was so treated somewhat later by Demarest, Lesson, Fischer, Gray, and other systematic writers,[2] but its distinctive characters were not clearly set forth till 1859, when Dr. J. E. Gray described and figured its skull, and showed that the northern species was not even congeneric with the Sea Bears of the south. Very few specimens of either the northern or southern Sea Bears appear to have reached European museums prior to about that date, so that naturalists had not previously been able to make a direct comparison of this species with any of its southern affines. Dr. Gray, in referring to this point in 1859, wrote as follows: "I had not been able to see a specimen of this species in any of the museums which I examined on the Continent or in England, or to find a skull of the genus [*Arctocephalus*] from the North Pacific Ocean, yet I felt so assured, from Ste'ler's description and the geographical position, that it must be distinct from the Eared Fur Seals from the Antarctic Ocean and Australia, with which it had usually been confounded, that in my 'Catalogue of Seals in the Collection of the British Museum' [1850] I regarded it as a distinct species, under the name of *Arctocephalus ursinus*, giving an abridgment of Steller's description as its specific character." "The British Museum," he adds, "has just received, under the name *Otaria leonina*, from Amsterdam, a specimen [skull and skin] of the Sea Bear from Bering's Straits, which was obtained from Saint Petersburg";[3] which is the specimen already spoken of as figured by Dr. Gray. From the great differences existing between this skull and those of the Southern Sea Bears, Dr. Gray, a few weeks later, separated the northern species from the genus *Arctocephalus*, under the name *Callorhinus*.[4]

It seems, however, that there were two skulls of Steller's Sea Bear in the Berlin Museum as early as 1841,[5] and three skeletons of the same species in the Museum of Munich in 1849,[6] yet Dr. Gray appears to have been the first to compare this animal with its southern relatives, and to positively decide its affinities.

Misled, however, by erroneous information respecting specimens of Eared Seals received at the British Museum from California, a skin of the *Callorhinus ursinus* was doubtfully described by this author, in the paper in which the name *Callorhinus* was proposed, as that of his *Arctocephalus monteriensis*, which is a Hair Seal. This skin was accompanied by a young skull, purporting, by the label it bore, to belong to it, but Dr. Gray observes that otherwise he should have thought it too small to have belonged to the same animal. Seven years later,[7] he described the skull as that of a new species (*Arctocephalus californianus*), still associating with it, however, the skin of the

[1] Krascheninikow, it is stated, "received all of Mr. Steller's papers" to aid him in the preparation of his "History of Kamtchatka."

[2] Nilsson and Müller in 1841, and Wagner in 1846 and 1849, on the other hand, still considered all the Sea Bears as belonging to a single species. Wagner, in 1849 (Arch. für Naturg., 1849, pp. 37–49) described the osteological characters of the northern species from three skeletons in the Munich Museum received from Bering's Sea. One of these was apparently that of a full-grown female; a second was believed to be that of a half-grown male, while the third belonged to a very young animal, in which the permanent teeth were still not wholly developed. Wagner compares the species with Steller's Sea Lion, and with the figures of the skulls of the southern Sea Bears given by F. Cuvier, Blainville, and Quoy and Gaimard, and notes various differences in the form of the teeth and skull, but believes that these differences must be regarded as merely variations dependent upon age.

[3] GRAY, J. E., in the Proceedings of the Zoölogical Society of London, 1859, p. 102.

[4] GRAY, J. E., *in the Proceedings of the Zoölogical Society of London, 1859*, p. 359.

[5] See Archiv für Naturgesch., 1841, p. 334.

[6] GRAY, J. E., in the Proceedings of the Zoölogical Society of London, 849, p. 39.

[7] GRAY, J. E., Catalogue of the Seals and Whales in the British Museum, 1866, p. 51.

Callorhinus ursinus. The skull he subsequently considered as that of a young *A. monteriensis* (=*Eumetopias Stelleri*); and referring his *A. californianus* to that species, he was consequently led into the double error of regarding the *Eumetopias Stelleri* as a Fur Seal (as already explained under that species and elsewhere in the present paper), and of excluding the *Callorhinus ursinus* from the list of Fur Seals. To this I called attention in 1870, and in 1871 Dr. Gray correctly referred his *A. monteriensis* and *A. californianus* in part (the "skin only") to *Callorhinus ursinus*.[1]

What may be termed the second or modern epoch in the general history of this species began in 1869, when Captain C. M. Scammon published a highly important contribution to its biology,[2] he describing at considerable length, from personal observation, its habits, distribution, and products, as well as the various methods employed for its capture. The following year Mr. W. H. Dall devoted a few pages[3] to its history, in which he made many important suggestions relative to the sealing business. During the same year I was able to add not only something to its technical history,[4] but also to make public an important communication on its habits kindly placed at my disposal by Captain Charles Bryant,[5] government agent in charge of the Fur Seal Islands of Alaska. In 1874, Captain Scammon republished his above mentioned paper,[6] adding thereto a transcript of Captain Bryant's observations already noted. Almost simultaneously with this appeared Mr. H. W. Elliott's exhaustive Report on the Seal Islands of Alaska,[7] in which the present species properly comes in for a large share of the author's attention. The work is richly illustrated with photographic plates, taken from Mr. Elliott's sketches, about twenty-five of which are devoted to the Fur Seal. The text of this rare and privately distributed work has been since reprinted,[8] with some changes and additions, and has been widely circulated. It contains very little relating to the Fur Seal that is strictly technical, but the general history of its life at the Pribylov Islands is very fully told, while the commercial or economic phase of the subject is treated at length. A few minor notices of this species have since appeared (mostly popular articles in illustrated magazines, chiefly from the pen of Mr. Elliott), but nothing relating to its general history requiring special notice in the present connection, until the publication, in 1881, by the Census Bureau and the Fish Commission, of the two editions of Mr. Elliott's elaborate monograph of the Seal Islands of Alaska.[9]

FIGURES.—The first figures of the Northern Sea Bear were given by Steller, in his paper already cited. They represent an adult male, in a quite natural attitude, and a female reclining on her back. In respect to details, these early figures were naturally more or less rude and inaccurate. They

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[1] GRAY, J. E.: Supplementary Catalogue of the Seals and Whales, p. 15; Hand-List of Seals, p. 32.

[2] SCAMMON, C. M., in the Overland Monthly, vol. iii, Nov., 1869, pp. 393–399.

[3] DALL, WILLIAM H.: Alaska and its Resources, 1870, pp. 492–498.

[4] Bulletin of the Museum of Comparative Zoölogy, Cambridge, ii, pp. 73–89.

[5] Bulletin of the Museum of Comparative Zoölogy, Cambridge, pp. 89–108.

[6] SCAMMON, C. M.: The Marine Mammals of the Northwestern Coast, &c., 1874, pp. 141–163.

[7] ELLIOTT, HENRY W.: Report on the Prybilov Group, or Seal Islands of Alaska, 4to, unpaged, 1873 [1874].

[8] ELLIOTT, HENRY W.: Condition of Affairs in Alaska, 1875, pp. 107–151.

[9] 1881. ELLIOTT, HENRY W.: Department of the Interior. | — | Tenth Census of the United States. | Francis A. Walker, | Superintendent. | — | The history and present condition | of the fishery industries. | Prepared under the direction of Professor S. F. Baird, U. S. Commissioner of Fish and Fisheries, by G. Brown Goode, Assistant Director, U. S. National Museum. | — | The Seal-Islands of Alaska, | by | Henry W. Elliott. | (Seal of Department of the Interior.) | Washington: | Government Printing Office: | 1881. Quarto, pp. 176. Two maps; twenty-nine plates.

1881. ELLIOTT, HENRY W.: U. S. Commission of Fish and Fisheries. | Spencer F. Baird, Commissioner. | — | 176. | Special Bulletin. | — | A Monograph | of the | Seal Islands of Alaska | by | Henry W. Elliott | — | Reprinted, with additions, from the Report on the Fishery Industries | of the Tenth Census. | Washington: | Government Printing Office. | 1882. Quarto, pp. 176. Two maps; twenty-nine plates.

These two editions differ in the fact that in the census edition, pp. 102 to 109, relating to "The Reproduction of the Fur Seal, Sea Lion, and Walrus," are replaced by "A Brief Review of the Official Reports upon the Conduct of Affairs on the Seal Islands."

were copied, however, by Buffon, Schreber, Pennant, and other early writers, and are the only *representations of this species known to me that were made prior to about the year 1839, except* Choris's plate of a group of these animals entitled "Ours marins dans l'île de St. Paul,"[1] published in 1822. This represents three old males, surrounded by their harems, and indicates very faithfully the mode of grouping and the variety of attitudes assumed by these animals when assembled on the rookeries. Hamilton, in 1839, gave a figure of the "Sea Bear of Steller (*Otaria ursina*)" which he tells us is "*from the engraving of the distinguished Naturalist of the Rurick*,"[2] the original of which I have not seen. This represents a male and female, the latter reclining on its side, with a pup resting on its right flipper.

The first figure of the skull is that published by Gray in 1859,[3]—a view in profile of the skull of an adult male. A wood-cut of the same was given in 1866,[4] and a fine lithographic plate in 1874,[5] representing the skull in profile, from above and from below.[6]

In 1870 I gave figures of two adult male skulls (two views of each), of an adult female skull (three views), of a very young skull (three views), and of the scapula, dentition, etc. These, so far as known to me, are the only figures of the skull or other details of structure thus far published.

In 1874 Captain Scammon gave figures of the animal,[7] a zincograph of an old male,[8] from a sketch by Mr. Elliott, a wood-cut of the head of a female seen from below (drawn by Elliott),[9] two outline figures representing the female as seen from below and in profile, and two others in outline illustrating "attitudes of the Fur Seals." Mr. Elliott, in his first Report on the Seal Islands, in a series of over two dozen large photographic plates (from India ink sketches from nature), has given an exhaustive presentation of the phases of fur seal life so faithfully studied by him at Saint Paul's Island. Among these may be mentioned especially those entitled "The East Landing and Black Buttes—The beach covered with young Fur Seals"; "The North Shore of Saint Paul's Island" (giving an extensive view of the rookeries); "Lukannon Beach" (Fur Seals playing in the surf, and rookeries in the distance); "Old male Fur Seal, or 'Sceecatch'" (as he appears at the end of the season after three months of fasting); "Fur-seal Harem" (showing the relative size of males, females, and young, various attitudes, positions, etc.); "Fur-seal Males, waiting for their 'Harems'" (the females beginning to arrive); "Fur-seal 'Rookery'" (breeding-grounds at Polavina Point); "Fur-seal Harem" (Reef Rookery, foreground showing relative size of males and females); "Fur-seal Pups at Sleep and Play"; "Hauling Grounds" (several views at different points); "Capturing Fur Seals"; "Driving Fur Seals"; "Killing Fur Seals—Sealing gang at work," etc.

The only other pictorial contributions to the history of the Fur Seal of noteworthy importance prior to the publication by the Census of Mr. Elliott's latest work, is Mr. Clark's colored plate, on which are represented a nearly full-grown male, a female, and a pup, prepared from skins sent to the British Museum by the Alaska Commercial Company. In these the attitudes are excellent and the coloring fair.

For detailed discussions of this species, its capture and its commercial uses, the reader is referred to Elliott's "Monograph" and to the chapters on THE HABITS OF THE FUR SEAL, and THE FUR SEAL FISHERY, in subsequent pages of this work.

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[1] CHORIS, L.: Voyage pittoresque autour du Monde, Paris, 1822. Iles Aléoutiennes, pl. xv.

[2] HAMILTON, R.: Marine Amphibia, p. 266, pl. xxi.

[3] GRAY, J. E., in Proceedings of the Zoölogical Society of London, 1859, pl. lxviii.

[4] GRAY, J. E.: Catalogue of the Seals and Whales in the British Museum, p. 45, fig. 16.

[5] GRAY, J. E.: Hand-List of Seals, pl. xix.

[6] I infer this to be the same specimen in each case, not only from the resemblance the figures bear to each other, but from Dr. Gray, so far as I can discover, referring to only the single skull from Bering's Strait, received in 1859.

[7] SCAMMON, C. M.: The Marine Mammals of the Northwest Coast, &c., pl. xxi, two figures.

[8] ELLIOTT, HENRY W.: Report on the Pribylov Group, or Fur Seal Islands, of Alaska, unpaged, and plates not numbered.

[9] Proceedings of the Zoölogical Society of London, 1878, 271, pl. xx.

23. THE HARBOR SEAL.

GENERAL HISTORY AND SYNONYMY.—The common Seal, *Phoca* (*Phoca*) *vitulina* Linné, is mentioned in the earliest works on natural history, having been described and rudely figured by various writers as early as the middle of the sixteenth century as well as during the seventeenth century. Even down to the time of Linné it was the only species recognized; or, more correctly, all the species known were usually confounded as one species, supposed to be the same as the common Seal of the European coasts. Consequently almost down to the beginning of the present century the "common Seal" was generally supposed to inhabit nearly all the seas of the globe, Buffon, Pennant, Schreber, and others referring to it as an inhabitant of the Southern Hemisphere. Linné distinguished only a single species, even in the later editions of his "Systema Naturæ." As is well known, the smaller species of Seal are with difficulty distinguishable by external characters, particularly during their younger stages. Few, however, are so variable in color as the present, and none has so wide a geographical range.

GEOGRAPHICAL DISTRIBUTION.—The Harbor Seal appears to have formerly been much more numerous on portions of our eastern coast than it is at present.[1] Dr. DeKay, writing in 1842, states that the "common Seal, or Sea Dog," is "now comparatively rare in our [New York] waters," though "formerly very abundant." He adds, "A certain reef of rocks in the harbor of New York is called *Robin's Reef*, from the numerous seals which were accustomed to resort there; *robin* or *robyn* being the name in Dutch for *Seal*. At some seasons, even at the present day, they are very numerous, particularly about the Execution Rocks in the Sound; but their visits appear to be very capricious." He further alludes to their capture nearly every year in the Passaic River, in New Jersey, and states that a Seal was taken in a seine in the Chesapeake Bay, near Elko, Maryland, in August, 1824, supposed by Dr. Mitchill, who saw it, to be of this species.[2] Although still occasionally appearing on the coast of the Atlantic States as far southward as North Carolina,[3] it is of probably only accidental occurrence south of New Jersey, and rare south of Massachusetts.

In respect to its occurrence on the New Jersey coast, Dr. C. C. Abbott, the well-known naturalist of Trenton, N. J., kindly writes me, in answer to my inquiries on this point, as follows: "In going over my note-books, I find I have there recorded the occurrence of Seals (*Phoca vitulina*) at Trenton, N. J., as follows: December, 1861; January, 1864; December, 1866; February, 1870; and December, 1877. In these five instances a single specimen was killed on the ledge of rocks crossing the river here and forming the rapids. In December, 1861, three were seen, and two in February, 1870. A week later one was captured down the river near Bristol, Bucks County, Pennsylvania. My impression is that in severe winters they are really much more abundant in the Delaware River than is supposed. Considering how small a chance there is of their being seen when the river is choked with ice, I am disposed to believe that an occasional pair or more come up the river, even as high as Trenton, the head of tide-water, and one hundred and thirty-eight miles from the ocean.

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[1] The "Semi-Weekly Advertiser," Boston, January 10, 1872, had the following:

"The keeper of the Bird Island light-house at Marion reports that one day last week he saw over 300 Seals on the ice at one time. He shot one and obtained from it two gallons of oil. In eight years that he has kept the light he never saw more than three at a time until now."

[2] DEKAY, JAMES E.: New York Zoölogy, or the Fauna of New York, part i, 1842, pp. 54, 55.

[3] A recent record of its capture in North Carolina is the following, the reference, I think, unquestionably relating to the present species:

"SOUTHERN RANGE OF THE SEAL.—The Wilmington, N. C., 'Star' of February 28, mentions the capture, in New River, Onslow County, of a large female Spotted Seal, measuring about seven feet in length, and weighing 250 pounds. This is an interesting note. The species must probably have been the common Harbor Seal (*Phoca vitulina*). The same newspaper says one was reported near Beaufort some time ago."—[W. E. D. SCOTT,] "Country," vol. i, No 21, p. 322, March 16, 1878.

"On examination of old local histories, I find reference to the Seals as not uncommon along our coast, and as quite frequently wandering up our rivers in winter. I can find no newspaper references to the occurrence of Seals later than February or earlier than December, but as historical references to climate, as well as the memory of aged men still living, show conclusively that our winters are now much milder than they were even fifty years ago, it is probable that Seals did come up the river earlier in past years.

"In conversation with an old fisherman, now seventy-six years old, who has always lived at Trenton, and has been a good observer, I learn that every winter, years ago, it was expected that one or more Seals would be killed; and that about 1840 two were killed in March, which it was supposed had accompanied a school of herring up the river.

"In my investigations in local archæology I have found, in some of the fresh-water shell heaps, or rather camp-fire and fishing-village sites along the river, fragments of bones which were at the time identified as those of Seals. I did not preserve them, as I had no knowledge of their being of interest. They were associated with bones of deer, bear, elk, and large wading birds, and then gave me the impression, which subsequent inquiry has strengthened, that the Seal, like many of our large mammals, had disappeared gradually, as the country became more densely settled, and that in pre-European times it was common, at certain seasons, both on the coast and inland."[1]

In later communications (dated January 25 and March 20, 1879) he inclosed to me newspaper slips and notes respecting the capture of eight specimens in New Jersey, mostly near Trenton, during the winter of 1878-'79.

On the coast of Massachusetts they occur in considerable numbers about the mouth of the Ipswich River, where I have sometimes observed half a score in sight at once. They are also to be met with about the islands in Boston Harbor, and along the eastern shore of Cape Cod. Captain N. E. Atwood states that they are now and then seen at Provincetown, and that in a shallow bay west of Rainsford Island "many hundreds" may be seen at any time in summer on a ledge of rocks that becomes exposed at low water.[2]

Farther northward they become more numerous, particularly on the coast of Maine and the shores of the Gulf of Saint Lawrence, Newfoundland, and Labrador, and are also common on the shores of Davis's Strait and in Greenland, where, says Dr. Rink, "it occurs here and there throughout the coast," and is likewise to be met with at all seasons of the year. Mr. Kumlien says it is one of the "rarer species" in the Cumberland waters, but its exact northern limit I have not seen stated.

On the European coasts it is said to occur occasionally in the Mediterranean, and to be not rare on the coast of Spain. It is more frequent on the coasts of France and the British Islands, and thence northward along the Scandinavian peninsula is the commonest species of the family. It also extends northward and eastward along the arctic coast of Europe, but late explorers of the Spitzbergen and Jan Mayen Islands do not enumerate it among the species there met with. Malmgren states distinctly that it is not found there,[3] and it is not mentioned by Von Heuglin nor by the other German naturalists who have recently visited these islands. From its littoral habits its absence there might be naturally expected. It is also said by some writers to occur in the Black and Caspian Seas, and in Lake Baikal, but the statement is seriously open to doubt, as will be shown later in connection with the history of the Ringed Seal.

On the Pacific coast of North America it occurs from Southern California northward to

[1] Letter dated Trenton, N. J., Dec. 26, 1878.
[2] See Bull. Mus. Comp. Zoöl., vol. i, p. 193.
[3] Weigm. Arch. für Naturg. 1864, p. 84.

Bering's Strait, where it seems to be an abundant species. I have examined specimens from the Santa Barbara Islands, and various intermediate points to Alaska, and from Plover Bay, on the eastern coast of Siberia. The extent of its range on the Asiatic coast has not been ascertained. If it is the species referred to by Pallas under the name *Phoca canina*, and by Temminck, Von Schrenck, and other German writers, under the name *Phoca nummularis*, as seems probable, it occurs in Japan and along the Amoor coast of the Ochotsk Sea. Von Schrenck speaks of it, on the authority of the natives, as entering the Amoor River.[1] The late Dr. Gray referred a specimen from Japan to his "*Halicyon Richardsi*," which, as already shown, is merely a synonym of *Phoca vitulina*. It thus doubtless ranges southward along the Asiatic coast to points nearly corresponding in latitude with its southern limit of distribution on the American side of the Pacific.

The Harbor Seal not only frequents the coast of the North Atlantic and the North Pacific, and some of the larger interior seas, but ascends all the larger rivers, often to a considerable distance above tide-water. It even passes up the Saint Lawrence to the Great Lakes, and has been taken in Lake Champlain. DeKay states, on the authority of a Canadian newspaper, that a Seal (in all probability of this species) was taken in Lake Ontario near Cape Vincent (Jefferson County, New York) about 1824, and adds that the same paper says that Indian traders report the previous occurrence of Seals in the same lake, though such instances are rare.[2] Thompson gives two instances of its capture in Lake Champlain; one of the specimens he himself examined, and has published a careful description of it, taken from the animal before it was skinned.[3]

They are also known to ascend the Columbia River as far as the Dalles (above the Cascades, and about two hundred miles from the sea), as well as the smaller rivers of the Pacific coast, nearly to their sources. Mr. Brown states that "Dog River, a tributary of the Columbia, takes its name from a dog-like animal, probably a Seal, being seen in the lake whence the stream rises."[4]

HABITS.—The Harbor Seal is the only species of the family known to be at all common on any part of the eastern coast of the United States. Although it has been taken as far south as North Carolina, it is found to be of very rare or accidental occurrence south of New Jersey. Respecting its history here, little has been recorded beyond the fact of its presence. Captain Scammon has given a quite satisfactory account of its habits and distribution as observed by him on the Pacific coast of the United States, but under the supposition that it was a species distinct from the well-known *Phoca vitulina* of the North Atlantic. Owing to its rather southerly distribution, as compared with its more exclusively boreal affines, its biography has been many times written in greater or less detail. Fabricius, as early as 1791, devoted not less than twenty pages to its history, based in part on his acquaintance with it in Greenland, and partly on the writings of preceding authors;[5] and much more recently extended accounts of it have been given by Nilsson and

[1] VON SCHRENK: Reisen im Amoor-Lande, Bd. i, p. 180.

[2] DEKAY: New York Zoölogy, or the Fauna of New York, pt. i, 1842, p. 55.

[3] His record of the capture of these examples is as follows:

"While several persons were skating upon the ice on Lake Champlain, a little south of Burlington, in February, 1810, they discovered a living Seal in a wild state which had found its way through a crack and was crawling upon the ice. They took off their skates, with which they attacked and killed it, and then drew it to the shore. It is said to have been four and a half feet long. It must have reached our lake by way of the Saint Lawrence and Richelieu."—Thompsons' Nat. and Civil Hist. of Vermont, 1842, p. 38.

"Another Seal was killed upon the ice between Burlington and Port Kent on the 23d of February, 1846. Mr. Tabor, of Keeseville, and Messrs. Morse and Field, of Peru, were crossing over in sleighs when they discovered it crawling upon the ice, and, attacking it with the butt end of their whips, they succeeded in killing it and brought it on shore at Burlington, where it was purchased by Morton Cole, esq., and presented to the University of Vermont, where its skin and skeleton are now preserved. * * * * At the time the above-mentioned Seal was taken, the lake, with the exception of a few cracks, was entirely covered with ice."—*Ibid.*, Append., 1853, p. 13.

[4] Proc. Zoöl. Soc. Lond., 1868, p. 412, foot-note.

[5] Fabricius appears to have exhaustively presented its literary history, his references to previous authors, in his table of synonymy, occupying nearly four pages.

Lilljeborg, but unfortunately for English readers the first of these histories is written in Danish and the other in Swedish. It has, however, been noticed quite fully by Bell, Macgillivray, and other British authors, while lesser and more fragmentary accounts of it are abundant. On the New England coast, as elsewhere, it is chiefly observed about rocky islands and shores, at the months of rivers and in sheltered bays, where it is always an object of interest. Although ranging far into the arctic regions, it is everywhere said to be a sedentary or non-migratory species, being resident throughout the year at all points of its extended habitat. Unlike most of the other species, it is strictly confined to the shores, never resorting to the ice-floes, and is consequently never met with far out at sea, nor does it habitually associate with other species. On the coast of Newfoundland, where it is more abundant and better known than at more southerly points, it is said to bring forth its young during the last two weeks of May and the early part of June, resorting for this purpose to the rocky points and outlying ledges along the shore. It is said to be very common along the shores of the Gulf of Saint Lawrence and of Newfoundland in summer, or during the period when the shores are free from ice, but in winter leaves the ice-bound coast for the remoter islands in the open sea. It is at all times watchful, and takes great care to keep out of reach of guns. Still, many are surprised while basking on the rocks, and fall victims to the seal-hunters, while considerable numbers of the young are captured in the seal-nets. They are described as very sagacious, and as possessing great parental affection. Mr. Carroll states that when an old one is found on the rocks with its young it will seize the latter and convey it in its mouth so quickly to the water that there is not time to shoot it; or, if the young one be too large to be thus removed, it will entice it upon its back and plunge with it into the sea. The same writer informs us that this species is a great annoyance to the salmon-fishers, boldly taking the salmon from one end of the net while the fisherman is working at the other end. It is also troublesome in other ways, since, whenever the old ones get entangled in the strong seal-nets, they are able to cut themselves free, a feat it is said no other Seal known in Newfoundland will do.

This species is known to the inhabitants of Newfoundland as the "Native Seal," in consequence of its being the only species found there the whole year. The young are there also called "Rangers," and when two or three years old—at which age they are believed to bring forth their first young—receive the name of "Dotards." Here, as well as in Greenland, the skins of this species are more valued than those of any other species, owing to their beautifully variegated markings, and are especially valued for covering trunks and the manufacture of coats, caps, and gloves.[1] Mr. Brown informs us that the natives of the eastern coast of Greenland prize them highly "as material for the women's breeches," and adds "that no more acceptable present can be given to a Greenland damsel than a skin of the 'Kassigiak,' as this species is there called."[2] The Greenlanders also consider its flesh as "the most palatable of all 'seal-beef'".[2]

According to Mr. Reeks, the period of gestation is about nine months, the union of the sexes occurring, according to the testimony of the Newfoundlanders, in September.[3] Only rarely does the female give birth to more than a single young. This agrees with what is stated by Bell and other English authors respecting its season of procreation.

Respecting its general history, I find the following from the pen of Mr. John Cordeaux, who, in writing of this species, as observed by him in British waters, says: "The Seal (*Phoca vitulina*) is not uncommon on that part of the Lincolnshire coast adjoining the Wash. This immense estuary, lying between Lincolnshire and Norfolk, is in great part occupied with large and dangerous

[1] CARROLL, MICHAEL: Seal and Herring Fisheries of Newfoundland, 1873, pp. 10, 11.
[2] BROWN, ROBERT, in Proceedings of the Zoölogical Society of London, 1868, p. 413
[3] REEKS, HENRY: Zoölogist, 2d ser., vol. vi, 1871, p. 2541.

sand-banks, intersected by deep but narrow channels. At ebb the sands are uncovered; and at these times, on hot days, numbers of Seals may be found basking and sunning themselves on the hot sands, or rolling and wallowing in the shallow water along the bank. Sometimes a herd of fifteen or twenty of these interesting creatures will collect on some favorite sand-spit; their chief haunts are the Long-sand, near the centre of the Wash; the Knock, along the Lincoln coast; and the Dog'shead sand, near the entrance to Boston Deeps. In the first week of July, when sailing down the Deeps along the edge of the Knock, we saw several Seals; some on the bank; others with their bodies bent like a bow, the head and hind feet only out of the water. They varied greatly in size, also in color, hardly any two being marked alike; one had the head and face dark colored, wearing the color like a mask; in others the upper parts were light gray; others looked dark above and light below, and some dark altogether. . . . The female has one young one in the year; and as these banks are covered at flood, the cub, when born, must make an early acquaintance with the water. In most of the *Phocidæ* the young one is at first covered with a sort of wool, the second or hairy dress being gradually acquired; and until this is the case it does not go into the water. This, however, does not appear to be the case with the common Seal, for Mr. L. Lloyd says (I believe in his 'Game Birds and Wild Fowl of Norway and Sweden,' but I have not the book to refer to) that the cub of the common species, whilst still in its mother's womb, casts this wooly covering; and when ushered into the world has acquired its second or proper dress.[1] If this is the case, it fully accounts for the cub being able to bear immersion from the hour of its birth. The Seal, if lying undisturbed and at rest, can remain for hours without coming to the surface."[2]

I am informed by competent observers that on the coast of Maine they assemble in a similar manner on sand bars, but take to the water before they can be closely approached.

Mr. Kumlien (in his MS. notes) observes: "The so-called 'Fresh-water Seal' of the whalemen is one of the rarer species in the waters of Cumberland Sound. They are mostly met with far up in the fjords, and in the fresh-water streams and ponds, where they go after salmon. They are rather difficult to capture, as at the season when they are commonly met with they have so little blubber that they sink when shot. . . . The adult males often engage in severe combats with each other. I have seen skins so scratched that they were nearly worthless. In fact, the Eskimo consider a 'Kassiarsoak' (a very large 'Kassigiak') as having an almost worthless skin, and seldom use it except for their skin tents. The skins of the young, on the contrary, are a great acquisition." He further states that they do not make an excavation beneath the snow for the reception of the young, like *Phoca fœtida*, "but bring forth later in the season on the bare ice, fully exposed."

Under the name "Leopard Seal," Captain Scammon has given a very good account of the habits of this species as observed by him on the Pacific coast of North America. He speaks of it as displaying no little sagacity, and considerable boldness, although exceedingly wary. He says it is "found about outlying rocks, islands, and points, on sand-reefs made bare at low tide, and is frequently met with in harbors among shipping, and up rivers more than a hundred miles from the sea. We have often observed them," he continues, "close to the vessel when under way, and likewise when at anchor, appearing to emerge deliberately from the depths below, sometimes only showing their heads, at other times exposing half of their bodies, but the instant any move was made on board, they would vanish like an apparition under water, and frequently that would be

[1] A statement to this effect is also made by Mr. Carroll, but Mr. Robert Brown affirms, on the authority of Captain McDonald, that in the Western Isles of Scotland the young are "born pure white, with curly hair, like the young of *Pagomys fœtidus*, but within three days of its birth begins to take dark colors on the snout and tips of the flippers."—Proc. Zoöl. Soc. Lond., 1868, p. 413.

[2] CORBEAUX, JOHN, in *Zoölogist*, 2d ser., vol. vii, 1872, pp. 3203, 3204.

the last seen of them, or, if seen again, they would be far out of gunshot." They come ashore, he observes, "more during windy weather than in calm, and in the night more than in the day; and they have been observed to collect in the largest herds upon the beaches and rocks, near the full and change of the moon. They delight in basking in the warm sunlight, and when no isolated rock or shore is at hand, they will crawl upon any fragment of drift-wood that will float them. Although gregarious, they do not herd in such large numbers as do nearly all others of the Seal tribe; furthermore, they may be regarded almost as mutes, in comparison with the noisy Sea Lions. It is very rarely, however, any sound is uttered by them, but occasionally a quick bark or guttural whining, and sometimes a peculiar bleating is heard when they are assembled together about the period of bringing forth their young. At times, when a number meet in the neighborhood of rocks or reefs distant from the mainland, they become quite playful, and exhibit much life in their gambols, leaping out of the water or circling around upon the surface. . . . Its rapacity in pursuing and devouring the smaller members of the piscatory tribes is quite equal, in proportion to its size, to that of the orca. When grappling with a fish too large to be swallowed whole, it will hold and handle it between its fore flippers, and, with the united work of its mouth . . . the wriggling prize is demolished and devoured as quickly, and in much the same manner, as a squirrel would eat a bur-covered nut. . . .

"Leopard Seals are very easily captured when on shore, as a single blow with a club upon the head will dispatch them. The Indians about Puget Sound take them in nets made of large hemp line, using them in the same manner as seines, drawing them around beaches when the rookery is on shore. They are taken by the whites for their oil and skins, but the Indians and Esquimaux make great account of them for food." He adds that the natives of Puget Sound singe them before a fire until the hair is consumed and the skin becomes crisp, when they are cut up and cooked as best suits their taste.[1]

The apparent fondness of this animal, in common with other species of the family, for music, has been often noted.

The food of this species consists largely of fish, but, like other species, it doubtless varies its fare with squids and shrimps. That it aspires to more epicurean tastes is evidenced by its occasional capture of sea-birds. This they ingeniously accomplish by swimming beneath them as they rest upon the water and seizing them. An eye-witness of this pastime relates an instance as observed by him on the Scottish coast. "While seated on the bents," he writes, "watching a flock of [herring] gulls that were fishing in the sea near Donmouth, I was startled by their jerking high in the air, and screaming in an unusual and excited manner. On no previous occasion have I observed such a sensation in a gull-hood, not even when a black-head was being pursued, till he disgorged his newly-swallowed fish, by that black-leg, the skua. The excitement was explained by a Seal [presumably *Phoca vitulina*, this being the only species common at the locality in question] showing above the water with a herring gull in his mouth. On his appearing the gulls became ferocious, and struck furiously at the Seal, who disappeared with the gull in the water. The Seal speedily reappeared, but on this occasion relinquished his victim on the gulls renewing their attack. The liberated gull was so disabled as to be unable to fly, but it had strength enough to hold up its head as it drifted with the tide."[2]

They are evidently discriminating in their tastes, and not loath to avail themselves of a fine salmon now and then not of their own catching. Their habit of plundering the nets of the fishermen on the coast of Newfoundland has been already alluded to, but this peculiarity is evidently

[1] Scammon, C. M.: Marine Mammals, etc., pp. 166, 167.
[2] Angus, W. Craibe, in Zoölogist, 2d ser., vol. vi, 1871, p. 2762.

not confined to the Newfoundland representative of the species, as shown by the following incident related by the writer last quoted. "On a sunny noon in the autumn of 1868," says this observer, "I observed a Seal, not far from the same place, with a salmon in his mouth, which he forced through the meshes of a stake net. The struggling salmon, whose head was in the jaws of the Seal, struck the water violently with his tail, which gleamed like a lustre in the lessening ray. The Seal rose and sank alternately, keeping seaward to escape Eley's cartridges from the shore. When above the water he shortened the silver bar, which continued to lash his sides long after its thickest part had disappeared, by rising to his perpendicular, as if to allow the precious metal by its own weight to slip into his crucible. The Seal evidently swallowed above, and masticated below, water—the process lasting about twelve minutes, during which the Seal had travelled a full half-mile."

In their raids upon the nets of the fishermen they become sometimes themselves the victims, being in this way frequently taken along our own coast as well as elsewhere. They are, however, at all times unwelcome visitors. DeKay states that formerly they were taken almost every year in the "fyke-nets" in the Passaic River, greatly to the disgust of the fishermen, the Seals when captured making an obstinate resistance and doing much injury to the nets. Their accidental capture in this way often affords a record of their presence at localities they are not commonly supposed to frequent, as in the Chesapeake Bay, and at even more southerly localities on the eastern coast of the United States.

Owing to the difficulty of capturing this species, and its comparatively small numbers, it is of little commercial importance, although the oil it yields is of excellent quality, and its skins are of special value for articles of dress, and other purposes, in consequence of their beautifully variegated tints. Though not a few are taken in strong seal-nets, they are usually captured by means of the rifle or heavy sealing gun. On rare occasions they are surprised on shore at so great a distance from water that they are overtaken and killed by a blow on the head with a club. Like other species of the seal family, the Harbor seal is very tenacious of life, and must be struck in a vital part by either ball or heavy shot, in order to kill it on the spot. Says Mr. Reeks, "I have been often amused at published accounts of Seals shot in the Thames or elsewhere, but which 'sank immediately.' What Seal or other amphibious animal would not do so if 'tickled' with the greater part of, perhaps, an ounce of No. 5 shot?" He adds that it is only in the spring of the year that this seal will "float" when killed in the water, but says that he has never seen a Seal "so poor, which, if killed *dead on the spot*, would not have floated from five to ten seconds," or long enough to give "ample time for rowing alongside," supposing the animal to have been killed by shot, and the boat to contain "two hands." The oil of this species, according to the same writer, sells in Newfoundland for fifty to seventy-five cents a gallon, while the skins are worth one dollar each. Mr. Carroll gives the weight of the skin and blubber of a full-grown individual as ranging from eighty to one hundred pounds, while that of a young one averages, at ten weeks old, thirty to thirty-five pounds. The flesh of the young, the same writer quaintly says, is "as pleasant to the taste as that of any description of salt-water bird." Its flesh, as already stated, is esteemed by the Greenlanders above that of any other species. Few statistics relating to the capture of this species are available, but the number taken is small in comparison with the "catch" of other species, particularly of the Harp or Greenland Seal. Dr. Rink states that only from one thousand to two thousand are annually taken in Greenland, which is about one to two per cent. of the total catch. They are hunted to a considerable extent, however, wherever they occur in numbers.

The Harbor Seal received this name from its predilection for bays, inlets, estuaries, and fjords,

from which habit it is also often termed Bay Seal, and, on the Scandinavian coast, Fjord Sea, (Fjordskäl), and also Rock Seal (Steen-Kobbe).[1]

24. THE HARP SEAL.

GENERAL HISTORY AND NOMENCLATURE.—The Harp Seal, *Phoca (Pagophilus) grœnlandica* Fabricius, like the Crested Seal, presents characters, at least in the male sex, that readily attract the attention of even the casual observer—the one by its "saddle" or "harp-mark" of black on a light ground, the other by its inflatable hood. Accordingly both were mentioned by various early writers, but notably by Egede, Ellis, and Cranz, and the indications they gave of their existence enter into the technical history of the species, forming as they do the basis of the first systematic names. Erxleben described the species in 1777, under the name *Phoca grœnlandica*, his description being founded mainly on information previously made public by Cranz.

Few Seals vary so much in color with age as the Harp Seal. This was long since mentioned by Cranz, who says: "All Seals vary annually their color till they are full grown, but no sort so much as this [the *Attersoak*], and the Greenlanders vary its name according to its age. They call the fœtus *iblau;* in this state these are white and wooly, whereas the other sorts are smooth and coloured. In the 1st year 't is called *Attarak*, and 't is a cream-colour. In the 2d year *Atteitsiak* then 't is gray. In the 3d *Aglektok*, painted. In the 4th *Milaktok*, and in the 5th year *Attarsoak*. Then it wears its half-moon, the signal of maturity."

Dr. Rink states that at the present day the Greenlanders, as well as the Europeans, divide the "Saddle-backs" into four or five different classes according to their age, but that in familiar language they only distinguish by different names the full-grown animals from the half-grown ones, the latter being called "Bluesides."

The young, when first born, are called by the Newfoundland sealers "White-coats"; later, during the first molt, "Ragged-jackets"; when they have attained the black crescentic marks they are termed "Harps," or "Saddlers," and also "Breeding Harps"; the yearlings and two-year-olds are called "Young Harps" or "Turning-Harps," and also "Bedlimers" (or "Bellamers," also spelled "Bedlamers"). The older and some recent writers state that the mature pattern of coloration is not attained till the fifth year, while Jukes, Brown, Carroll, and others state that it is acquired in the third or fourth year. There is also a diversity of statement respecting the sexual differences of color in the adults, some writers affirming that the sexes are alike, while others state that the female is without the harp-mark, or has the dark markings of the male only faintly indicated. Mr. Carroll says: "The reason why they are called Harp Seals, or 'Saddlers,' is, the male Seal, as well as the female, has a dark stripe on each side from the shoulders to the tail, leaving a muddy white stripe down the back. The male Harp Seal is very black about the head as well as under the throat. . . . The female Harp is of a rusty gray about the head and white under the throat." Both Jukes and Reeks, however, refer to the *absence* of the harp-mark in the female.

GEOGRAPHICAL DISTRIBUTION.—Although the Harp Seal has a circumpolar distribution, it

[1] Seals appear to be increasing in numbers in Massachusetts Bay. We observed them frequently near Race Point, Provincetown, in 1879, where they sometimes get into the gill-nets set for mackerel. At Barnstable they have become very numerous and troublesome of late. They are often shot or taken in the weirs at Barnstable and Yarmouth, and are accused of seriously depleting the fisheries in this locality, as well as at Plymouth, where they have been preserved for a number of years. Crossing the entrance to Barnstable Harbor at sunset November 10, I counted eight or ten heads above the surface. The number here is estimated at sixty-five or seventy, and there are probably not less than three hundred in the bay. They are resident, disappearing for a time in the spring and returning accompanied by their young, about one-quarter as large as their parents, in April or May. Capt. Gideon Bowley, of Provincetown, tells me that they feed on "sun squalls," or medusæ, and that he has seen them "boil 'em up," or vomit them, when caught.—G. BROWN GOODE.

appears not to advance so far northward as the Ringed Seal or the Bearded Seal; yet the icy seas of the north are pre-eminently its home. It is not found on the Atlantic coast of North America in any numbers south of Newfoundland. A few are taken at the Magdalen Islands, and while on their way to the Grand Banks some must pass very near the Nova Scotia coast. Dr. Gilpin, however, includes it only provisionally among the Seals that visit the shores of that Province. It doubtless occasionally wanders, like the Crested Seal, to points far south of its usual range, as I find a skeleton of this species in the collection of the Museum of Comparative Zoölogy, bearing the legend "Nahant, Mass., L. Agassiz." I have at times felt doubtful about the correctness of the assigned locality, as this seems to be the only proof of the occurrence of this species on the Massachusetts coast. I have, however, recently been informed by Dr. C. C. Abbott, of New Jersey, that a Seal, described to him as being about six feet long, white, with a broad black band along each side of the back, was taken near Trenton, in that State, during the winter of 1878–'79. This description can of course refer to no other species than *Phoca grœnlandica*, and as it comes from a wholly trustworthy source it seems to substantiate the occasional occurrence of this species as far south as New Jersey. Von Heuglin gives it as ranging "in den amerikanischen Meeren *südwärts bis New York*,"[1] *but I know not on what authority.*

The Harp Seals are well known to be periodically exceedingly abundant along the shores of Newfoundland, where, during spring, hundreds of thousands are annually killed. In their migrations they pass along the coast of Labrador, and appear with regularity twice a year off the coast of Southern Greenland. Capt. J. C. Ross states that in Baffin's Bay they keep mostly "to the loose floating floes which constitute what is termed by the whale-fishers 'the middle ice' of Baffin's Bay and Davis' Straits." He says he never met with them in any part of Prince Regent's Inlet, but states that they are reported by the natives to be very numerous on the west side of the Isthmus of Boothia, but that they are not seen on the east side.[2] They are well-known visitors to *the shores of Iceland*, and swarm in the icy seas about Jan Mayen and Spitzbergen. They also occur about Nova Zembla, and Payer refers to their abundance at Franz Josef Land. They occur in the Kara Sea, and along the arctic coast of Europe. Malmgren, Lilljeborg, and Collett state that it is of regular occurrence on the coast of Finmark, where it occurs in small numbers from October and November till February. Although reported by Bell and others as having been taken in the Severn, and by Saxby as observed at Baltasound, Shetland, the capture of a specimen in Morecombe Bay, England, reported by Turner in 1874, Mr. E. R. Alston says is "the first British specimen that has been *properly identified*."

The distribution of this species in the North Pacific is not well known. Pallas (under the name *Phoca dorsata*) records it from Kamtchatka, where its occurrence is also affirmed by Steller. Temminck mentions having examined three skins obtained at Sitka, but adds that it was not observed by "les voyageurs néerlandais" in Japan. In the collections in the National Museum from the North Pacific this species is unrepresented, the species thus far received from there being the following four, namely: *Phoca vitulina*, *Phoca fœtida*, *Erignathus barbatus*, and *Histriophoca fasciata*.

HUNTING AND PRODUCTS.—As so large a part of what has been already said in the general account of the seal fishery of the North Atlantic and Arctic waters necessarily relates to the present species, it is scarcely requisite in the present connection to more than recall the leading points of the subject, with the addition of a few details not previously given. As already stated, the sealing grounds *par excellence* are the ice-floes off the eastern coast of Newfoundland and around

[1] VON HEUGLIN: Reisen nach dem Nordpolarmeer, p. 56.
[2] CARROLL: Seal and Herring Fisheries of Newfoundland, p. 26.

Jan Mayen Island, where the present species forms almost the sole object of pursuit. The sealing season lasts for only a few weeks during spring; the enterprise[1] gives employment during this time to hundreds of vessels and thousands of men, the average annual catch falling little short of a million Seals, valued at about three million dollars. While the pursuit is mainly carried on in vessels, sailing chiefly from English, German, and Norwegian ports, or from those of Newfoundland and the other British Provinces, many are caught along the shores of the countries periodically visited by these animals, as those of South Greenland, Southern Labrador, Newfoundland, and the Gulf of Saint Lawrence. The pursuit with vessels, and the various incidents connected therewith, have already been detailed, and sufficient allusions have perhaps also already been made to the Greenland method of seal-hunting.

In consequence of the gregarious habits of the species, and the fact that one-half to two-thirds of those taken are young ones that are not old enough to make any effectual attempt to escape, the success of a sealing voyage depends almost wholly upon the mere matter of luck in discovering the herds. While the old Seals are mostly shot, the young are killed with clubs. In respect to the ease and facility with which they are captured it may be noted that it is not at all unusual, in the height of the season, for the crew of a single small vessel to kill and take on board from five hundred to a thousand in a day. Mr. Brown states: "In 1866 the steamer Camperdown obtained the enormous number of 22,000 Seals in nine days," or an average of 2,500 per day. "It is nothing uncommon," he adds, "for a ship's crew to club or shoot, in one day, as many as from 500 to 800 old Seals, with 2,000 young ones."[2] Such slaughter is necessarily attended with more or less barbarity, but this seems to be sometimes carried to a needless extreme. The Seals are very tenacious of life, and, in the haste of killing, many are left for a long time half dead, or are even flayed alive. Jukes states that even the young are "sometimes barbarously skinned alive, the body writhing in blood after being stripped of its skin," and they have even been seen to swim away in that state, as when the first blow fails to kill the Seals their hard-hearted murderers "cannot stop to give them a second." "How is it," he adds, "one can steel one's mind to look on that which to read of, or even think of afterwards, makes one shudder? In the bustle, hurry, and excitement, these things pass as a matter of course, and as if necessary; but they are most horrible, and will not admit of an attempt at palliation." Scoresby and other writers refer to similar heartless proceedings—as though the necessary suffering attending such a sacrifice of unresisting creatures were not in itself bad enough without the infliction of such needless cruelty. The young Seals not only do not attempt any resistance, but are said to make no effort to move when approached, quietly suffering themselves to be knocked on the head with a club. The old Seals are more wary, and are generally killed with fire-arms. Scoresby relates that "When the Seals are observed to be making their escape into the water before the boats reach the ice, the sailors give a long-continued shout, on which their victims are deluded by the amazement a sound so unusual produces and frequently delay their retreat until arrested by the blows of their enemies."

The annual catch of Harp Seals in Greenland is stated by Rink to be 17,500 full-grown "Saddle-backs" and 15,500 "Bluesides," or 33,000 in all. The catch from the Newfoundland ports alone often reaches 500,000, and in the Jan Mayen seas often exceeds 300,000, so that the total annual catch of this species alone doubtless ranges from 800,000 to 900,000.

The commercial products are the oil—used in the lubrication of machinery, in tanning leather, and in miners' lamps—and the skins, which are employed for the manufacture of various kinds of

[1] For statistics of the seal fishery, see Allen's "North American Pinnipeds," pp. 497–502.
[2] Man. Nat. Hist., Geol., &c., Greenland, Mammals, p. 67, foot-note.

leather and articles of clothing. The skins are said to be mostly sold to English manufacturers, who employ them in the preparation of a superior article of "patent" or lacquered leather. The flesh is esteemed by the Greenlanders as superior to that of their favorite *Neitsik* (*Phoca fœtida*).

25. THE RINGED SEAL.

GENERAL HISTORY AND NOMENCLATURE.—The earliest notices of *Phoca fœtida*, Fabricius, in systematic works are based on the brief account given by Cranz in 1765, but there appear to be still earlier references to it by Scandinavian writers.

GEOGRAPHICAL DISTRIBUTION.—Although the Ringed Seal is a well-known inhabitant of the Arctic Seas, of both hemispheres, the southern limit of its distribution cannot be given with certainty. Wagner[1] records specimens from Labrador, which is the most southern point on the eastern coast of North America from which it seems to have been reported. It is not enumerated by Jukes or Carroll as among the species hunted by the Newfoundland sealers,[2] nor is it mentioned by Gilpin[3] as occurring in Nova Scotia. Its occasional presence here and in the Gulf of Saint Lawrence is doubtless to be expected. Further northward, and especially along the shores of Davis's Straits and Greenland, its abundance is well attested. It has also been found as far north as explorers have penetrated, having been met with by Parry as high as latitude 82° 40′. J. C. Ross states that it is common on both sides of the Isthmus of Boothia, where it forms the chief means of subsistence to the inhabitants during eight or nine months of the year.[4] It is common in Iceland, and Malmgren and Von Heuglin state it to be numerous at Spitzbergen. The last-named author gives it as abundant in summer in the Stor-Fjord and its branches, in Henlopen Strait, and in the bays of the northwest coast of Spitzbergen, occurring in great herds as well as singly, in the open water along the shores and in the openings in the ice-floes. He states that it is also numerous about Nova Zembla, where great numbers are killed for their skins and fat.[5] It is a common species on the coast of Finland, and farther eastward along the arctic coast of Europe and doubtless also of Western Asia.[6] It is also a common inhabitant of the Gulf of Bothnia and neighboring waters, and also of the Ladoga and other interior seas of Finland. It is said by Blasius to extend southward along the coast of Middle Europe to North Germany, Ireland, and the British Channel. Professor Flower has recorded its capture on the coast of Norwich, England; it undoubtedly occurs at the Orkneys and the Hebrides, where it is supposed to be represented by the species known there as "Bodach" or "Old Man." A specimen was also taken many years since on the coast of France, but here, as on the

[1] SCHREBER'S Säugethiere, vii, 1846, p. 31.

[2] Professor Jukes says four species are known on the coast of Newfoundland, namely, the "Bay Seal" (*Phoca vitulina*), the Harp Seal (*Phoca grœnlandica*), the Hooded Seal (*Cystophora cristata*), and the "Square Flipper" (probably *Halichœrus grypus*). The first he did not see on the ice among the Seals pursued by the sealers. The second is the one that forms the principal object of the chase. The third seems not to be numerous, but occurs occasionally out on the ice-floes with the Harp Seals. The fourth is referred to as very rare, and as being larger than the Hooded Seal. Not one was heard of or seen that season. He supposes it may be the *Phoca barbata*.—Excursions in Newfoundland, vol. i, pp. 308-312.

Carroll states that the species of Seal that are taken on the coast of Newfoundland are the "Square Flipper Seal" (probably *Halichœrus grypus*), the "Hood Seal" (*Cystophora cristata*), the "Harp Seal" (*Phoca grœnlandica*), and the "Dotard" or "Native Seal" (*Phoca vitulina*).—Seal and Herring Fisheries of Newfoundland, 1873, p. 10.

[3] The species given by Gilpin as found on the coast of Nova Scotia are the Harbor Seal (*Phoca vitulina*), the Harp Seal (*Phoca grœnlandica*), the Gray Seal (*Halichœrus grypus*), and the Hooded Seal (*Cystophora cristata*).

[4] Ross's Second Voyage, App., 1835, p. xix.

[5] Reise nach dem Nordpolarmeer, Th. iii, p. 50.

[6] In an account of Professor Nordenskjöld's late arctic voyage, published in "Nature" (vol. xxi, p. 40, November 13, 1879), it is stated that *Phoca fœtida* "was caught in great numbers, and along with fish and various vegetables forms the main food of the natives" at Cape Serdze (about 120 miles from Bering's Straits), the point where the "Vega" wintered, this and the polar bear being the only mammals seen.

shores of the larger British Islands, it can occur as merely a rare straggler.[1] Its fossil remains have been reported by Professor Turner as having been found in the brick clays of Scotland. It appears also to be a common species in the North Pacific, there being specimens in the National Museum, unquestionably of this species, from the coast of Alaska, and from Plover Bay, on the Siberian side of Bering's Strait. Its southern limit of distribution along the shores of the North Pacific, on either the American or the Asiatic side, cannot at present be given. Judging from its known distribution in other portions of the arctic waters, there is no reason to infer its absence from the northern shores of Eastern Asia and Western North America.

HABITS, PRODUCTS, AND HUNTING.—The Ringed Seal is pre-eminently boreal, its home being almost exclusively the icy seas of the arctic regions. Its favorite resorts are said to be retired bays and fjords, in which it remains so long as they are filled with firm ice; when this breaks up they betake themselves to the floes, where they bring forth their young. It is essentially a littoral, or rather glacial species, being seldom met with in the open sea. From its abundance in its chosen haunts it is a species well known to arctic voyagers, and frequent reference is made to it in most of the narratives of arctic explorations.[2]

The habits of the Ringed Seal, as observed in European waters, seem to agree with what has already been related respecting their life-history in Davis's Strait and Cumberland Sound. Malmgren, for example, states that the females bring forth their young on the western coast of Finland, on the ice, near the edge of great openings, between the 24th of February and the 25th of March, or at the time given by Fabricius and later writers for the same event on the coast of Greenland, and in no respect does their mode of life appear to differ in the icy seas about Spitzbergen from what has already been related.

The Ringed Seal is of far less commercial value than the Harp Seal, but in this respect may be considered as holding the second rank among the northern Phocids. Brown states that "it is chiefly looked upon and taken as a curiosity by the whalers, who consider it of very little commercial importance and call it 'Floe-rat.'" Von Heuglin, however, states that many thousands are annually taken by the sealers for their skins and fat, in the vicinity of Nova Zembla and Spitzbergen. It is of the greatest importance, however, to the Esquimaux and other northern tribes, by whom it is captured for food and clothing. Mr. Brown informs us that it forms, during the latter part of summer and autumn, "the principal article of food in the Danish settlements, and on it the writer of these notes and his companions dined many a time; we even learned to like it and to become quite epicurean connoisseurs in all the qualities, titbits, and dishes of the well-beloved Neitsik! The skin," he continues, "forms the chief material of clothing in North Greenland. All of the *οἱ πολλοὶ* dress in Neitsik breeches and jumpers; and we sojourners from a far country soon encased ourselves in the somewhat *hispid* but most comfortable nether garments. It is only high dignitaries like 'Herr Inspektor' that can afford such extravagance as a Kassigiak (*Callocephalus vitulinus*) wardrobe! The arctic *belles* monopolize them all." Rink states that the number annually captured in South Greenland has been calculated at 51,000. Capt. J. C. Ross

[1] Respecting the southern limit of the habitat of this species in Europe, Professor Flower has the following: "Nilsson speaks of it as being found on all the Scandinavian coasts, and as having been met with as far south as the Channel, on the strength of specimens in the Paris Museum from that locality; but he was unable to find any proofs of its having been met with on the coast of England. Nor have I been able to discover any positive evidence that it can, at the present day, be reckoned a British species, although there is little doubt that it must occasionally visit our shores, where its occurrence would be easily overlooked."—Proc. Zoöl. Soc. Lond., 1871, p. 150.

Collett, contrary to the testimony of Nilsson, excludes it from the mammalian fauna of Norway, and states that he does not know of an authentic instance of its capture on the Norwegian coast.—Bemærkninger til Norges Pattedyrfauna, 1876, p. 57, foot-note 2.

[2] In Allen's Pinnipeds, *l. c.*, is a long and interesting account of their habits, from the pen of Ludwig Kumlien.

states that the Esquimaux wholly depend upon it for their winter food, and von Schrenck alludes to the great importance of this animal to the natives of Amoor Land.

26. THE RIBBON SEAL.

GENERAL HISTORY.—The first account of the present species was published by Pennant, under the name "Rubbon Seal," in the first quarto edition of his "History of Quadrupeds," in 1781 (vol. ii, p. 523).

GEOGRAPHICAL DISTRIBUTION.—According to Pallas, the present species, *Histriophoca fasciata* (Zimm.) Gill, occurs around the Kurile Islands and in the Ochotsk Sea. Von Schrenck states that Hr. Wosnessenski obtained specimens that were killed on the eastern coast of Kamtchatka, and that he himself saw skins of examples killed on the southern coast of the Ochotsk Sea, where, however, the species seems to be of rare occurrence. He further states that it occurs also in the Gulf of Tartary, between the island of Saghalien and the mainland, but apparently not to the southward of that island, the southern point of which (in latitude 46° N.) he believes to be the southern limit of its distribution. Mr. Dall secured specimens taken at Cape Romanzoff.[1] Captain Scammon states, "It is found upon the coast of Alaska, bordering on Bering Sea, and the natives of Ounalaska recognize it as an occasional visitor to the Aleutian Islands. . . . The Russian traders who formerly visited Cape Romanzoff, from Saint Michael's, Norton Sound, frequently brought back the skins of the male *Histriophoca*, which were used for covering trunks and for other ornamental purposes." This writer also states that he "observed a herd of Seals upon the beaches at Point Reyes, California," in April, 1852, which, "without close examination, answered to the description given by Gill" of the present species. Probably, however, a "close examination" would have shown them to be different, as no examples are yet known from the Californian coast, and the locality is far beyond the probable limits of the habitat. Its known range may, therefore, be given as Bering's Sea southward—on the American coast to the Aleutian Islands, and on the Asiatic coast to the island of Saghalien.

HABITS.—Almost nothing appears to have been as yet recorded respecting the habits of the Ribbon Seal. Von Schrenck gives us no information of importance, and we search equally in vain for information elsewhere. All of the four specimens obtained by Wosnessenski were taken on the eastern coast of Kamtchatka, at the mouth of the Kamtchatka River, about the end of March. According to the report of hunters, it very rarely appears at this locality so early in the season, being not often met with there before the early part of May. The natives use its skins, in common with those of other species, for covering their snow-shoes.

27. THE WEST INDIAN SEAL.

GEOGRAPHICAL DISTRIBUTION.—Respecting the present geographical distribution of the West Indian Seal, *Monachus tropicalis* Gray, I am indebted for valuable information to Mr. R. W. Kemp, who, under date of "Key West, Fla., April 29, 1878," wrote me as follows: "Some two or three years ago there were two seen near Cape Florida. It was supposed that they had strayed from some of the Bahama Islands, as there are some few to be found in that vicinity. I am informed by reliable parties that Seals are to be found in great numbers at the Anina Islands, situated between the Isle of Pines and Yucatan. One of my informants says that as he was sailing about the islands fishing and wrecking, he and his party discovered a number of Seals on one of them, and went on shore to kill some, merely 'for fun.' On nearing the shore the Seals got into

[1] The National Museum possesses four fine specimens, two obtained by Mr. Dall, in 1880, and two by Mr. E. W. Nelson, as well as several large pouches, each made of an entire skin of this species by the Eskimos.

the water. They then hid themselves in the shrubbery along the beach, and in about ten or fifteen minutes the Seals came on the beach again. The men, armed with axes, sprang upon them, the Seals trying to get into the water again. Two of them were killed, and another one, as one of the men came up to him, turned around and barked furiously at him, which frightened the poor man so badly (he having never seen one before, and knowing nothing of their habits) that he almost fainted. The Seals are said to be very easily killed or captured alive. They yield a great deal of oil. The skins are very large, but not easy to cure, on account of their fatty substance." In a later letter he refers to their great rarity on the Florida coast, where he says they occur "only once or twice in a life-time," but alludes to their comparative abundance on the coast of Yucatan, and their occasional occurrence at the Bahama Islands.

Mr. L. F. de Pourtalès also informs me that there is a rock on Salt Key Bank, near the Bahamas, called "Dog Rock," presumably from its having been formerly frequented by the Seals. Also, that his pilot, in 1868–'69, told him he had himself killed Seals among the rocky islets of Salt Key Bank.

I learn from Dr. S. W. Garman, who accompanied Mr. Agassiz during his dredging expedition in the Caribbean Sea, in the United States Coast Survey steamer "Blake," during the winter of 1877–'78, that the Seal of those waters is well known to the wreckers and turtle-hunters of that region, and that they often kill it for its oil. He also informs me that these animals had also been frequently seen and killed by one of the officers of the "Blake," especially about the Isle of Pines, south of Cuba, and at the Alacranes, where, as already noted, they occurred in such abundance at the time of Dampier's visit in 1676 as to be extensively hunted for their oil. They are also known to the whalers who visit these waters.

The specimens described by Messrs. Hill and Gosse were taken at the Pedro Kays, off the southern coast of Jamaica, where thirty years ago they appear to have occurred in considerable numbers.

On a "Chart of the Environs of Jamaica," published in 1774,[1] as well as on later maps of this region, are indicated some islets off the Mosquito coast, in about latitude 12° 40′, which bear the name "Seal Kays," doubtless in reference to the presence there of these animals.

It therefore appears that the habitat of the West Indian Seal extends from the northern coast of Yucatan northward to the southern point of Florida, eastward to the Bahamas and Jamaica, and southward along the Central American coast to about latitude 12°. Although known to have been once abundant at some of these localities, it appears to have now well nigh reached extinction, and is doubtless to be found at only a few of the least frequented islets in various portions of the area above indicated. Being still well known to many of the wreckers and turtle-hunters, it seems strange that it should have so long remained almost unknown to naturalists. The only specimen extant in any museum seems to be the imperfect skin transmitted by Mr. Gosse to the British Museum thirty years ago. Consequently, respecting none of the Pinnipeds, at least of the northern hemisphere, is information still so desirable.

28. THE HOODED SEAL.

GEOGRAPHICAL DISTRIBUTION AND MIGRATIONS.—The Hooded or Crested Seal, *Cystophora cristata* (Erxl.) Nilss., is restricted to the colder parts of the North Atlantic and to portions of the Arctic Sea. It ranges from Greenland eastward to Spitzbergen and along the arctic coast of Europe, but is rarely found south of Southern Norway and Newfoundland. As is the case with

[1] History of Jamaica, vol. i, facing title-page. The work is anonymous, but the authorship is attributed to Edward Long.

other pelagic species, stragglers are sometimes met with far to the southward of the usual range of the species. On the North American coast it appears to be of uncommon occurrence south of the point already mentioned, as it is said by Gilpin[1] to be "a rare visitor to the shores of Nova Scotia." Like the Harp Seal, it appears also to be regularly migratory, but owing to its much smaller numbers and less commercial importance, its movments are not so well known. Carroll states that it visits the coast of Newfoundland at the same time as the Harp Seal, or about the 25th of February, the time, however, varying with the state of the weather. He further states that Hooded Seals always keep to the eastward of the Harp Seals, amongst the heavy ice; also that they are quite numerous in spring in the Gulf of Saint Lawrence, where "many of them are killed by persons who reside on Saint Paul's Island."[2] Dr. Packard states that it "is not uncommonly, during the spring, killed in considerable numbers by the sealers" along the coast of Labrador.[3] Rink says, "It is only occasionally found along the greater part of the coast [of Greenland], but visits the very limited tract between 60° and 61° N. lat., in great numbers, most probably in coming from and returning to the east side of Greenland. The first time it visits us is from about May 20 till the end of June, during which it yields a very lucrative catch."[4] Robert Brown observes, "With regard to the favorite localities of this species of Seal, Cranz and the much more accurate Fabricius disagree—the former affirming that they are found mostly on great ice islands where they sleep in an unguarded manner, while the latter states that they delight in the high seas, visiting the land in April, May, and June. This appears contradictory and confusing; but in reality both authors are right, though not in an exclusive sense." Again he says: "This Seal is not common anywhere. On the shores of Greenland it is chiefly found beside large fields of ice, and comes to the coast, as was remarked by Fabricius long ago, at certain times of the year. They are chiefly found in South Greenland, though it is erroneous to say that they are exclusively confined to that section. I have seen them not uncommonly about Disco Bay, and have killed them in Melville Bay, in the most northerly portion of Baffin's Bay. They are principally killed in the district of Julianshaab, and then almost solely in the most southern part, on the outermost islands, from about the 20th of May to the last of June; but in this short time they supply a great portion of the food of the natives and form a third of the colony's yearly production. In the beginning of July the Klapmyds leaves, but returns in August, when it is much emaciated. Then begins what the Danes in Greenland call the magre Klapmydse fangst, or the 'lean-Klapmyds-catching,' which lasts from three to four weeks. Very seldom is a Klapmyds to be got at other places, and especially at other times. The natives call a Klapmyds found single up a fjord by the name of Nerimartout, the meaning of which is 'gone after food.' They regularly frequent some small islands not far from Julianshaab, where a good number are caught. After this they go farther north, but are lost sight of, and it is not known where they go to (Rink, *l. c.*). Those seen in North Greenland are mere stragglers, wandering from the herd, and are not a continuation of the migrating flocks. Johannes (a very knowing man of Jakobshavn) informed me that generally about the 12th of July a few are killed in Jakobshavn Bay (lat. 69° 13′ N.). It is more pelagic in its habits than the other Seals, with the exception of the Saddleback."[5]

I conclude the account of the geographical distribution of the Hooded Seal in Baffin's Bay with the following from Mr. Kumlien's account:

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[1] Proceedings and Transactions Nova Scotian Institute of Natural Sciences, vol. iii, pt. 4, p. 884.
[2] Seal and Herring Fisheries of Newfoundland, pp. 13, 14.
[3] Proc. Best Soc. Nat. Hist., vol. x, p. 271.
[4] Danish Greenland, etc., 1877, p. 126.
[5] Proc. Zoöl. Soc. Lond., 1868, pp. 436, 437; Man. Nat. Hist., etc., Greenland, Mam., pp. 65, 66.

"The Bladder-nose appears to be very rare in the upper Cumberland waters. One specimen was procured at Annanactook in autumn, the only one I saw. The Eskimo had no name for it, and said they had not seen it before. I afterward learned that they are occasionally taken about the Kikkerton Islands in spring and autumn. I found their remains in the old kitchenmiddens at Kingwah. A good many individuals were noticed among the pack-ice in Davis's Straits in July."[1]

On the European coast this species is said to be of not very common occurrence on the northern coast of Norway, but more to the southward only stragglers appear to have been met with.[2] In March and April, according to Malmgren, they are seen about Jan Mayen, and they are said to occur on the coast of Finmark, and at the mouth of the White Sea. Von Baer[3] and Schultz also state that it is rarely found not only in the White Sea, but along the Timanschen and Mourman coasts. Von Heuglin says it appears to be found in the Spitzbergen waters only on the western coast of these islands,[4] and states that it is not known to occur at Nova Zembla. He gives its principal range as lying more to the westward, around Iceland and Greenland.

It thus appears that the range of the Crested Seal is restricted mainly to the arctic waters of the North Atlantic, from Spitzbergen westward to Greenland and Baffin's Bay, and thence southward to Newfoundland. Stragglers have been captured, however, far to the southward of these limits, on both sides of the Atlantic. Thus Gray observes:

"A young specimen has been taken in the river Orwell; at the mouth of the Thames; and at the Island of Oleron, west coast of France, but I greatly doubt if it had not escaped from some ship coming from North America; there is no doubt of the determination of the species. The one caught on the River Orwell, 29th June, 1847, is in the Museum of Ipswich, and was described by Mr. W. B. Clarke, on the 14th August, 1847, in 4to, with a figure of the Seal and skull. The one taken on the Isle d'Oleron is in the Paris Museum, and is figured, with the skull, in Gervais, Zool. et Paléont. Franç., t. 42, and is called *Phoca Isidorei*, by Lesson, in the Rev. Zool., 1843, 256. The young is very like that of *Pagophilus grœnlandicus*, but is immediately known from it by being hairy between the nostrils, and by the grinders being only plated and not lobed on the surface."[5]

Its capture has occurred a few times on the coast of the United States, as far from its usual range even as on the European coast. A large Seal is occasionally seen on the coast of Massachusetts, which has been supposed to be the Crested Seal, but just what this large Seal is remains still to be determined.[6] DeKay, in 1824, recorded[7] the capture of a male example of this species

[1] Bulletin of the United States National Museum, No. 15, 1879, p. 64.

[2] Says Blasius, writing in 1857, "An den südlichen Küstenländern der Nordsee hat man sie bis jetzt noch nicht gesehen."—Naturgesch. der Säugeth. Deutschlands, p. 260.

[3] *Bull. Acad. Imp. des Sci. de St. Pétersb., iii, 1838, p. 350.*

[4] Malmgren, writing some years earlier, says that in recent times it has not been observed with certainty at Spitzbergen, though reported as occurring there by Martens and Scoresby. Possibly, he says, during its summer wanderings it may extend to the latitude of Spitzbergen. During Torell's first journey to Spitzbergen a young individual was killed in the vicinity of Bear Island. He says it is only exceptionally taken by the seal-hunters about Jan Mayen, only a comparatively small number being captured.—Arch. für Naturgesch., 1864, p. 72.

[5] GRAY, J. E., in Zoölogist, 2d ser., vol. vii, 1872, p. 3338.

[6] In my "Catalogue of the Mammals of Massachusetts," I refer to this large Seal as follows, supposing it to be the Hooded Seal: "From accounts I have received from residents along the coast of a Seal of very large size observed by them, and occasionally captured, I am led to think this species is not of unfrequent occurrence on the Massachusetts coast. Mr. C. W. Bennett informs me of one taken some years since in the Providence River, a few miles below Providence, which he saw shortly after. From his very particular account of it I cannot doubt that it was of this species. Mr. C. J. Maynard also informs me that a number of specimens have been taken at Ipswich within the past few years, that have weighed from seven hundred to nine hundred pounds. It seems to be most frequent in winter, when it apparently migrates from the north."—Bull. Mus. Comp. Zoöl., vol. i, No. 8, 1869, pp. 193, 194. This identification was made almost solely on the ground of size, taken in connection with the fact that the species had been taken in Long Island Sound near New York City. The question, however, may fairly be raised whether the large Seals more or less frequently seen on the coast of New England are not really the Gray Seal (*Halichœrus grypus*).

[7] Ann. New York Lyceum Nat. Sci., vol. i, 1824, p. 94.

in a small creek that empties into Long Island Sound at East Chester, about fifteen miles from New York City. Twenty years[1] later he refers to this as the first and only known instance of its occurrence within the limits of the State of New York, where, he says, "it can only be regarded as a rare and accidental visitor." Professor Cope, however, has recorded its capture in the Chesapeake Bay, where he says it has twice occurred.[2] The first specimen was recorded in 1865[3] as "some species of *Cystophora*, taken near Cambridge, Maryland, on an arm of the Chesapeake Bay, eighteen miles from salt water, by Mr. Daniel M. Henry." The specimen, it is said, "measured 6½ feet, and weighed, when living, about 330 lbs." Although Professor Cope adds, "Whether this species is the *C. cristata* or *antillarum*, cannot be determined, owing to the imperfection of extant descriptions," there is no reason for doubting that it was really the Crested Seal, a conclusion to which Professor Cope seems to have later arrived. Although Gray's suggestion about the English specimen naturally arises, namely, transportation from the north in some ship, it seems more probable that they were really wanderers from the usual home of the species.

HABITS.—As already noted in the account of the geographical distribution of this species, it is, like the Harp Seal, pelagic and migratory, preferring the drift ice of the "high seas" to the vicinity of land, and seems rarely if ever to resort to rocky islands or shores. It brings forth its young on the ice, remote from the land, in March, a week or ten days later than the Harp Seal, with which it appears only rarely to associate, although the two species are often found on neighboring ice-floes. It is commonly described as the most courageous and combative of the Phocids, often turning fiercely upon its pursuers.

The Hooded Seal is described as very active when in the water. It swims very low, with only the top of the head above the surface. During the rutting season the males wage fierce battles for the possession of the females, the noise of which may be heard miles away. At times the sexes are said to live apart, but associate in families during the breeding season. Their affection for each other, and especially for their young, is represented as very strong, both parents remaining by them with such persistency that the whole family are easily killed.

FOOD.—The food of this species doubtless consists chiefly of fishes of different species. Malmgren supposed it to subsist mainly on those of large size. That it also feeds upon squids, and probably on other molluska, is evinced by their remains having been found in their stomachs, as well as "the beaks of large cuttle-fish."[4]

HUNTING AND PRODUCTS.—This species, owing to its scarcity, is of relatively small commercial importance, yet many are taken every year by the Newfoundland and Jan Mayen sealers; generally no separate estimates, however, are given of the number taken. Dr. Rink states that the average annual catch in Greenland is 3,000. The flesh is greatly esteemed by the Greenlanders.

The Hooded Seal is usually taken on the ice, but Mr. Reeks states that many are also shot in the spring of the year by the settlers along the coast of Newfoundland. As already stated, the hood of the male affords such a protection to its owner as to render the animal so provided very hard to kill with the ordinary seal-club, or even with a heavy load of shot; and they are, furthermore, "at times very savage, and it requires great dexterity on the part of the seal-hunters to keep from being bitten."

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[1] New York Zoölogy, or the Fauna of New York, 1842, pt. i, p. 56.
[2] New Topographical Atlas of Maryland, 1873, p. 16.
[3] Proceedings of the Academy of Natural Sciences, Philadelphia, 1865, p. 273.
[4] JUKES: Excursions in Newfoundland, vol. i, p. 312.

29. THE CALIFORNIAN SEA ELEPHANT.

GENERAL HISTORY.—The California Sea Elephant, *Macrorhinus angustirostris* Gill, was first described by Dr. Gill, in 1866, from a skull of a female in the Museum of the Smithsonian Institution, received from Saint Bartholomew's Bay, Lower California. Its external characters were first made known by Capt. C. M. Scammon in 1869, and the species was redescribed by him in 1874, with detailed measurements of two adult females and a newly-born pup. This is all that has thus far appeared relating to its technical history. Captain Scammon, as early as 1854, gave some account of the habits of this species, under the name Sea Elephant, and earlier incidental references to it doubtless occur in the narratives of travelers. Dr. Gill observes, in his paper already cited, "For a long time, the fact that a species of the genus *Macrorhinus* or Elephant Seal inhabits the coast of Western North America has been well known. But, on account of the want of opportunity for comparison of specimens, the relations of the species have not been understood." I fail to find, however, in any technical account of the Sea Elephant, any previous notice of their occurrence on the coast of North America.

GEOGRAPHICAL DISTRIBUTION.—The Sea Elephant seems to have been formerly very abundant on the coast of California and Western Mexico, whence it became long since nearly extirpated. Captain Scammon, in writing (about 1852) of Cedros Island, off the coast of Lower California, says: "Seals and Sea Elephants once basked upon the shores of this isolated spot in vast numbers, and in years past its surrounding shores teemed with sealers, sea-elephant and sea-otter hunters; the remains of their rude stone houses are still to be seen in many convenient places, which were once the habitations of these hardy men."[1] A few Sea Elephants are still found at Santa Barbara Island, where they are reported, however, to be nearly extinct. Whether or not they still occur elsewhere along the Californian coast I am without means of determining, although it is probable that a small remnant still exists at other points, where scarcely more than a quarter of a century ago vessels were freighted with their oil. Neither is it possible to determine with certainty the limits of their former range. Captain Scammon, who doubtless obtained his information from trustworthy sources, states that it extended from Cape Lazaro, latitude 24° 46′ north, to Point Reyes, in latitude 38°, or for a distance of about two hundred miles. As has heretofore been stated, Dampier, in 1686, met with Seals on the islands off the western coast of Mexico, as far south as latitude 21° to 23°, but of what species his record unfortunately fails to show. They were doubtless either Sea Elephants or Sea Lions (*Zalophus californianus*), and may have included both. This rather implies its former extension, two hundred years ago, considerably to the southward of the limit assigned by Captain Scammon, on probably traditional reports current among the residents of this part of the coast at the time of his visit there in 1852.

"The sexes vary much in size, the male being frequently triple the bulk of the female; the oldest of the former will average fourteen to sixteen feet; the largest we have ever seen measured twenty-two feet from tip to tip." "The adult females average ten feet in length between extremities."—*Scammon.* "Round the under side of the neck, in the oldest males, the animal appears to undergo a change with age; the hair falls off, the skin thickens and becomes wrinkled—the furrows crossing each other, producing a checkered surface—and sometimes the throat is more or less marked with white spots. Its proboscis extends from opposite the angle of the mouth forward (in the larger males) about fifteen inches, when the creature is in a state of quietude, and the upper surface appears ridgy; but when the animal makes an excited respiration, the trunk becomes elongated, and the ridges nearly disappear." The females "are destitute of the proboscis, the nose being like that of the common Seal, but projecting more over the mouth."—*Scammon.*

Captain Scammon gives the length of a "new-born pup" as four feet.

HABITS.—We are indebted to Captain Scammon, who has fortunately had favorable opportunities for observation, for everything of importance that has thus far been recorded respecting the habits of the Sea Elephant of California. "The habits of these huge beasts," he tells us,[1] "when on shore, or loitering about the foaming breakers, are in many respects like those of the Leopard Seals [*Phoca vitulina*]. Our observations on the Sea Elephants of California go to show that they have been found in much larger numbers from February to June than during other months of the year; but more or less were at all times found on shore upon their favorite beaches, which were about the islands of Santa Barbara, Cerros, Guadalupe, San Bonitos, Natividad, San Roque, and Asuncion, and some of the most inaccessible points on the mainland between Asuncion and Cerros. When coming up out of the water, they were generally first seen near the line of surf; then crawling up by degrees, frequently reclining as if to sleep; again moving up or along the shore, appearing not content with their last resting place. In this manner they would ascend the ravines, or 'low-downs,' half a mile or more, congregating by hundreds. They are not so active on land as the Seals; but, when excited to inordinate exertion, their motions are quick—the whole body quivering with their crawling, semi-vaulting gait, and the animal at such times manifesting great fatigue. Notwithstanding their unwieldiness, we have sometimes found them on broken and elevated ground, fifty or sixty feet above the sea.

"The principal seasons of their coming on shore are, when they are about to shed their coats, when the females bring forth their young (which is one at a time, rarely two), and the mating season. These seasons for 'hauling up' are more marked in southern latitudes. The different periods are known among the hunters as the 'pupping cow,' 'brown cow,' 'bull and cow,' and 'March bull' seasons;[2] but on the California coast, either from the influence of climate or some other cause, we have noticed young pups with their mothers at quite the opposite months. The continual hunting of the animals may possibly have driven them to irregularities. The time of gestation is supposed to be about three-fourths of the year. The most marked season we could discover was that of the adult males, which shed their coats later than the younger ones and the females. Still, among a herd of the largest of those fully matured (at Santa Barbara Island, in June, 1852), we found several cows and their young, the latter apparently but a few days old.

"When the Sea Elephants come on shore for the purpose of 'shedding,' if not disturbed they remain out of water until the old hair falls off. By the time this change comes about, the animal is supposed to lose half its fat; indeed, it sometimes becomes very thin, and is then called a 'slimskin.'

"In the stomach of the Sea Elephant a few pebbles are found, which has given rise to the saying that 'they take in ballast before going down' (returning to the sea). On warm and sunny days we have watched them come up singly on smooth beaches, and burrow in the dry sand, throwing over their backs the loose particles that collect about their fore limbs, and nearly covering themselves from view; but when not disturbed, the animals follow their gregarious propensity, and collect in large herds." "The largest number I ever found in one herd," he states in another connection, "was one hundred and sixty-five, which lay promiscuously along the beach or up the ravine near by."

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[1] Marine Mammals, 1874, pp. 117–119. See also Proc. Acad. Nat. Sci. Phila., 1869, pp. 63–65, where the account here quoted was first published. See further J. Ross Browne's "Resources of the Pacific Coast" [Append.], p. 129, where the same author has also given a short account of its habits as observed at Cedros (or Cerros) Island in 1852. Also an article entitled "Sea-elephant Hunting," in the "Overland Monthly," iii, pp. 112–117, Nov., 1870.

[2] Referring to the habits of the Southern Sea Elephant (*Macrorhinus leoninus*), as he had "learned from shipmasters who have taken Seals about Kerguelen's Land, the Crozets, and Hurd's Island." See Proc. Acad. Nat. Sci. Phila., 1869, p. 64.

Nothing further respecting the breeding habits or sexual relations of the species appears to have been as yet recorded, but they may be presumed to be similar to those of the Sea Elephant of the Antarctic Seas.[1]

COMPARISON WITH THE SOUTHERN SEA ELEPHANT.—So far as can be determined by descriptions, the Northern and the Southern Sea Elephants[2] differ very little in size, color, or other external features. Captain Scammon gives the average length of the full-grown male of the northern species as twelve to fourteen feet, and says that the largest he ever measured had a length of twenty-two feet "from tip to tip." Péron gives the length of the southern species as twenty to twenty-five, and even thirty feet, with a circumference of fifteen to eighteen feet. Anson gives the length as twelve to twenty feet, and the circumference as eight to fifteen feet. Pernety records the total length as twenty-five feet. Scammon gives the length of the young of the northern species, at birth, as four feet; and Péron gives four or five feet as the length of the young at birth for the southern species. The skeletons of the two old males of the southern species, already mentioned, allowing for the intervertebral cartilages that have disappeared in maceration, measure respectively not over fifteen and sixteen feet, adding to which the length of the hind flipper and the proboscis gives a total length, from "tip to tip," of about twenty-one to twenty-two feet. From the foregoing we may infer that the usual difference in size between the two species is not great, the southern species on the whole appearing to be somewhat the larger of the two. It would seem that the Northern and Southern Sea Elephants, though presumably distinct, are closely allied, as well in structural characters as in habits. In respect to geographical distribution, I am not aware that the southern species has been found north of about the 35th degree of south latitude (the Island of Juan Fernandez), or the northern species south of about the 24th degree of north latitude. It may consequently be safely assumed that the two forms have been long isolated, and that the southern is an offshoot from northern stock, since the only other known species of the *Cystophorinæ* is also northern in its distribution.

[1] It is here assumed that the Sea Elephants of the Southern Hemisphere are all referable to a single species, the *Phoca leonina* of Linné, 1758, based on the Sea Lion of Lord Anson, which was renamed *Phoca elephantina* by Molina, 1782, and again renamed *Phoca proboscidea* by Péron, in 1816, and of which *Phoca Byroni* of Desmarest, and also *Phoca Ansoni* of the same author (the latter species in part only), and the *Mirounga patagonica* of Gray are synonyms. I am aware, however, that Peters has recently proposed the recognition of four species, namely, *Cystophora leonina* (= Anson's Sea Lion), *C. falklandica* (= Pernety's Sea Lion), *C. proboscidea* (*ex* Péron), and *C. kerguelensis* (the Sea Elephant of Kerguelen Island). He seems not, however, to have arrived at this course by an examination of an extensive suite of specimens from various localities, as he refers in this connection to only a single old male example from Kerguelen Island. He seems to have been influenced merely by the varying statements in respect to size and some other features given by Pernety, Anson, and Péron. His entire presentation of the case is as follows: "Pernety gibt von seinem Seelöwen eine lange Mähne, eine Totallänge von 25 Fuss und einem Durchmesser der Basis der Eckzähne von 3 Zoll an. Pérons See-Elephanten sollen bis 30 Fuss lang und von blaugrauer Farbe sein. Vielleicht sind alle diese Arten verschieden und es würde dann der Name *C. leonina* L. bloss dem Anson'schen Seelöwen zu belassen sein, während die *C. falklandica*, wie man die von Pernety benennen könnte, die *C. proboscidea* Péron, die *C. angustirostris* Gill der nördlichen Hemisphäre und die von Kerguelenland besonderen Arten angehören würden. Für den letzteren Fall schlage ich vor, diese Art *kerguelensis* zu benennen." (*Monatsb. d. K. P. Akad. Wissensch. zu Berlin 1875, p. 394, foot-note*).

[2] The Sea Elephants appear to be exceptional among the *Phocidæ* in the great disparity of size between the sexes, in which, as well as in their breeding habits, they closely resemble the Otaries. Although, unlike the latter, they have not the power of using the hind limbs in locomotion on land, and are hence unable to walk, they manage to crawl to a considerable distance from the sea—according to Scammon, a "half a mile or more." The habits of the Southern Sea Elephant (*Macrorhinus leoninus*) were long since described by Anson and Pernety, and later by Péron, but their accounts seem in some respects to be tinged with romance. According to these writers the males fight desperately for the possession of the females.

C.—THE HABITS OF THE FUR SEAL.

By HENRY W. ELLIOTT.

30. LIFE-HISTORY OF THE FUR SEAL.

DESCRIPTION OF AN ADULT MALE.—The Fur Seal, which repairs every year to the Pribylov Islands to breed and to shed its hair and fur, in numbers that seem almost fabulous, is the highest organized of all the *Pinnipedia*, and, indeed, for that matter, when land and water are weighed in the account together, there is no other animal known to man which can be truly, as it is, classed superior, from a purely physical point of view. Certainly there are few, if any, creatures in the animal kingdom that can be said to exhibit a higher order of instinct, approaching even our intelligence.

I wish to draw attention to a specimen of the finest of this race—a male in the flush and prime of his first maturity, six or seven years old, and full grown. When it comes up from the sea early in the spring, out to its station for the breeding season, we have an animal before us that will measure six and a half to seven and a quarter feet in length from tip of nose to the end of its abbreviated, abortive tail. It will weigh at least 400 pounds, and I have seen older specimens much more corpulent, which, in my best judgment, could not be less than 600 pounds in weight. The head of this animal now before us, appears to be disproportionately small in comparison with the immense thick neck and shoulders; but as we come to examine it we will find it is mostly all occupied by the brain. The light frame-work of the skull supports an expressive pair of large bluish hazel eyes; alternately burning with revengeful, passionate light, then suddenly changing to the tones of tenderness and good nature. It has a muzzle and jaws of about the same size and form observed in any full-blooded Newfoundland dog, with this difference, that the lips are not flabby and overhanging; they are as firmly lined and pressed against one another as our own. The upper lips support a yellowish white and gray moustache, composed of long, stiff bristles, and when it is not torn out and broken off in combat, it sweeps down and over the shoulders as a luxuriant plume. Look at it as it comes leisurely swimming on toward the land; see how high above the water it carries its head, and how deliberately it surveys the beach, after having stepped upon it (for it may be truly said to step with its fore-flippers, as they regularly alternate when it moves up), carrying the head well above them, erect and graceful, at least three feet from the ground. The fore-feet, or flippers, are a pair of dark bluish-black hands, about eight or ten inches broad at their junction with the body, and the metacarpal joint, running out to an ovate point at their extremity, some fifteen to eighteen inches from this union; all the rest of the forearm, the ulna, radius, and humerus being concealed under the skin and thick blubber-folds of the main body and neck, hidden entirely at this season, when it is so fat. But six weeks to three months after this time of landing, when that superfluous fat and flesh has been consumed by self-absorption, those bones show plainly under the shrunken skin. On the upper side of these flippers the hair of the body straggles down finer and fainter as it comes below to a point close by, and slightly beyond that spot of junction where the phalanges and the metacarpal bones unite, similar to that point on our own hand where our knuckles are placed; and here the hair ends, leaving the rest of the skin to the end of the flipper bare and wrinkled in places at the margin of the inner side; showing, also, fine small pits, containing abortive nails, which are situated immediately over the union of the phalanges with their cartilaginous continuations to the end of the flipper.

On the other side of the flipper the skin is entirely bare, from its outer extremity up to the body connection; it is sensibly tougher and thicker than elsewhere on the body; it is deeply and regularly wrinkled with seams and furrows, which cross one another so as to leave a kind of sharp diamond-cut pattern. When they are placed by the animal upon the smoothest rocks, shining and slippery from algoid growths and the sea-polish of restless waters, they seldom fail to adhere.

When we observe this Seal moving out on the land, we notice that, though it handles its fore-feet in a most creditable manner, it brings up its rear in quite a different style; for, after every second step ahead with the anterior limbs, it will arch its spine, and in arching, it drags and lifts up, and together forward, the hind-feet, to a fit position under its body, giving it in this manner fresh leverage for another movement forward by the fore-feet, in which the spine is again straightened out, and then a fresh hitch is taken upon the posteriors once more, and so on as the Seal progresses. This is the leisurely and natural movement on land, when not disturbed, the body all the time being carried clear of and never touching the ground. But if the creature is frightened, this method of progression is radically changed. It launches into a lope, and actually gallops so fast that the best powers of a man in running are taxed to head it off. Still, it must be remembered that it cannot run far before it sinks trembling, gasping, breathless, to the earth; thirty or forty yards of such speed marks the utmost limit of its endurance.

The radical difference in the form and action of the hind-feet cannot fail to strike the eye at once; they are one-seventh longer than the fore-hands, and very much lighter and more slender; they resemble, in broad terms, a pair of black kid gloves, flattened out and shriveled, as they lie in their box.

There is no suggestion of fingers on the fore-hands; but the hind-feet seem to be toes run into ribbons, for they literally flap about involuntarily from that point where the cartilaginous processes unite with the phalangeal bones. The hind-feet are also merged in the body at their junction with it, like those anterior; nothing can be seen of the leg above the tarsal joint.

The shape of the hind-flipper is strikingly like that of a human foot, provided the latter were drawn out to a length of twenty or twenty-two inches, the instep flattened down, and the toes run out into thin, membraneous, oval-tipped points, only skin-thick, leaving three strong, cylindrical, grayish, horn-colored nails, half an inch long each, back six inches from these skinny toe-ends, without any sign of nails to mention on the outer big and little toes.

On the upper side of this hind-foot the body-hair comes down to that point where the metatarsus and phalangeal bones join and fade out. From this junction the phalanges, about six inches down to the nails above mentioned, are entirely bare, and stand ribbed up in bold relief on the membrane which unites them as the web to a duck's foot; the nails just referred to mark the ends of the phalangeal bones, and their union in turn with the cartilaginous processes, which run rapidly tapering and flattening out to the ends of the thin toe-points. Now, as we are looking at this Fur Seal's motion and progression, that which seems most odd, is the gingerly manner (if I may be allowed to use the expression) in which it carries these hind-flippers; they are held out at right angles from the body directly opposite the pelvis, the toe-ends or flaps slightly waving, curled, and drooping over, supported daintily, as it were, above the earth, the animal only suffering its weight behind to fall upon its heels, which are themselves opposed to each other, scarcely five inches apart.

We shall, as we see this Seal again later in the season, have to notice a different mode of progression and bearing both when it is lording over its harem, or when it grows shy and restless at the end of the breeding season, then faint, emaciated, dejected; but we will now proceed to observe him in the order of his arrival and that of his family. His behavior during the long period of fasting and unceasing activity and vigilance, and other cares which devolve upon him as the most

eminent of all polygamists in the brute world, I shall carefully relate; and to fully comprehend the method of this exceedingly interesting animal, it will be frequently necessary for the reader to refer to my sketch-maps of its breeding-grounds or rookeries, and the islands.

ARRIVAL AT THE SEAL GROUNDS: COMING IN OF THE BULLS.—The adult males are the first examples of the *Callorhinus* to arrive in the spring on the seal ground, which has been deserted by all of them since the close of the preceding year.

Between the 1st and 5th of May, usually, a few males will be found scattered over the rookeries, pretty close to the water. They are at this time quite shy and sensitive, seeming not yet satisfied with the land; and a great many spend day after day idly swimming out among the breakers, a little distance from the shore, before they come to it, perhaps somewhat reluctant at first to enter upon the assiduous duties and the grave responsibilities before them in fighting for and maintaining their positions in the rookeries.

The first arrivals are not always the oldest bulls, but may be said to be the finest and most ambitious of their class. They are full grown and able to hold their places on the rookeries of the breeding-flats, which they immediately take up after coming ashore. Their method of landing is to come collectively to those breeding-grounds where they passed the prior season; but I am not able to say authoritatively, nor do I believe it, strongly as it has been urged by many careful men who were with me on the islands, that these animals come back to and take up the same position on their breeding-grounds that they individually occupied when there last year. From my knowledge of their action and habit, and from what I have learned of the natives, I should say that very few, if any, of them make such a selection and keep these places year after year. Even did the Seal itself intend to come directly from the sea to that spot on the rookery which it left last summer, what could it do if it came to that rookery margin a little late and found that another "See-catch" had occupied its ground? The bull could do nothing. It would either have to die in its tracks, if it persisted in attaining this supposed objective point, or do what undoubtedly it does do—seek the next best locality which it can attain adjacent.

One old "See-catch" was pointed out to me at the "Gorbatch" section of the Reef Rookery as an animal that was long known to the natives as a regular visitor close by or on the same rock every season during the past three years. They called him "Old John," and they said they knew him because he had one of his posterior digits missing, bitten off, perhaps, in a combat. I saw him in 1872, and made careful drawings of him in order that I might recognize his individuality should he appear again in the following year, and when that time rolled by I found him not; he failed to reappear, and the natives acquiesced in his absence. Of course it was impossible to say that he was dead when there were ten thousand rousing, fighting bulls to the right, left, and below us, under our eyes, for we could not approach for inspection. Still, if these animals came each to a certain place in any general fashion, or as a rule, I think there would be no difficulty in recognizing the fact; the natives certainly would do so; as it is, they do not. I think it very likely, however, that the older bulls come back to the same common rookery-ground where they spent the previous season; but they are obliged to take up their position on it just as the circumstances attending their arrival will permit, such as finding other Seals which have arrived before them, or of being whipped out by stronger rivals from their old stands.

It is entertaining to note, in this connection, that the Russians themselves, with the object of testing this mooted query, during the later years of their possession of the islands, drove up a number of young males from Lukannon, cut off their ears, and turned them out to sea again. The following season, when the droves came in from the "hauling-grounds" to the slaughtering-fields, quite a number of those cropped Seals were in the drives, but instead of being found all at one

place—the place from whence they were driven the year before—they were scattered examples of croppies from every point on the island. The same experiment was again made by our people in 1870 (the natives having told them of this prior undertaking), and they went also to Lukannon, drove up 100 young males, cut off their left ears, and set them free in turn. Of this number, during the summer of 1872, when I was there, the natives found in their driving of 75,000 Seals from the different hauling-grounds of Saint Paul up to the village killing-grounds, two on Novostashnah Rookery, ten miles north of Lukannon, and two or three from English Bay and Tolstoi Rookeries, six miles west by water; one or two were taken on Saint George Island, thirty-six miles to the southeast, *and not one from Lukannon was found among those that were driven from there; probably, had* all the young males on the two islands this season been examined, the rest of the croppies that had *returned from the perils of the deep, whence they sojourned during the winter, would have been* distributed quite equally about the Pribylov hauling-grounds. Although the natives say that they think the cutting off of the animal's ear gives the water such access to its head as to cause its death, yet I noticed that those examples which we had recognized by this auricular mutilation were normally fat and well developed. Their theory does not appeal to my belief, and it certainly requires confirmation.

These experiments would tend to prove very cogently and conclusively, that when the Seals approach the islands in the spring, they have nothing in their minds but a general instinctive *appreciation of the fitness of the land, as a whole; and no special fondness or determination to elect* any one particular spot, not even the place of their birth. A study of my map of the distribution of the seal-life on Saint Paul, clearly indicates that the landing of the Seals on the respective rookeries is influenced greatly by the direction of the wind at the time of their approach to the islands in the spring and early summer. The prevailing airs, blowing, as they do at that season, from the north and northwest, carry far out to sea the odor of the old rookery flats, together with the fresh scent of the pioneer bulls which have located themselves on these breeding-grounds, three or four weeks in advance of their kind. The Seals come up from the great North Pacific, and hence it will be seen that the rookeries of the south and southeastern shores of Saint Paul Island receive nearly all the seal-life, although there are miles of perfectly eligible ground at Nahsayvernia, or north shore. To settle this matter beyond all argument, however, I know is an exceedingly difficult *task, for the identification of individuals, from one season to another, among the hundreds of* thousands, and even millions, that come under the eye on one of these great rookeries, is well nigh *impossible.*

AGE OF FEMALES WHEN FIRST PREGNANT.—As to the time when the virgin cow is first covered by the bull, I found a strange medley of ideas among the people on the island. The common opinion of the others and the natives was, that they were not covered until they were three years of age, bringing forth their first young in the former case, in the generally accepted version, when they reached their fourth year. But this, on examination, was not a difficult problem at all to solve. The evidence every year decides when the yearlings are driven up to the village in the fall, that although to external appearance there is no difference between the sexes, an examination conclusively established the fact, that the yearling females herded with the yearling males on the hauling-grounds, each about equal in number, and that when the balance of the "Holluschickie," two-year-olds and upward, were driven in they never found a female[1] in the droves. Where were these two-year-old females then? They were not upon the hauling-grounds with the yearling females and bachelors. Where were they? The answer is, they have come up on the breeding-grounds, clothed with desire and supplied with physical life to meet prospective maternity.

[1] *i. e., virile female.*

RELATIVE DURATION OF LIFE: REPRODUCTION IS TERRESTRIAL.—This fact also shows that, as the female Fur Seal is so conspicuously inferior to the male, physically viewed, as to size and weight, so also is her life lessened. In other words, when she is matured, as she must be by her third year, in bearing then her first pup, she can reasonably be expected to live no longer than nine or ten years, according to the general natural law governing this question; while the male, not coming to his maturity and physical prime until he is five or six years of age, lives, in obedience to the same law, fifteen or twenty years.

OLD AND YOUNG MALES FIGHTING.—The males under six years of age, although hovering about the sea margins of the breeding-grounds, do not engage in much fighting there; it is the six and seven year old males, ambitious and flushed with their reproductive consciousness, that swarm out and do battle with the older males of these places. The young male of this latter class is, however, no match for an old fifteen or twenty year old bull, provided that the aged "Seecatchie" retains his teeth; for, with these weapons, his relatively harder thews and sinews give him the advantage in almost every instance, among the hundreds of combats that I have witnessed. These trials of strength between the old and the young are incessant until the rookeries are mapped out; and by common consent the males of all classes recognize the coming of the females. After their arrival and settlement over the whole extent of the breeding-grounds, about the 15th July at the latest, very little fighting takes place.[1]

ONLY ONE PUP BORN AT TIME OF PARTURITION.—Touching the number of young born at a birth, the most diligent inquiry and scrutiny of observation on the rookeries have satisfied me that it is confined to a single pup. If they have twins, I have failed to discover a single instance of that character. I also failed to notice a malformed pup or a monster anywhere throughout the multitudes under my observation, from July until the middle of November every season. I think this somewhat noteworthy, as it presents, perhaps, better than any other exhibition in the animal

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[1] It has been suggested to me that the exquisite power of scent possessed by these animals enables them to reach the breeding-grounds at about the place where they left them the season previously; surely the nose of the Fur Seal is endowed to a superlative degree with those organs of smell, and its range of appreciation in this respect must be very great.

"In carnivorous quadrupeds the structure of the bones of the nasal cavities is more intricate than in the herbivorous, and is calculated to afford a far more extensive surface for the distribution of the nerve. In the Seal this conformation is most fully developed and the bony plates are here not turbinated, but ramified, as shown in the woodcut. Eight or more principal branches rise from the main trunk, and each of these is divided and subdivided to an extreme degree of minuteness, so as to form in all many hundred plates. The olfactory membrane, with all its nerves, is closely applied to every plate in this vast assemblage, as well as to the main trunk and to the internal surface of the surrounding cavity, so that its extent cannot be less than 120 square inches in each nostril. An organ of such exquisite sensibility requires an extraordinary provision for securing it against injury, and nature has supplied a mechanism for the purpose, enabling the animal to close at pleasure the orifice of the nostril."—HARWOOD: Comp. Anat. and Physiol., Bridgewater Treatise, vol. ii, p. 402.

I noticed in all sleeping and waking Seals that the nasal apertures were never widely expanded; and that they were at intervals rapidly opened and closed with inhalation and exhalation of each breath; the nostrils of the Fur Seal are, as a rule, well opened when the animal is out of water, and remain so while it is on land.

The distances at sea, away from the Pribylov Islands, in which Fur Seals are found during the breeding season, are very considerable; scattered records have been made of seeing large bands of them during August as far down the northwest coast as they probably range at any season of the year, viz, well out at sea in the latitude of Cape Flattery, 47° to 49° south latitude. In the winter and spring, up to middle of June, all classes are found here spread out over wide areas of the ocean; then, by the 15th June they will have all departed, the first and the latest, en route for the Pribylov Islands. Then, when seen again in this extreme southern range, I presume the unusually early examples of return, toward the end of August, are squads of the yearlings of both sexes, for this division is always the last to land on, and the first to leave, the Seal Islands, annually. Also, the two-year-old females which have been covered on the breeding-grounds during June and July undoubtedly stray back to sea, and down again from the Pribylov group, very early in August, some of them as far as the coast-heads of Fuca Straits; at least, many of them at one time are never seen massed on the rookeries, and as they do not consort with the Holluschickie and yearlings on land, quite a number of their large aggregate doubtless make frequent and extended fishing excursions during the height of the breeding season.

kingdom, the survival of the fittest in the struggle for existence; for these bulls, by their own evolution, permit only the strongest and most perfect of their kind to stamp their impress on the coming generations.[1]

From the time of the first arrival in May up to the beginning of June, or as late as the middle of that month, if the weather be clear, is an interval in which everything seems quiet. Very few Seals are added to the pioneers that have landed, as we have described. By the 1st of June, however, sometimes a little before, and never much later, the seal-weather—the foggy, humid, oozy damp of summer—sets in; and with it, as the gray banks roll up and shroud the islands, the bull Seals *swarm from the depths by hundreds and thousands, and locate themselves in advantageous* positions for the reception of the females, which are generally three weeks or a month later than this date in arrival.

PRE-EMPTION OF THE ROOKERIES: BATTLES OF THE SEALS.—The labor of locating and maintaining a position on the rookery is really a terribly serious business for those bulls which come in last; and it is so all the time to those males that occupy the water-line of the breeding-grounds. A constantly sustained fight between the newcomers and the occupants goes on morning, noon, and night, without cessation, frequently resulting in death to one or even both of the combatants.

It appears, from my survey of these breeding-grounds, that a well-understood principle exists *among the able-bodied bulls, to wit: that each one shall remain undisturbed on his ground*, which is usually about six to eight feet square, provided that at the start, and from that time until the arrival of the females, he is strong enough to hold this ground against all comers; inasmuch as the crowding in of the fresh arrivals often causes the removal of those which, though equally able-bodied at first, have exhausted themselves by fighting earlier and constantly, they are finally driven by these fresher animals back farther and higher up on the rookery, and sometimes off altogether.

Many of these bulls exhibit wonderful strength and desperate courage. I marked one veteran at Gorbatch, who was the first to take up his position early in May, and that position, as usual, directly at the water-line. This male Seal had fought at least forty or fifty desperate battles, and fought off his assailants every time—perhaps nearly as many different Seals which coveted his position—*and when the fighting season was over (after the cows are mostly all hauled up), I saw* him still there, covered with scars and frightfully gashed; raw, festering, and bloody, one eye gouged out, but lording it bravely over his harem of fifteen or twenty females, who were all huddled together on the same spot of his first location and around him.

This fighting between the old and adult males (for none others fight) is mostly, or rather entirely, done with the mouth. The opponents seize one another with their teeth, and then clenching their jaws, nothing but the sheer strength of the one and the other tugging to escape can shake them loose, and that effort invariably leaves an ugly wound, the sharp canines tearing out deep gutters in the skin and furrows in the blubber, or shredding the flippers into ribbon-strips.

They usually approach each other with comically averted heads, just as though they were ashamed of the rumpus which they were determined to precipitate. When they get near enough to reach one another they enter upon the repetition of many feints or passes, before either one or the other takes the initiative by gripping. The heads are darted out and back as quick as a flash;

[1] A trained observer, Kumlien, who passed the winter of 1877-'78 in Cumberland Sound, and, speaking of this *feature in the Ringed Seal (Phoca fœtida), says, "There is usually but one young at a birth; still twins are not of rare* occurrence, and one instance came under my observation where there were triplets; but they were small, and two of them probably would not have lived had they been born."

their hoarse roaring and shrill, piping whistle never ceases, while their fat bodies writhe and swell with exertion and rage; furious lights gleam in their eyes; their hair flies in the air, and their blood streams down; all combined, makes a picture so fierce and so strange that, from its unexpected position and its novelty, is perhaps one of the most extraordinary brutal contests man can witness.

In these battles of the Seals, the parties are always distinct; the one is offensive, the other defensive. If the latter proves the weaker he withdraws from the position occupied, and is never followed by his conqueror, who complacently throws up one of his hind flippers, fans himself, as it were, to cool his fevered wrath and blood from the heat of the conflict, sinks into comparative quiet, only uttering a peculiar chuckle of satisfaction or contempt, with a sharp eye open for the next covetous bull or "See-catch."[1]

ATTITUDES AND COLORATION OF THE FUR SEAL.—The period occupied by the males in taking and holding their positions on the rookery, offers a very favorable opportunity to study them in the thousand and one different attitudes and postures assumed, between the two extremes of desperate conflict and deep sleep—sleep so profound that one can, if he keeps to the leeward, approach close enough, stepping softly, to pull the whiskers of any old male taking a nap on a clear place; but after the first touch to these moustaches, the trifler must jump with electrical celerity back, if he has any regard for the sharp teeth and tremendous shaking which will surely overtake him if he does not. The younger Seals sleep far more soundly than the old ones, and it is a favorite pastime for the natives to surprise them in this manner—favorite, because it is attended with no personal risk; the little beasts, those amphibious sleepers, rise suddenly, and fairly shrink to the earth, spitting and coughing their terror and confusion.

The neck, chest, and shoulders of a fur-seal bull comprise more than two-thirds of his whole weight; and in this long, thick neck, and the powerful muscles of the fore-limbs and shoulders, is embodied the larger portion of his strength. When on land, with the fore hands he does all climbing over the rocks and grassy hummocks back of the rookery, or shuffles his way over the smooth parades; the hind-feet being gathered up as useless trappings after every second step forward, which we have described at the outset of this chapter. These anterior flippers are also the propelling power when in water, the exclusive machinery with which they drive their rapid passage; the hinder ones floating behind like the steering sweep to a whale-boat, used evidently as rudders, or as the tail of a bird is while its wings sustain and force its rapid flight.

The covering to the body is composed of two coats, one being a short, crisp, glistening over-hair, and the other a close, soft, elastic pelage, or fur, which gives the distinctive value to the pelt. I can call it readily to the mind of my readers, when I say to them that the down and feathers on the breast of a duck lie relatively as the fur and hair do upon the skin of the Seal.

At this season of first "hauling up,"[2] in the spring, the prevailing color of the bulls, after they dry off and have been exposed to the weather, is a dark, dull brown, with a sprinkling in it of lighter brown-black, and a number of hoary or grizzled gray coats peculiar to the very old males. On the shoulders of all of them, that is, the adults, the over-hair is either a gray or rufous ocher, or a very emphatic "pepper and salt"; this is called the "wig." The body-colors are most intense and pronounced upon the back of the head, neck, and spine, fading down on the flanks lighter, to much lighter ground on the abdomen; still never white, or even a clean gray, so beautiful and peculiar to them when young, and to the females. The skin of the muzzle and flippers is a dark

[1] "See-catch," native name for the bulls on the rookeries, especially those which are able to maintain their position.

[2] "Hauling up," a technical term, applied to the action of the Seals when they land from the surf and haul up or drag themselves over the beach. It is expressive and appropriate, as are most of the sealing phrases.

bluish-black, fading in the older examples to a reddish and purplish tint. The color of the ears and tail is similar to that of the body, being somewhat, if anything, a trifle lighter; the ears on a bull Fur Seal are from one inch to an inch and a half in length; the pavilions or auricles are tightly rolled up on themselves, so that they are similar in shape to, and exactly the size of, the little finger on the human hand, cut off at the second phalangeal joint, a trifle more cone-shaped, however, as they are greater at the base than they are at the tip. They are haired and furred as the body is.

I think it probable that this animal has and does exert the power of compressing or dilating this scroll-like pavilion to its ear, just according as it dives deeper or rises in the water; and also, I am quite sure that the Hair Seal has this control over the *meatus externus*, from what I have seen of it. I have not been able to verify it in either case by actual observation; yet such opportunity as I have had gives me undoubted proof of the fact, that the hearing of the Fur Seal is wonderfully keen and surpassingly acute. If you make any noise, no matter how slight, the alarm will be given instantly by these insignificant-looking auditors, and the animal, rising up from deep sleep with a single motion erect, gives you a stare of stupid astonishment, and at this season of defiance, mingling it with incessant, surly roaring, growling, and "spitting."

VOICE OF THE FUR SEAL.—This spitting, as I call it, is by no means a fair or full expression of the most characteristic sound or action peculiar, so far as I have observed, to the Fur Seals alone, the bulls in particular. It is the usual prelude to all their combats, and it is their signal of astonishment. It follows somewhat in this way: when the two disputants are nearly within reaching or striking distance, they make a number of feints or false passes, as fencing-masters do, at one another, with the mouth wide open, lifting the lips or snarling so as to exhibit the glistening teeth, and with each pass of the head and neck they expel the air so violently through the larynx, as to make a rapid *choo-choo-choo* sound, like steam-puffs as they escape from the smoke-stack of a locomotive when it starts a heavy train, especially when the driving-wheels slip on the rail.

All of the bulls have the power and frequent inclination to utter four distinct calls or notes. This is not the case with the Sea Lion,[1] whose voice is confined to a single bass roar, or that of the walrus, which is limited to a dull grunt, or that of the Hair Seal,[2] which is inaudible. This volubility of the Fur Seal is decidedly characteristic and prominent; he utters a hoarse, resonant roar, loud and long; he gives vent to a low, entirely different, gurgling growl; he emits a chuckling, sibilant, piping whistle, of which it is impossible to convey an adequate idea, for it must be heard to be understood; and this spitting or *choo* sound just mentioned. The cows[3] have but one note—a hollow, prolonged, bla a-ting call, addressed only to their pups; on all other occasions they are usually silent. It is something strangely like the cry of a calf or an old sheep. They also make a spitting sound or snort when suddenly disturbed—a kind of a cough, as it were. The pups "blaat" also, with little or no variation, their sound being somewhat weaker and hoarser than their mother's, after birth; they, too, comically spit or cough when aroused suddenly from a nap or driven into a corner, opening their little mouths like young birds in a nest, when at bay, backed up in some crevice, or against some tussock.

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[1] *Eumetopias Stelleri.*

[2] *Phoca vitulina.*

[3] Without explanation, I may be considered as making use of paradoxical language by using these terms of description; for the inconsistency of talking of "pups" with "cows," and "bulls," and "rookeries," on the breeding-grounds of the same, cannot fail to be noticed; but this nomenclature has been given and used by the American and English whaling and sealing parties for many years, and the characteristic features of the Seals themselves so suit the naming, that I have felt satisfied to retain the style throughout as rendering my description more intelligible, especially so to those who are engaged in the business, or may be hereafter. The Russians are more consistent, but not so "pat"; they call the bull "See-catch," a term implying strength, vigor, etc.; the cow, "Matkah," or mother; the pups, "Kotickie," or little seals; the non-breeding males under six and seven years, "Holluschickie," or bachelors. The name applied collectively to the Fur Seal by them is "—Morskie-kot," or Sea Cat.

Indeed, so similar is the sound, that I noticed a number of sheep which the Alaska Commercial Company had brought up from San Francisco to Saint George Island, during the summer of 1873, were constantly attracted to the rookeries, and were running in among the "Holluschickie"; so much so that they neglected the good pasturage on the uplands beyond, and a small boy had to be regularly employed to herd them where they could feed to advantage. These transported *Oridæ*, though they could not possibly find anything in their eyes suggestive of companionship among the Seals, had their ears so charmed by the sheep-like accents of the female pinnipeds, as to persuade them against their senses of vision and smell.

The sound which arises from these great breeding-grounds of the Fur Seal, where thousands upon tens of thousands of angry, vigilant bulls are roaring, chuckling, and piping, and multitudes of seal-mothers are calling in hollow, blaating tones to their young, that in turn respond incessantly, is simply defiance to verbal description. It is, at a slight distance, softened into a deep booming, as of a cataract; and I have heard it, with a light, fair wind to the leeward, as far as six miles out from land on the sea; and even in the thunder of the surf and the roar of heavy gales, it will rise up and over to your ear for quite a considerable distance away. It is the monitor which the sea-captains anxiously strain their ears for, when they run their dead reckoning up, and are laying to for the fog to rise, in order that they may get their bearings of the land; once heard, they hold on to the sound and feel their way in to anchor. The seal-roar at "Novostashnah," during the summer of 1872, saved the life of the surgeon,[1] and six natives belonging to the island, who had pushed out on an egging-trip from Northeast Point to Walrus Island. I have sometimes thought, as I have listened through the night to this volume of extraordinary sound, which never ceases with the rising or the setting of the sun throughout the entire season of breeding, that it was fully equal to the churning boom of the waves of Niagara. Night and day, throughout the season, this din upon the rookeries is steady and constant.

EFFECTS OF HEAT ON THE SEALS.—The Seals seem to suffer great inconvenience and positive misery from a comparatively low degree of heat. I have been often surprised to observe that, when the temperature was 46° and 48° Fahr. on land during the summer, they would show everywhere signs of distress, whenever they made any exertion in moving or fighting, evidenced by panting and the elevation of their hind-flippers, which they used incessantly as so many fans. With the thermometer again higher, as it is at rare intervals, standing at 55° and 60°, they then seem to suffer even when at rest; and at such times the eye is struck by the kaleidoscopic appearance of a rookery—in any of these rookeries where the Seals are spread out in every imaginable position their lithesome bodies can assume, all industriously fan themselves; they use sometimes the fore-flippers as ventilators, as it were, by holding them aloft motionless, at the same time fanning briskly with the hinder ones, according as they sit or lie. This wavy motion of fanning or flapping gives a hazy indistinctness to the whole scene, which is difficult to express in language; but one of the most prominent characteristics of the Fur Seal, and perhaps the most unique feature, is this very fanning manner in which they use their flippers, when seen on the breeding-grounds at this season. They also, when idle as it were, off-shore at sea, lie on their sides in the water with only a partial exposure of the body, the head submerged, and then hoist up a fore- or hind-flipper clear out of the water, at the same time scratching themselves or enjoying a momentary nap; but in this position there is no fanning. I say "scratching," because the Seal, in common

[1] Dr. Otto Cramer. The suddenness with which fog and wind shut down and sweep over the sea here, even when the day opens most auspiciously for a short boat-voyage, has so alarmed the natives in times past, that a visit is now never made by them from island to island, unless on one of the company's vessels. Several bidarrahs have never been heard from, which, in earlier times, attempted to sail, with picked crews of the natives, from one island to the other.

with all animals, is preyed upon by vermin, and it has a peculiar species of *louse, or parasitic tick*, that belongs to it.

SLEEPING AFLOAT.—Speaking of the Seal as it rests in the water, leads me to remark that they seem to sleep as sound and as comfortably, bedded on the waves or rolled by the swell, as they do on the land; they lie on their backs, fold the fore-flippers across the chest, and turn the hind ones up and over, so that the tips rest on their necks and chins, thus exposing simply the nose and the heels of the hind-flippers above water, nothing else being seen. In this position, unless it is very rough, the Seal sleeps as serenely as did the prototype of that memorable song, who was "rocked in the cradle of the deep."

FASTING OF THE SEALS AT THE ROOKERIES: INTESTINAL WORMS.—All the bulls, from the very first, *that have been able to hold their positions, have not left them* from the moment of their landing for a single instant, night or day; nor will they do so until the end of the rutting season, which subsides entirely between the 1st and 10th of August, beginning shortly after the coming of the cows in June. Of necessity, therefore, this causes them to fast, to abstain entirely from food of any kind, or water, for three months at least; and a few of them actually stay out four months, in total abstinence, before going back into the water for the first time after "hauling up" in May; they then return as so many bony shadows of what they were only a few months anteriorly; covered with wounds, abject and spiritless, they laboriously crawl back to the sea to renew a fresh lease of life.

Such physical endurance is remarkable enough alone; but it is simply wonderful, when we come to associate this fasting with the unceasing activity, restlessness, and duty devolved upon the bulls as the heads of large families. They do not stagnate like hibernating bears in caves; there is not one torpid breath drawn by them in the whole period of their fast; it is evidently sustained *and accomplished by the self-absorption of their own fat*, with which they are so liberally supplied when they first come out from the sea and take up their positions on the breeding-grounds, and which gradually disappears, until nothing but the staring hide, protruding tendons and bones, marks the limit of their abstinence. There must be some remarkable provision made by nature for the entire torpidity of the Seals' stomachs and bowels, in consequence of their being empty and unsupplied during this long period, coupled with the intense activity and physical energy of the animals during the same time, which, however, in spite of the violation of a supposed physiological law, does not seem to affect them, for they come back *just as sleek, fat, and ambitious as ever, in* the following season.

I have examined the stomachs of hundreds which were driven up and killed immediately after their arrival in the spring, near the village; I have the word of the natives here, who have seen hundreds of thousands of them opened during the slaughtering seasons past, but in no single case has anything ever been found, other than the bile and ordinary secretions of healthy organs of this class, with the marked exception of finding in every one a snarl or cluster of worms,[1] from the size of a walnut to a bunch as large as a man's fist. Fasting apparently has no effect upon the worms, for on the rare occasion, and perhaps the last one that will ever occur, of killing three or four hundred old bulls late in the fall to supply the natives with canoe skins, I was present, and again examined their paunches, finding the same worms within. The worms were lively in these empty stomachs, and their presence, I think, gives some reason for the habit which the old bulls have (the others do not) of swallowing small water-worn bowlders, the stones in some of the stomachs weighing half a pound apiece, in others much smaller. In one paunch I found over five

[1] *Nematoda.*

pounds, in the aggregate, of large pebbles, which, in grinding against one another, I believe, must comfort the Seal by aiding to destroy, in a great measure, these intestinal pests.

The Sea Lion is also troubled in the same way by a similar species of worm, and I preserved the stomach of one of these animals in which there was more than ten pounds of stones, some of them alone very great in size. Of this latter animal, I suppose it could swallow bowlders that weigh two and three pounds each. I can ascribe no other cause for this habit among these animals than that given, as they are the highest type of the carnivora, eating fish as a regular means of subsistence, varying the monotony of this diet with occasional juicy fronds of sea-weed or kelp, and perhaps a crab or such once in a while, provided it is small and tender or soft-shelled. I know that the sailors say that the *Callorhinus* swallows these stones to "ballast" himself; in other words, to enable him to dive deeply and quickly; but I noticed that the females and the "Holluschickie" dive quicker and swim better than the old fellows above specified, and they do so without any ballast. They also have less muscular power, only a tithe of that which the "Sea catch" possesses. No, the ballast theory is not tenable.

ARRIVAL OF THE COW SEALS AT THE ROOKERIES.—Between the 12th and 14th of June, the first of the cow Seals, as a rule, come up from the sea; then the long agony of the waiting bulls is over, and they signalize it by a period of universal, spasmodic, desperate fighting among themselves. Though they have quarreled all the time from the moment they first landed, and continue to do so until the end of the season, in August, yet that fighting which takes place at this date is the bloodiest and most vindictive known to the Seal. I presume that the heaviest percentage of mutilation and death among the old males from these brawls occurs in this week of the earliest appearance of the females.

A strong contrast now between the males and females looms up, both in size and shape, which is heightened by the air of exceeding peace and dove-like amiability which the latter class exhibit, in contradistinction to the ferocity and saturnine behavior of the males.

DESCRIPTION OF THE COW SEAL.—The cows are from four to four and a half feet in length from head to tail, and much more shapely in their proportions than the bulls; there is no wrapping around their necks and shoulders of unsightly masses of blubber; their lithe, elastic forms, from the first to the last of the season, are never altered; this they are, however, enabled to keep, because in the provision of seal economy, they sustain no protracted fasting period; for, soon after the birth of their young, they leave it on the ground and go to the sea for food, returning perhaps to-morrow, perhaps later, even not for several days in fact, to again suckle and nourish it; having in the mean time sped far off to distant fishing banks, and satiated a hunger which so active and highly organized an animal must experience, when deprived of sustenance for any length of time.

As the females come up wet and dripping from the water, they are at first a dull, dirty-gray color, dark on the back and upper parts, but in a few hours the transformation in their appearance made by drying is wonderful. You would hardly believe that they could be the same animals, for they now fairly glisten with a rich steel and maltese gray luster on the back of the head, the neck, and along down the spine, which blends into an almost snow-white over the chest and on the abdomen. But this beautiful coloring in turn is again altered by exposure to the same weather; for after a few days it will gradually change, so that by the lapse of two or three weeks it is a dull, rufous-ocher below, and a cinereous brown and gray mixed above. This color they retain throughout the breeding season, up to the time of shedding their coat in August.

The head and eye of the female are exceedingly beautiful; the expression is really attractive, gentle, and intelligent; the large, lustrous, blue-back eyes are humid and soft with the tenderest expression, while the small, well formed head is poised as gracefully on her neck as can be well

imagined; she is the very picture of benignity and satisfaction, when she is perched up on some convenient rock, and has an opportunity to quietly fan herself, the eyes half-closed and the head thrown back on her gently-swelling shoulders.

The females land on these islands not from the slightest desire to see their uncouth lords and masters, but from an accurate and instinctive appreciation of the time in which their period of gestation ends. They are in fact driven up to the rookeries by this cause alone; the young cannot be brought forth in the water, and in all cases marked by myself, the pups were born soon after landing, some in a few hours, but most usually a day or so elapses before delivery.

ORGANIZATION OF THE ROOKERIES.—They are noticed and received by the males on the water-line stations with attention; they are alternately coaxed and urged up on to the rocks, as far as these beach-masters can do so, by chuckling, whistling, and roaring, and then they are immediately under the most jealous supervision; but, owing to the covetous and ambitious nature of the bulls which occupy these stations to the rear of the water-line and way back, the little cows have a rough-and-tumble time of it when they begin to arrive in small numbers at first, for no sooner is the pretty animal fairly established on the station of male number one, who has welcomed her there, than he, perhaps, sees another one of her style in the water from whence she has come, and, in obedience to his polygamous feeling, he devotes himself anew to coaxing the later arrival, by that same winning manner so successful in her case; then when bull number two, just back, observes bull number one off guard, he reaches out with his long strong neck and picks up the unhappy but passive cow by the scruff of her's, just as a cat does a kitten, and deposits her upon his seraglio ground; then bulls number three and four, and so on, in the vicinity, seeing this high-handed operation, all assail one another, especially number two, and for a moment have a tremendous fight, perhaps lasting half a minute or so, and during this commotion the little cow is generally moved, or moves, farther back from the water, two or three stations more, where, when all gets quiet again, she usually remains in peace. Her last lord and master, not having the exposure to such diverting temptation as her first, gives her such care that she not only is unable to leave, did she wish, but no other bull can seize upon her. This is only a faint (and I fully appreciate it), wholly inadequate description of the hurly-burly and the method by which the rookeries are filled up, from first to last, when the females arrive. This is only one instance of the many trials and tribulations which both parties on the rookery subject themselves to, before the harems are filled.

Far back, fifteen or twenty "See-catchie" stations deep from the water-line, and sometimes more, but generally not over an average of ten or fifteen, the cows crowd in at the close of the season for arriving, which is by the 10th or 14th of July; then they are able to go about pretty much as they please, for the bulls have become so greatly enfeebled by this constant fasting, fighting, and excitement during the past two months, that they are quite content now even with only one or two partners, if they should have no more.

The cows seem to haul up in compact bodies from the water, filling in the whole ground to the rear of the rookeries, never scattering about over the surface of this area; they have mapped out from the first their chosen resting places, and they will not lie quietly in any position outside of the great mass of their kind. This is due to their intensely gregarious nature, and admirably adapted for their protection. And here I should call attention to the fact that they select this rookery-ground with all the skill of civil engineers. It is preferred with special reference to the drainage, for it must lie so that the produce of the constantly dissolving fogs and rain-clouds shall not lie upon them, having a great aversion to and a firm determination to rest nowhere on water-puddled ground. This is admirably exhibited, and will be understood by a study of my

sketch-maps which follow, illustrative of these rookeries and the area and position of the Seals upon them. Every one of these breeding-grounds slopes up gently from the sea, and on no one of them is there anything like a muddy flat.

I found it an exceedingly difficult matter to satisfy myself as to a fair general average number of cows to each bull on the rookery; but, after protracted study, I think it will be nearly correct when I assign to each male a general ratio of from fifteen to twenty females at the stations nearest the water; and for those back in order from that line to the rear, from five to twelve; but there are so many exceptional cases, so many instances where forty-five and fifty females are all under the charge of one male; and then, again, where there are two or three females only, that this question was and is not entirely satisfactory in its settlement to my mind.

Near Ketavie Point, and just above it to the north, is an odd washout of the basalt by the surf, which has chiseled, as it were, from the foundation of the island, a lava table, with a single roadway or land passage to it. Upon the summit of this footstool I counted forty-five cows, all under the charge of one old veteran. He had them penned up on this table-rock by taking his stand at the gate, as it were, through which they passed up and passed down—a Turkish brute typified.

UNATTACHED MALES.—At the rear of all these rookeries there is invariably a large number of able-bodied males who have come late, but who wait patiently, yet in vain, for families; most of them having had to fight as desperately for the privilege of being there as any of their more fortunately located neighbors, who are nearer the water, and in succession from there to where they are themselves; but the cows do not like to be in any outside position. They cannot be coaxed out where they are not in close company with their female mates and masses. They lie most quietly and contentedly in the largest harems, and cover the surface of the ground so thickly that there is hardly moving or turning room until the females cease to come from the sea. The inaction on the part of the males in the rear during the breeding-season only serves to qualify them to move into the places which are necessarily vacated by those males that are, in the mean time, obliged to leave from virile exhaustion, or incipient wounds. All the surplus able-bodied males, that have not been successful in effecting a landing on the rookeries, cannot at any one time during the season be seen here on this rear line. Only a portion of their number are in sight; the others are either loafing at sea, adjacent, or are hauled out in morose squads between the rookeries on the beaches.

COURAGE OF THE FUR SEALS.—The courage with which the Fur Seal holds his position as the head and guardian of a family, is of the highest order. I have repeatedly tried to drive them from their harem posts, when they were fairly established on their stations, and have always failed, with few exceptions. I might use every stone at my command, making all the noise I could. Finally, to put their courage to the fullest test, I have walked up to within twenty feet of an old veteran, toward the extreme end of Tolstoi, who had only four cows in charge, and commenced with my double-barreled fowling-piece to pepper him all over with fine mustard-seed shot, being kind enough, in spite of my zeal, not to put out his eyes. His bearing, in spite of the noise, smell of powder, and painful irritation which the fine shot must have produced, did not change in the least from the usual attitude of determined plucky defense, which nearly all of the bulls assumed when attacked with showers of stones and noise; he would dart out right and left with his long neck and catch the timid cows, that furtively attempted to run after each report of my gun, fling and drag them back to their places under his head; and then, stretching up to his full height look me directly and defiantly in the face, roaring and chuckling most vehemently. The cows, however, soon got away from him; they could not stand my racket in spite of their dread of him; but he still stood

his ground, making little charges on me of ten or fifteen feet in a succession of gallops or lunges, spitting furiously, and then comically retreating to the old position, with an indescribable leer and swagger, back of which he would not go, fully resolved to hold his own or die in the attempt.

This courage is all the more noteworthy from the fact that, in regard to man, it is invariably of a defensive character. The Seal is always on the defensive; he never retreats, and he will not attack. If he makes you return when you attack him, he never follows you much farther than the boundary of his station, and then no aggravation will compel him to take the offensive, so far as I have been able to observe. I was very much impressed by this trait.

BEHAVIOR OF THE FEMALE SEALS ON THE ROOKERIES.—The cows, during the whole season, do great credit to their amiable expression by their manner and behavior on the rookery; they never fight or quarrel one with another, and never or seldom utter a cry of pain or rage when they are roughly handled by the bulls, which frequently get a cow between them and actually tear the skin from her back with their teeth, cutting deep gashes in it as they snatch her from mouth to mouth. If sand does not get into these wounds it is surprising how rapidly they heal; and, from the fact that I never could see scars on them anywhere except the fresh ones of this year, they must heal effectually and exhibit no trace the next season.

The cows, like the bulls, vary much in weight, but the extraordinary disparity in the size of the sexes, adult, is exceedingly striking. Two females taken from the rookery nearest to Saint Paul Village, right under the bluffs, and almost beneath the eaves of the natives' houses, called "Nah Speel," after they had brought forth their young, were weighed by myself, and their respective returns on the scales were fifty-six and one hundred pounds each, the former being about three or four years old, and the latter over six—perhaps ten; both were fat, or rather in good condition—as good as they ever are. Thus the female is just about one-sixth the size of the male.[1] Among the Sea Lions the proportion is just one-half the bulk of the male,[2] while the Hair Seals, as I have before stated, are not distinguishable in this respect, as far as I could observe, but my notice was limited to a few specimens only.

ATTITUDES OF FUR SEALS ON LAND.—It is quite beyond my power, indeed entirely out of the question, to give a fair idea of the thousand and one positions in which the Seals compose themselves and rest when on land. They may be said to assume every possible attitude which a flexible body can be put into, no matter how characteristic or seemingly forced or constrained. Their joints seem to be double-hinged; in fact, all ball and socket union of the bones. One favorite position, especially with the females, is to perch upon a point or edge-top of some rock, and throw their heads back upon their shoulders, with the nose held directly up and aloft; and then closing their eyes, to take short naps without changing their attitude, now and then softly lifting one or the other of their long, slender hind-flippers, which they slowly wave with their peculiar fanning motion to which I have alluded heretofore. Another attitude, and one of the most common, is to curl themselves up just as a dog does on a hearth rug, bringing the tail and nose close together. They also stretch out, laying the head close to the body, and sleep an hour or two without rising, holding one of the hind-flippers up all the time, now and then gently moving it, the eyes being tightly closed.

I ought, perhaps, to define here the anomalous tail of the Fur Seal. It is just about as important as the caudal appendage to a bear, even less significant: it is the very emphasis of abbreviation. In the old males it is positively only four or five inches in length, while among the females only two and a half to three inches, wholly inconspicuous, and not even recognized by the casual observer.

[1] Adult male and female—*Callorhinus ursinus.*
[2] Adult male and female—*Eumetopias Stelleri.*

SLEEPING SEALS.—I come now to speak of another feature which interested me nearly, if not quite, as much as any other characteristic of this creature; and that is their fashion of slumber. The sleep of the Fur Seal, seen on land, from the old male down to the youngest, is always accompanied by an involuntary, nervous, muscular twitching and slight shifting of the flippers, together with ever and anon quivering and uneasy rollings of the body, accompanied by a quick folding anew of the fore-flippers; all of which may be signs, as it were, in fact, of their simply having nightmares, or of sporting, in a visionary way, far off in some dream-land sea; but perhaps very much as an old nurse said, in reference to the smiles on a sleeping child's face, they are disturbed by their intestinal parasites. I have studied hundreds of such somnolent examples. Stealing softly up, so closely that I could lay my hand upon them from the point where I was sitting, did I wish to, and watching the sleeping Seals, I have always found their sleep to be of this nervous description. The respiration is short and rapid, but with no breathing (unless the ear is brought very close) or snoring sound; the quivering, heaving of the flanks only indicates the action of the lungs. I have frequently thought that I had succeeded in finding a snoring Seal, especially among the pups; but a close examination always gave some abnormal reason for it; generally a slight distemper, never anything severer, however, than some trifle by which the nostrils were stopped up to a greater or less degree.

The cows on the rookeries sleep a great deal, but the males have the veriest cat-naps that can be imagined. I never could time the slumber of any old male on the breeding-grounds, which lasted without interruption longer than five minutes, day or night; while away from these places, however, I have known them to lie sleeping in the manner I have described, broken by these fitful, nervous, dreamy starts, yet without opening the eyes, for an hour or so at a time.

With the exception of the pups, the Fur Seal seems to have very little rest awake or sleeping; perpetual motion is well nigh incarnate with its being.

FUR-SEAL PUPS.—As I have said before, the females, soon after landing, are delivered of their young. Immediately after the birth of the pup (twins are rare, if ever) the little creature finds its voice, a weak, husky *blaat*, and begins to paddle about with its eyes wide open from the start, in a confused sort of way for a few minutes, until the mother turns around to notice her offspring and give it attention, and still later to suckle it; and for this purpose she is supplied with four small, brown nipples, almost wholly concealed in the fur, and which are placed about eight inches apart, lengthwise with the body, on the abdomen, between the fore- and hind-flippers, with about four inches of space between them transversely. These nipples are seldom visible, and then faintly seen through the hair and fur. The milk is abundant, rich, and creamy. The pups nurse very heartily, almost gorging themselves, so much so that they often have to yield up the excess of what they have taken down, mewling and puking in the most orthodox manner.

The pup from birth, and for the next three months, is of a jet-black color, hair and flippers, save a tiny white patch just back of each forearm. It weighs first from three to four pounds, and is twelve to fourteen inches long. It does not seem to nurse more than once every two or three days, but in this I am very likely mistaken, for they may have received attention from the mother in the night, or other times in the day when I was unable to keep up my watch over the individuals which I had marked for this supervision.

The apathy with which the young are treated by the old on the breeding-grounds, especially by the mothers, was very strange to me, and I was considerably surprised at it. I have never seen a seal-mother caress or fondle her offspring; and should it stray to a short distance from the hare , I could step to and pick it up, and even kill it before the mother's eye, without causing her the slightest concern, as far as all outward signs and manifestation would indicate. The same indiffer-

ence is also exhibited by the male to all that may take place of this character outside of the boundary of his seraglio; but the moment the pups are inside the limits of his harem-ground, he is a jealous and a fearless protector, vigilant and determined; but if the little animals are careless enough to pass beyond this boundary, then I can go up to them and carry them off before the eye of the old Turk without receiving from him the slightest attention in their behalf—a curious guardian, forsooth!

It is surprising to me how few of these young pups get crushed to death while the ponderous males are floundering over them, engaged in fighting and quarreling among themselves. I have seen two bulls dash at each other with all the energy of furious rage, meeting right in the midst of a small "pod" of forty or fifty pups, tramp over them with all their crushing weight, and bowling them out right and left in every direction by the impetus of their movements, without injuring a single one, as far as I could see. Still, when we come to consider the fact that, despite the great weight of the old males, their broad, flat flippers and yielding bodies may press down heavily on these little fellows without actually breaking bones or mashing them out of shape, it seems questionable whether more than one per cent. of all the pups born each season on these great rookeries of the Pribylov Islands are destroyed in this manner on the breeding-grounds.[1]

The vitality of the Fur Seal is simply astonishing. His physical organization passes beyond the fabled nine lives of the cat. As a slight illustration of his tenure of life, I will mention the fact, that one morning the chief came to me with a pup in his arms, which had just been born, and was still womb-moist, saying that the mother had been killed at Tolstoi by accident, and he supposed that I would like to have a "choochil."[2] I took it up into my laboratory, and finding that it could walk about and make a great noise, I attempted to feed it, with the idea of having a comfortable subject to my pencil, for life-study of the young in the varied attitudes of sleep and motion. It refused everything that I could summon to its attention as food; and, alternately sleeping and walking, in its clumsy fashion, about the floor, it actually lived nine days—spending the half of every day in floundering over the floor, accompanying all movement with a persistent, hoarse, *bluating* cry—and I do not believe it ever had a single drop of its mother's milk.

In the pup, the head is the only disproportionate feature at birth, when it is compared with the adult form; the neck being also relatively shorter and thicker. The eye is large, round, and full, but almost a "navy blue" at times, it soon changes into the blue-black of adolescence.

The females appear to go to and come from the water to feed and bathe, quite frequently, after bearing their young, and the immediate subsequent coitus with the male; and usually return to the spot or its immediate neighborhood, where they leave their pups, crying out for them, and recognizing the individual replies, though ten thousand around, all together, should *blaat* at once. They quickly single out their own and nurse them. It would certainly be a very unfortunate matter if the mothers could not identify their young by sound, since their pups get together like a great swarm of bees, and spread out upon the ground in what the sealers call "pods," or clustered groups, while they are young and not very large; but from the middle or end of September, until they leave the islands for the dangers of the great Pacific, in the winter, along into the heat of November, they gather in this manner, sleeping and frolicking by tens of thousands, bunched together at various places all over the islands contiguous to the breeding-grounds, and right on them. A mother comes up from the sea, whither she has been to wash, and perhaps to feed, for the last day or two, feeling her way along to about where she thinks her pup should be—at least where she left

[1] The only damage which these little fellows have up here, is being caught by an October gale down at the surf-margin, when they have not fairly learned to swim; large numbers have been destroyed by sudden "nips" of this character.

[2] A specimen to stuff.

it last—but perhaps she misses it, and finds instead a swarm of pups in which it has been incorporated, owing to its great fondness for society. The mother, without first entering into the crowd of thousands, calls out just as a sheep does for a lamb; and, out of all the din she—if not at first, at the end of a few trials—recognizes the voice of her offspring, and then advances, striking out right and left, toward the position from which it replies. But if the pup happens at this time to be asleep, it gives, of course, no response, even though it were close by; in the event of this silence the cow, after calling for a time without being answered, curls herself up and takes a nap, or lazily basks, to be usually more successful, or wholly so, when she calls again.

The pups themselves do not know their own mothers—a fact which I ascertained by careful observation; but they are so constituted that they incessantly cry out at short intervals during the whole time they are awake, and in this way the mother can pick out from the monotonous blaating of thousands of pups, her own, and she will not permit any other to suckle it; but the "Kotickie" themselves attempt to nose around every seal-mother that comes in contact with them.

I have repeatedly watched young pups as they made advances to nurse from another pup's mother; the result invariably being, that while the mother would permit her own offspring to suckle freely, yet, when these little strangers touched her nipples, she would either move abruptly away, or else turn quickly down upon her stomach, so that the maternal fountains were inaccessible to the alien and hungry "Kotickie." I have witnessed so many examples of the females turning pups away, to suckle only some particular other one, that I feel sure I am entirely right in saying that the seal-mothers know their own young; and that they will not permit any others to nurse save their own. I believe that this recognition of them is due chiefly to the mother's scent and hearing.

Disorganization of the rookeries.—Between the end of July and the 5th or 8th of August of every year, the rookeries are completely changed in appearance; the systematic and regular disposition of the families or harems over the whole extent of the breeding-ground has disappeared; all that clock-work order which has heretofore existed seems to be broken up. The breeding-season over, those bulls which have held their positions since the first of May leave, most of them thin in flesh and weak, and of their number a very large proportion do not come out again on land during the season; but such as are seen at the end of October and November, are in good flesh. They have a new coat of rich, dark, gray-brown hair and fur, with gray or grayish-ocher "wigs" of longer hair over the shoulders, forming a fresh, strong contrast to the dull, rusty brown and umber dress in which they appear to us during the summer, and which they had begun to shed about the first of August, in common with the females and the "Holluschickie." After these males leave, at the close of their season's work and of the rutting for the year, those of them that happen to return to the land in any event do not come back until the end of September, and do not haul upon the rookery-grounds again. As a rule they prefer to herd together, like the younger males, upon the sand-beaches and rocky points close to the water.

The cows and pups, together with those bulls which we have noticed in waiting in the rear of the rookeries, and which have been in retirement throughout the whole of the breeding-season, now take possession, in a very disorderly manner, of the rookeries. There come, also, a large number of young, three, four, and five year old males, which have been prevented by the menacing threats of the older, stronger bulls, from landing among the females during the rutting-season.

Before the middle of August three-fourths, at least, of the cows at this date are off in the water, only coming ashore at irregular intervals to nurse and look after their pups a short time. They presented to my eye, from the summits of the bluffs round about, a picture more suggestive than anything I have ever seen presented by animal life, of entire comfort and enjoyment. Here,

just out and beyond the breaking of the rollers, they idly lie on the rocks or sand-beaches, ever and anon turning over and over, scratching their backs and sides with their fore- and hind-flippers. The Seals on the breeding ground appear to get very lousy.

The Fur Seal spends a great deal of time, both at sea and on land, in scratching its hide; for it is annoyed by a species of louse, a *Pediculus*, to just about the same degree and in the same manner that our dogs are by fleas. To scratch, it sits upon its haunches, and scrapes away with the toe-nails of first one and then the other of its hind-flippers; by which action it reaches readily all portions of its head, neck, chest, and shoulders; and, with either one or the other of its fore-flippers, it rubs down its spinal region back of the shoulders to the tail. By that division of labor with its feet, it can promptly reduce, with every sign of comfort, any lousy irritation wheresoever on its body. This *Pediculus*, peculiar to the Fur Seal, attaches itself almost exclusively to the pectoral regions; a few, also, are generally found at the bases of the auricular pavilions.

When the Fur Seal is engaged in this exercise, it cocks its head and wears exactly the same expression that our common house-dog does while subjugating and eradicating fleas; the eyes are partly or wholly closed; the tongue lolls out; and the whole demeanor is one of quiet but intense satisfaction.

The Fur Seal appears also to scratch itself in the water with the same facility and unction so marked on land; only it varies the action by using its fore-hands principally, in its fluviatile exercise, while its hind-feet do most of the terrestrial scraping.

While I have written with much emphasis upon the total absence of any record as to the prevalence of an epidemic in these large rookeries, I should, perhaps, mark the fact that no symptoms of internal diseases have ever been noticed here, such as tuberculosis of the lungs, etc., which invariably attack and destroy the Fur Seal when it is taken into confinement, as well as the Sea Lions also; the latter, however, have a much greater power of endurance under such artificial circumstances of life. The thousands upon thousands of disemboweled Pribylov fur-seal carcasses have never presented abnormal or diseased viscera of any kind.

MANGY COWS AND PUPS.—The frequent winds and showers drive and spatter sand into their fur and eyes, often making the latter quite sore. This occurs when they are obliged to leave the rocky rookeries and follow their pups out over the sand-ridges and flats, to which they always have a natural aversion. On the hauling-grounds they pack the soil under foot so hard and tightly in many places, that it holds water in the surface depressions, just like so many rock-basins. Out of and into these puddles the pups and the females flounder and patter incessantly, until evaporation slowly abates the nuisance. This is for the time only, inasmuch as the next day, perhaps, brings more rain, and the dirty pools are replenished.

The pups sometimes get so thoroughly plastered in these muddy, slimy puddles, that the hair falls off in patches, giving them, at first sight, the appearance of being troubled with scrofula or some other plague: from my investigations, directed to this point, I became satisfied that they were not permanently injured, though evidently very much annoyed. With reference to this suggestion as to sickness or distemper among the Seals, I gave the subject direct and continued attention, and in no one of the rookeries could I discover a single Seal, no matter how old or young, which appeared to be suffering in the least from any physical disorder, other than that which they themselves had inflicted, one upon the other, by fighting. The third season, passing directly under my observation, failed to reward my search with any manifestation of disease among the Seals which congregate in such mighty numbers on the rookeries of Saint Paul and Saint George. The remarkable freedom from all such complaints enjoyed by these animals is noteworthy, and the

most trenchant and penetrating cross-questioning of the natives, also, failed to give me any history or evidence of an epidemic in the past.

HOSPITALS.—The observer will, however, notice every summer, gathered in melancholy squads of a dozen to one hundred or so, scattered along the coast where the healthy Seals never go, those sick and disabled bulls which have, in the earlier part of the season, been either internally injured or dreadfully scarred by the teeth of their opponents in fighting. Sand is blown by the winds into the fresh wounds and causes an inflammation and a sloughing, which very often finishes the life of the victim. The sailors term these invalid gatherings "hospitals," a phrase which, like most of their homely expressions, is quite appropriate.

YOUNG SEALS LEARNING TO SWIM.—Early in August, usually by the 8th or 10th, I noticed one of the remarkable movements of the season. I refer to the pup's first essay in swimming. Is it not odd—paradoxical—that the young Seal, from the moment of his birth until he is a month or six weeks old, is utterly unable to swim? If he is seized by the nape of the neck and pitched out a rod into the water from shore, his bullet-like head will drop instantly below the surface, and his attenuated posterior extremities flap impotently on it; suffocation is the question of only a few minutes, the stupid little creature not knowing how to raise his immersed head and gain the air again. After they have attained the age I indicate, their instinct drives them down to the margin of the surf, where the alternate ebbing and flowing of its wash covers and uncovers the rocky or sandy beaches. They first smell and then touch the moist pools, and flounder in the upper wash of the surf, which leaves them as suddenly high and dry as it immersed them at first. After this beginning they make slow and clumsy progress in learning the knack of swimming. For a week or two, when overhead in depth, they continue to flounder about in the most awkward manner, thrashing the water as little dogs do, with their fore feet, making no attempt whatever to use the hinder ones. Look at that pup now, launched out for the first time beyond his depth; see how he struggles—his mouth wide open, and his eyes fairly popping. He turns instantly to the beach, ere he has fairly struck out from the point whence he launched in, and, as the receding swell which at first carried him off his feet and out, now returning leaves him high and dry, for a few minutes he seems so weary that he weakly crawls up, out beyond its swift returning wash, and coils himself up immediately to take a recuperative nap. He sleeps a few minutes, perhaps half an hour, then awakes as bright as a dollar, apparently rested, and at his swimming lesson he goes again. By repeated and persistent attempts, the young Seal gradually becomes familiar with the water and acquainted with his own power over that element, which is to be his real home and his whole support. Once boldly swimming, the pup fairly revels in his new happiness. He and his brethren have now begun to haul and swarm along the whole length of Saint Paul coast, from Northeast Point down and around to Zapadnie, lining the alternating sand-beaches and rocky shingle with their plump, black forms. How they do delight in it! They play with a zest, and chatter like our own children in the kindergartens—swimming in endless evolutions, twisting, turning, or diving—and when exhausted, drawing their plump, round bodies up again on the beach. Shaking themselves dry as young dogs would do, they now either go to sleep on the spot, or have a lazy terrestrial frolic among themselves.

How an erroneous impression ever got into the mind of any man in this matter of the pup's learning to swim, I confess that I am wholly unable to imagine. I have not seen any "driving" of the young pups into the water by the old ones, in order to teach them this process, as certain authors have pointedly affirmed.[1] There is not the slightest supervision by the old mother or father of the pup, from the first moment of his birth, in this respect, until he leaves for the North Pacific,

[1] ALLEN: History of North American Pinnipeds, p. 387.

full-fledged with amphibious power. At the close of the breeding-season, every year, the pups are restlessly and constantly shifting back and forth over the rookery ground of their birth, in large squads, sometimes numbering thousands upon thousands. In the course of this change of position they all sooner or later come in contact with the sea; they then blunder into the water for the first time, in a most awkward, ungainly manner, and get out as quick as they can; but so far from showing any fear or dislike of this, their most natural element, as soon as they rest from their exertion they are immediately ready for a new trial, and keep at it, provided the sea is not too stormy or rough. During all this period of self-tuition they seem thoroughly to enjoy the exercise, in spite of their repeated and inevitable discomfitures at the beginning.

PODDING OF THE PUPS.—The "podding" of these young pups in the rear of the great rookeries of Saint Paul, is one of the most striking and interesting phases of this remarkable exhibition of highly organized life. When they first bunch together they are all black, for they have not begun to shed the natal coat: they shine with an unctuous, greasy reflection, and grouped in small armies or great regiments on the sand-dune tracts at Northeast Point, they present a most extraordinary and fascinating sight. Although the appearance of the "Holluschickie" at English Bay fairly overwhelms the observer with the impression of its countless multitudes, yet I am free to declare, that at no one point in this evolution of the seal-life, during the reproductive season, have I been so deeply stricken by the sense of overwhelming enumeration, as I have, when, standing on the summit of Cross Hill, I looked down to the southward and westward over a reach of six miles of alternate grass and sand-dune stretches, mirrored upon which were hundreds of thousands of these little black pups, spread in sleep and sport within this restricted field of vision. They appeared as countless as the grains of the sand upon which they rested.

SECOND CHANGE OF COAT.—By the 15th of September, all the pups born during the year have become familiar with the water; they have all learned to swim, and are now nearly all down by the water's edge, skirting in large masses the rocks and beaches previously this year unoccupied by Seals of any class. Now they are about five or six times their original weight, or, in other words, they are thirty to forty pounds avoirdupois, as plump and fat as butter-balls, and they begin to take on their second coat, shedding their black pup-hair completely. This second coat does not vary in color, at this age, between the sexes. They effect this transformation in dress very slowly, and cannot, as a rule, be said to have ceased their molting until the middle or 20th of October.

This second coat or sea going jacket, of the pup, is a uniform, dense, light-gray over-hair, with an under-fur which is slightly grayish in some, but in most cases is a soft, light-brown hue. The over-hair is fine, close, and elastic, from two-thirds of an inch to an inch in length, while the fur is not quite half an inch long. Thus the coarser hair shingles over and conceals the soft under-wool completely, giving the color by which, after the second year, the sex of the animal is recognized. The pronounced difference between the sexes is not effected, however, by color alone until the third year of the animal. This over-hair of the young pup's new jacket on the back, neck, and head, is a dark chinchilla-gray, blending into a stone-white, just tinged with a grayish tint on the abdomen and chest. The upper lip, upon which the whiskers or moustaches take root, is covered with hair of a lighter gray than that of the body. This moustache consists of fifteen or twenty longer or shorter bristles, from half an inch to three inches in length, some brownish, horn-colored, and others whitish-gray and translucent, on each side and back and below the nostrils, leaving the muzzle quite prominent and hairless. The nasal openings and their surroundings are, as I have before said when speaking of this feature, similar to those of a dog.

EYES OF THE PUP-SEALS.—The most attractive feature about the fur-seal pup, and that

which holds this place as it grows on and older, is the eye. This organ is exceedingly clear, dark, and liquid, with which, for beauty and amiability, together with real intelligence of expression, those of no other animal that I have ever seen, or have ever read of, can be compared; indeed, there are few eyes in the orbits of men and women which suggest more pleasantly the ancient thought of their being "windows to the soul." The lids to the eye are fringed with long, perfect lashes, and the slightest annoyance, in the way of dust or sand, or other foreign substances, seems to cause them exquisite annoyance, accompanied by immoderate weeping. This involuntary tearfulness so moved Steller that he ascribed it to the processes of the Seal's mind, and declared that the seal-mothers actually shed tears.

RANGE OF VISION.—I do not think that their range of vision on land, or out of the water, is very great. I have experimented frequently with adult Fur Seals, by allowing them to catch sight of my person, so as to distinguish it as of foreign character, three and four hundred paces off, taking the precaution of standing to the leeward of them when the wind was blowing strong, and then walking unconcernedly up to them. I have invariably noticed, that they would allow me to approach quite close before recognizing my strangeness; this occurring to them, they at once made a lively noise, a medley of coughing, spitting, snorting, and blaating, and plunged in spasmodic lopes and shambled to get away from my immediate neighborhood; as to the pups, they all stupidly stare at the form of a human being until it is fairly on them, when they also repeat in miniature these vocal gymnastics and physical efforts of the older ones, to retreat or withdraw a few rods, sometimes only a few feet, from the spot upon which you have cornered them, after which they instantly resume their previous occupation of either sleeping or playing, as though nothing had happened.

BEHAVIOR OF FUR SEALS AT NIGHT.—I naturally enough, when beginning my investigation of these seal-rookeries, expected to find the animals subdued at night, or early morning, on the breeding-grounds; but a few consecutive nocturnal watches satisfied me that the family organization and noise was as active at one time as at another throughout the whole twenty-four hours. If, however, the day preceding had chanced to be abnormally warm, I never failed then to find the rookeries much more noisy and active during the night than they were by daylight. The Seals, as a rule, come and go to and from the sea, fight, roar, and vocalize as much during midnight moments as they do at noonday times. An aged native endeavored to satisfy me that the "Seec tchie" could see much better by twilight and night than by daylight. I am not prepared to prove to the contrary, but I think that the fact of his not being able to see so well himself at that hour of darkness was the true cause of most of his belief in the improved nocturnal vision of the Seals.

As I write, this old Aleut, Phillip Vollkov, has passed to his final rest—"un konchielsah"—winter of 1878-'79. He was one of the real characters of Saint Paul; he was esteemed by the whites on account of his relative intelligence, and beloved by the natives, who called him their "wise man," and who exulted in his piety. Phillip, like the other people there of his kind, was not much comfort to me when I asked questions as to the Seals. He usually answered important inquiries by crossing himself, and replying, "God knows." There was no appeal from this.

SULLENNESS OF OLD MALE SEALS.—The old males, when grouped together by themselves, at the close of the breeding-season, indulge in no humor or frolicsome festivities whatsoever. On the contrary, they treat each other with surly indifference. The mature females, however, do not appear to lose their good nature to anything like so marked a degree as do their lords and masters, for they will at all seasons of their presence on the islands be observed, now and then, to suddenly unbend from severe matronly gravity by coyly and amiably tickling and gently teasing one another, as they rest in the harems, or later, when strolling in September. There is no sign

given, however, by these seal-mothers of desire or action in fondling or caressing their pups; nor do the young appear to sport with any others than the pups themselves, when together. Sometimes a yearling and a five or six months old pup will have a long-continued game between themselves. They are decidedly clannish in this respect—creatures of caste, like Hindoos.

POWER OF SCENT: ODOR OF THE SEALS.—The greatest activity displayed by any one of the five senses of the Seal, is evidenced in its power of scent. This faculty is all that can be desired in the line of alertness. I never failed to awaken an adult Seal from the soundest sleep, when from a half to a quarter of a mile distant, no matter how softly I proceeded, if I got to the windward, though they sometimes took alarm when I was a mile off.

They leave evidences of their being on these great reproductive fields, chiefly at the rookeries, in the hundreds of dead carcasses which mark the last of those animals that have been rendered infirm, sick, or were killed by fighting among themselves in the early part of the season, or of those which have crawled far away from the scene of battle to die from death-wounds received in the bitter struggle for a harem. On the rookeries, wherever these lifeless bodies rest, the living, old and young, clamber and patter backward and forward over and on the putrid remains, and by this constant stirring up of decayed matter, give rise to an exceedingly disagreeable and far-reaching "*funk*." This has been, by all writers who have dwelt on the subject, referred to as the smell which these animals emit for another reason—erroneously called the "rutting odor." If these creatures have any odor peculiar to them when in this condition, I will frankly confess that I am unable to distinguish it from the fumes which are constantly being stirred up and rising out of these decaying carcasses of the older Seals, as well as from the bodies of the few pups which have been killed accidentally by the heavy bulls fighting over them, charging back and forth against one another, so much of the time.

They have, however, a very characteristic and peculiar smell, when they are driven and get heated; their breath exhalations possess a disagreeable, faint, sickly odor, and when I have walked within its influence at the rear of a seal-drive, I could almost fancy, as it entered my nostrils, that I stood beneath an ailanthus tree in bloom; but this odor can by no means be confounded with what is universally ascribed to another cause. It is also noteworthy, that if your finger is touched ever so lightly to a little fur-seal blubber, it will smell very much like that which I have appreciated and described as peculiar to their breath, which arises from them when they are driven, only it is a little stronger. Both the young and old Fur Seals have this same breath taint at all seasons of the year.

REVIEW OF STATEMENTS CONCERNING LIFE IN THE ROOKERIES.—To recapitulate and sum up the system and regular method of life and reproduction on these rookeries of Saint Paul and Saint George, as the Seals seem to have arranged it, I shall say that—

First. The earliest bulls land in a negligent, indolent way, at the opening of the season, soon after the rocks at the water's edge are free from ice, frozen snow, etc. This is, as a rule, about the 1st to the 5th of every May. They land from the beginning to the end of the season in perfect confidence and without fear; they are very fat, and will weigh at an average 500 pounds each; some stay at the water's edge, some go to the tier back of them again, and so on until the whole rookery is mapped out by them, weeks in advance of the arrival of the first female.

Second. That by the 10th or 12th of June, all the male stations on the rookeries have been mapped out and fought for, and held in waiting by the "Seecatchie." These males are, as a rule, bulls rarely ever under six years of age; most of them are over that age, being sometimes three, and occasionally doubtless four, times as old.

Third. That the cows make their first appearance, as a class, on or after the 12th or 15th of

June, in very small numbers; but rapidly after the 23d and 25th of this month, every year, they begin to flock up in such numbers as to fill the harems very perceptibly; and by the 8th or 10th of July, they have all come, as a rule—a few stragglers excepted. The average weight of the females now will not be much more than eighty to ninety pounds each.

Fourth. That the breeding-season is at its height from the 10th to the 15th of July every year, and that it subsides entirely at the end of this month and early in August; also, that its method and system are confined entirely to the land, never effected in the sea.

Fifth. That the females bear their first young when they are three years old, and that the period of gestation is nearly twelve months, lacking a few days only of that lapse of time.

Sixth. That the females bear a single pup each, and that this is born soon after landing; no exception to this rule has ever been witnessed or recorded.

Seventh. That the "Seecatchie" which have held the harems from the beginning to the end of the season, leave for the water in a desultory and straggling manner at its close, greatly emaciated, and do not return, if they do at all, until six or seven weeks have elapsed, when the regular systematic distribution of the families over the rookeries is at an end for the season. A general medley of young males now are free, which come out of the water, and wander over all these rookeries, together with many old males, which have not been on seraglio duty, and great numbers of the females. An immense majority over all others present are pups, since only about 25 per cent. of the mother-seals are out of the water now at any one time.

Eighth. That the rookeries lose their compactness and definite boundaries of true breeding limit and expansion by the 25th to the 28th of July every year; then, after this date, the pups begin to haul back, and to the right and left, in small squads at first, but as the season goes on, by the 18th of August, they depart without reference to their mothers; and when thus scattered, the males, females, and young swarm over more than three and four times the area occupied by them when breeding and born on the rookeries. The system of family arrangement and uniform compactness of the breeding classes breaks up at this date.

Ninth. That by the 8th or 10th of August the pups born nearest the water first begin to learn to swim; and that by the 15th or 20th of September they are all familiar, more or less, with the exercise.

Tenth. That by the middle of September the rookeries are entirely broken up; confused, straggling bands of females are seen among bachelors, pups, and small squads of old males, crossing and recrossing the ground in an aimless, listless manner. The season now is over.

Eleventh. That many of the Seals do not leave these grounds of Saint Paul and Saint George before the end of December, and some remain even as late as the 12th of January; but that by the end of October and the beginning of November every year, all the Fur Seals of mature age—five and six years, and upward—have left the islands. The younger males go with the others: many of the pups still range about the islands, but are not hauled to any great extent on the beaches or the flats. They seem to prefer the rocky shore-margin, and to lie as high up as they can get on such bluffy rookeries as Tolstoi and the Reef. By the end of this month, November, they are, as a rule, all gone.

Such is the sum and the substance of my observations which relate to the breeding-grounds alone on Saint Paul and Saint George. It is the result of summering and wintering on them, and these definite statements I make with that confidence which one always feels, when he speaks of that which has entered into his mind by repeated observation, and has been firmly grounded by careful deductions therefrom.

THE "HOLLUSCHICKIE" OR "BACHELOR" SEALS: A DESCRIPTION.—I now call the attention

of the reader to another very remarkable feature in the economy of the seal-life on these islands. The great herds of "Holluschickie,"[1] numbering from one-third to one-half, perhaps, of the whole aggregate of near 5,000,000 Seals known to the Pribylov group, are never allowed by the "Seecatchie," under the pain of frightful mutilation or death, to put their flippers on or near the rookeries.

By reference to my map, it will be observed that I have located a large extent of ground—markedly so on Saint Paul—as that occupied by the Seals' "hauling-grounds"; this area, in fact, represents those portions of the island upon which the "Holluschickie" roam in their heavy squadrons, wearing off and polishing the surface of the soil, stripping every foot, which is indicated on the chart as such, of its vegetation and mosses, leaving the margin as sharply defined on the bluffy uplands and sandy flats as it is on the map itself.

The reason that so much more land is covered by the "Holluschickie" than by the breeding Seals—ten times as much at least—is due to the fact, that though not as numerous, perhaps, as the breeding Seals, they are tied down to nothing, so to speak—are wholly irresponsible, and roam hither and thither as caprice and the weather may dictate. Thus they wear off and rub down a much larger area than the rookery Seals occupy; wandering aimlessly, and going back, in some instances, notably at English Bay, from one-half to a whole mile inland, not traveling in desultory files along winding, straggling paths, but sweeping in solid platoons, they obliterate every spear of grass and rub down nearly every hummock in their way..

DEFINITION OF "HOLLUSCHICKIE."—All the male Seals, from six years of age, are compelled to herd apart by themselves and away from the breeding-grounds, in many cases far away; the large hauling-grounds at Southwest Point being about two miles from the nearest rookery. This class of Seals is termed "Holluschickie" or the "Bachelor" Seals by the natives, a most fitting and expressive appellation.

The Seals of this great subdivision are those with which the natives on the Pribylov group are the most familiar: naturally and especially so, since they are the only ones, with the exception of a few thousand pups, and occasionally an old bull or two, taken late in the fall for food and skins, which are driven up to the killing grounds at the village for slaughter. The reasons for this exclusive attention to the "Bachelors" are most cogent, and will be given hereafter when the "business" is discussed.

LOCATING THE HAULING-GROUNDS: PATHS THROUGH THE ROOKERIES.—Since the "Holluschickie" are not permitted by their own kind to land on the rookeries and stop there, they have the choice of two methods of locating, one of which allows them to rest in the rear of the rookeries, and the other on the free beaches. The most notable illustration of the former can be witnessed on Reef Point, where a pathway is left for their ingress and egress through a rookery—a path left by common consent, as it were, between the harems. On these trails of passage they come and go in steady files all day and all night during the season, unmolested by the jealous bulls which guard the seraglios on either side as they travel; all peace and comfort to the young Seal if he minds his business and keeps straight on up or down, without stopping to nose about right or left; all woe and desolation to him, however, if he does not, for in that event he will be literally torn in bloody griping, from limb to limb, by the vigilant old "Seecatchie."

Since the two and three year old "Holluschickie" come up in small squads with the first bulls in the spring, or a few days later, such common highways as those between the rookery-ground and the sea are traveled over before the arrival of the cows, and get well defined. A passage for the "Bachelors," which I took much pleasure in observing day after day at Polavina, another at Tolstoi, and two on the Reef, in 1872, were entirely closed up by the "Seecatchie" and obliterated,

[1] The Russian term "Holluschickie" or "Bachelors" is very appropriate, and is usually employed.

when I again searched for them in 1874. Similar passages existed, however, on several of the large rookeries of Saint Paul; one of those at Tolstoi exhibits this feature very finely, for here the hauling-ground extends around from English Bay, and lies up back of the Tolstoi Rookery, over a flat and rolling summit, from 100 to 120 feet above the sea-level. The young males and yearlings of both sexes come through and between the harems, at the height of the breeding-season, on two of these narrow pathways, and before reaching the ground above, are obliged to climb up an almost abrupt bluff, which they do by following and struggling in the water-runs and washes which are worn into its face. As this is a large hauling-ground, on which, every favorable day during the season, fifteen or twenty thousand commonly rest, the sight of skillful seal-climbing can be witnessed here at any time during that period; and the sight of such climbing as this of Tolstoi is exceedingly novel and interesting. Why, verily, they ascend over and upon places where an ordinary man might, at first sight, with great positiveness say that it was utterly impossible for him to climb.

HAULING-GROUNDS ON THE BEACHES.—The other method of coming ashore, however, is the one most followed and favored. In this case they avoid the rookeries altogether, and repair to the unoccupied beaches between them, and then extend themselves out all the way back from the sea, as far from the water, in some cases, as a quarter and even half of a mile. I stood on the Tolstoi sand-dunes one afternoon, toward the middle of July, and had under my eyes, in a straightforward sweep from my feet to Zapadnie, a million and a half of Seals spread out on these hauling-grounds. Of these, I estimated that fully one-half, at that time, were pups, yearlings, and "Holluschickie." The rookeries across the bay, though plainly in sight, were so crowded, that they looked exactly as I have seen surfaces appear upon which bees had swarmed in obedience to that din and racket made by the watchful apiarian, when he desires to hive the restless honey-makers.

The great majority of yearlings and "Holluschickie" are annually hauled out and packed thickly over the sand-beach and upland hauling-grounds, which lie between the rookeries on Saint Paul Island. At Saint George there is nothing of this extensive display to be seen, for here is only a tithe of the seal-life occupying Saint Paul, and no opportunity whatever is afforded for an amphibious parade.

GENTLENESS OF THE SEALS.—Descend with me from this sand-dune elevation of Tolstoi, and walk into that drove of "Holluschickie" below us; we can do it; you do not notice much confusion or dismay as we go in among them; they simply open out before us and close in behind our tracks, stirring, crowding to the right and left as we go, twelve or twenty feet away from us on each side. Look at this small flock of yearlings, some one, others two, and even three years old, which are coughing and spitting around us now, staring up in our faces in amazement as we walk ahead; they struggle a few rods out of our reach, and then come together again behind us, showing no further sign of notice of ourselves. You could not walk into a drove of hogs at Chicago, without exciting as much confusion and arousing an infinitely more disagreeable tumult; and as for sheep on the plains, they would stampede far quicker. Wild animals indeed! You can now readily understand how easy it is for two or three men, early in the morning, to come where we are, turn aside from this vast herd in front of and around us two or three thousand of the best examples, and drive them back, up and over to the village. That is the way they get the Seals; there is not any "hunting" or "chasing" or "capturing" of Fur Seals on these islands.

"HOLLUSCHICKIE" DO NOT FAST.—While the young male Seals undoubtedly have the power of going for lengthy intervals without food, they, like the female Seals on the breeding-grounds, certainly do not maintain any long fasting periods on land; their coming and going from the shore is frequent and irregular, largely influenced by the exact condition of the weather from day to day;

for instance, three or four thick, foggy days seem to call them out from the water by hundreds of thousands upon the different hauling-grounds (which the reader observes recorded on my map). In some cases, I have seen them lie there so close together that scarcely a foot of ground, over whole acres, is bare enough to be seen; then a clear and warmer day follows, and this seal-covered ground, before so thickly packed with animal life, will soon be almost deserted: comparatively so at least, to be filled up immediately as before, when favorable weather shall again recur. They must frequently eat when here, because the first yearlings and "Holluschickie" that appear in the spring are no fatter, sleeker, or livelier than they are at the close of the season; in other words, their condition, physically, seems to be the same from the beginning to the end of their appearance here during the summer and fall. It is quite different, however, with the "Seecatch"; we know how and where it spends two to three months, because we find it on the grounds at all times, day or night, during that period.

SPORTS AND PASTIMES OF THE YOUNG "BACHELORS."—A small flock of the young Seals, one to three years old, generally, will often stray from these hauling-ground margins, up and beyond, over the fresh mosses and grasses, and there sport and play one with another, just as little puppy-dogs do; and when weary of this gamboling a general disposition to sleep is suddenly manifested, and they stretch themselves out and curl up in all the positions and all the postures that their flexible spines and ball-and-socket joints will permit. They seem to revel in the unwonted vegetation, and to be delighted with their own efforts in rolling down and crushing the tall stalks of the grasses and umbelliferous plants; one will lie upon its back, hold up its hind-flippers, and lazily wave them about, while it scratches, or rather rubs, its ribs with the fore-hands alternately, the eyes being tightly closed during the whole performance; the sensation is evidently so luxurious that it does not wish to have any side-issue draw off its blissful self-attention. Another, curled up like a cat on a rug, draws its breath, as indicated by the heaving of its flanks, quickly but regularly, as though in heavy sleep; another will lie flat upon its stomach, its hind-flippers covered and concealed, while it tightly folds its fore-feet back against its sides, just as a fish carries its pectoral fins—and so on to no end of variety, according to the ground and the fancy of the animals.

These "Bachelor" Seals are, I am sure, without exception, the most restless animals in the whole brute creation, which can boast of a high organization. They frolic and lope about over the grounds for hours, without a moment's cessation, and their sleep, after this, is exceedingly short, and it is ever accompanied with nervous twitchings and uneasy muscular movements; they seem to be fairly brimful and overrunning with spontaneity—to be surcharged with fervid, electric life.

Another marked feature which I have observed among the multitudes of "Holluschickie," which have come under my personal observation and auditory, and one very characteristic of this class, is, that nothing like ill-humor appears in all of their playing together; they never growl or bite, or show even the slightest angry feeling, but are invariably as happy, one with another, as can be imagined. This is a very singular trait; they lose it, however, with astonishing rapidity, when their ambition and strength develop and carry them, in due course of time, to the rookery.

The pups and yearlings have an especial fondness for sporting on the rocks which are just at the water's level and awash, so as to be covered and uncovered as the surf rolls in. On the bare summit of these wave-worn spots, they will struggle and clamber in groups of a dozen or two at a time throughout the whole day, in endeavoring to push off that one of their number which has just been fortunate enough to secure a landing; the successor has, however, but a brief moment of exultation in victory, for the next roller that comes booming in, together with the pressure by its friends, turns the table, and the game is repeated, with another Seal on top. Sometimes, as well as I could see, the same squad of "Holluschickie" played for a whole day and night, without a

moment's cessation, around such a rock as this, off Nah Speel Rookery; but in this observation I may be mistaken, because the Seals cannot be told apart.

SEALS AMONG THE BREAKERS.—The graceful unconcern with which the Fur Seal sports safely in, among, and under booming breakers, during the prevalence of the numerous heavy gales at the islands, has afforded me many consecutive hours of spell-bound attention to them, absorbed in watching their adroit evolutions within the foaming surf, that seemingly, every moment, would, in its fierce convulsions, dash these hardy swimmers, stunned and lifeless, against the iron-bound foundations of the shore, which alone checked the furious rush of the waves. Not at all. Through the wildest and most ungovernable mood of the roaring tempest and storm-tossed waters attending its transit, I never failed, on creeping out, and peering over the bluffs, in such weather, to see squads of these perfect watermen—the most expert of all amphibians—gamboling in the seething, creamy wake of mighty rollers, which constantly broke in thunder tones over their alert, dodging heads. The swift succeeding seas seemed, every instant, to poise the Seals at the very verge of death. Yet the *Callorhinus*, exulting in his skill and strength, bade defiance to their wrath, and continued his diversions.

SWIMMING FEATS OF THE "BACHELORS."—The "Holluschickie" are the champion swimmers of all the seal tribe; at least, when in the water around the islands, they do nearly every fancy tumble and turn that can be executed. The grave old males and their matronly companions seldom indulge in any extravagant display, as do these youngsters, jumping out of the water like so many dolphins, describing beautiful elliptic curves sheer above its surface, rising three and even four feet from the sea, with the back slightly arched, the fore-flippers folded tightly against the sides, and the hinder ones extended and pressed together straight out behind, plumping in head first, to reappear in the same manner, after an interval of a few seconds of submarine swimming, like the flight of a bird, on their course. Sea Lions and Hair Seals never jump in this manner.

All classes will invariably make these dolphin-jumps, when they are surprised or are driven into the water, curiously turning their heads while sailing in the air, between the "rises" and "plumps," to take a look at the cause of their disturbance. They all swim rapidly, with the exception of the pups, and may be said to dart under the water with the velocity of a bird on the wing; as they swim they are invariably submerged, running along horizontally about two or three feet below the surface, guiding their course by the hind-flippers as by a rudder, and propelling themselves solely by the fore-feet, rising to breathe at intervals which are either very frequent or else so wide apart that it is impossible to see the speeding animal when he rises a second time.

How long they can remain under water without taking a fresh breath, is a problem which I had not the heart to solve, by instituting a series of experiments at the island; but I am inclined to think that, if the truth were known in regard to their ability of going without rising to breathe, it would be considered astounding. On this point, however, I have no data worth discussing, but will say that, in all their swimming which I have had a chance to study, as they passed under the water, mirrored to my eyes from the bluff above by the whitish-colored rocks below the rookery waters at Great Eastern Rookery, I have not been able to satisfy myself how they used their long, flexible hind-feet, other than as steering media. If these posterior members have any perceptible motion, it is so rapid that my eye is not quick enough to catch it; but the fore-flippers, however, can be most distinctly seen, as they work in feathering forward and sweeping flatly back, opposed to the water, with great rapidity and energy. They are evidently the sole propulsive power of the Fur Seal in the water, as they are its main fulcrum and lever combined, for progression on land. I regret that the shy nature of the Hair Seal never allowed me to study its swimming motions, but it seems to be a general point of agreement among authorities on the *Phocidæ*, that all motion in

water by them arises from that power which they exert and apply with the hind-feet. So far as my observations on the Hair Seal go, I am inclined to agree with this opinion.

All their movements in water, whether they are traveling to some objective point or are in *sport, are quick and joyous; and nothing is more suggestive* of intense satisfaction and pure physical comfort, than is that spectacle which we can see every August, a short distance out at sea from any rookery where thousands of old males and females are idly rolling over in the billows side by side, rubbing and scratching with their fore- and hind-flippers, which are here and there stuck up out of the water by their owners, like the lateen-sails of the Mediterranean feluccas, or, when the *hind-flippers are presented*, like a "cat-o'-nine tails." They sleep in the water a great deal, too, more than is generally supposed, showing that they do not come on land to rest—very clearly not.

LEAPING OUT OF WATER: "DOLPHIN-JUMPS."—As I never detected the Sea Lions or the Hair Seals leaping from the water around these islands, in those peculiar dolphin-like jumps which I have hitherto described, I made a note of it early during my first season of observation, for corroboration in the next. It is so: neither the Sea Lion nor the Hair Seal here ever leaped from the ocean in this agile and singular fashion heretofore described. Allen, so conservative usually, seems, however, to have fallen into an error by reading the notes of Mr. J. H. Blake, descriptive of the Sea Lions of the Gallapagos Islands. As Allen quotes them entire in a foot-note,[1] I am warranted in calling attention to the fact, that no authentic record has as yet been made of such peculiar swimming by *Phocidæ*, or the sea-lion branch of the *Otariidæ*. My notice has been called to this mistake by Professor Allen's own note, page 367, upon a quotation from my work, citing Mr. Blake's notes above referred to, which are themselves very interesting, but do not even hint at a dolphin-jump.

How fast the Fur Seal can swim, when doing its best, I am naturally unable to state. I do know that a squad of young "Holluschickie" followed the "Reliance," in which I was sailing, down from the latitude of the Seal Islands to Akootan Pass with perfect ease, laying around the vessel, while she was logging straight ahead, 14 knots to the hour.

The Fur Seal, the Sea Lion, the Walrus, and the Hair Seal all swim around these islands, and in these waters, submerged, extended horizontally and squarely upon their stomachs. I make this note here because I am surprised to read[2] that the Harp (Hair) Seal's "favorite position when swimming, as affirmed by numerous observers, is on the back or side, in which position they also sleep in the water." Although this is a far-distant, geographically speaking, relative of the Hair Seal of Saint Paul Island, yet the remarkable difference in fashion of swimming seems hardly warranted, when the two animals are built exactly alike. Still, I have no disposition to question, earnestly, the truth of the statement, inasmuch as I have learned of so many very striking radical differences in habits of animals as closely related, as to pause, ere seriously doubting this assertion that a Harp Seal's favorite way in swimming is to lie upon its back when so doing. It is simply an odd contradiction to the method employed by the Hair Seals of the North Pacific and of Bering Sea.

While I am unable to prove that the Fur Seal possesses the power to swim to a very great depth, by actual tests instituted, yet I am free to say that it certainly can dive to the uttermost depths, where its food-fish are known to live in the ocean; it surely gives full and ample evidence of possessing the muscular power for that enterprise. In this connection, it is interesting to cite the testimony of Mr. F. Borthen, the proprietor of the Fro Islands, a group of small islets off Trondhjems Fiörd, in Norway; this gentleman has had an opportunity of watching the Gray Seal

[1] *History of North American Pinnipeds, p. 211.*
[2] ALLEN: *op. cit.*, p. 651.

(*Halichœrus grypus*) as it bred and rested on these rocks during an extended period of time. Among many interesting notes as to the biology of this large Hair Seal, he says: "As a proof that they [the Seals] fetch their food from a considerable depth, it is related that a few years ago a young one was found caught by one of the hooks of a fishing line that was placed at a depth of between seventy and eighty fathoms, on the outer side of the islands. Gray Seals have several times been seen to come up to the surface with lings (*Molva vulgaris*) and other deep-water fishes in their mouths, such fishes seldom or never found at a less depth than between sixty and seventy fathoms."[1]

CLASSING THE "HOLLUSCHICKIE" BY AGE.—When the "Holluschickie" are up on land they can be readily separated into their several classes as to age by the color of their coats and size, when noted, namely, the yearlings, the two, three, four, and five years old males. When the yearlings, or the first class, haul out, they are dressed just as they were after they shed their pup-coats and took on the second covering during the previous year in September and October; and now, as they come out in the spring and summer, one year old, the males and females cannot be distinguished apart, either by color or size, shape or action; the yearlings of both sexes have the same steel-gray backs and white stomachs, and are alike in behavior and weight.

Next year these yearling females, which are now trooping out with the youthful males on the hauling-grounds, will repair to the rookeries, while their male companions will be obliged to come again to this same spot.

SHEDDING THE HAIR: STAGEY SEALS.—About the 15th and 20th of every August, they have become perceptibly "stagey," or, in other words, their hair is well under way in shedding. All classes, with the exception of the pups, go through this process at this time every year. The process requires about six weeks between the first dropping or falling out of the old over-hair, and its full substitution by the new. This takes place, as a rule, between August 1 and September 28.

The fur is shed, but it is so shed that the ability of the Seal to take to the water and stay there, and not be physically chilled or disturbed during the process of molting, is never impaired. The whole surface of these extensive breeding-grounds, traversed over by us after the Seals had gone, was literally matted with the shed hair and fur. This under-fur or pelage is, however, so fine and delicate, and so much concealed and shaded by the coarser over-hair, that a careless eye or a superficial observer might be pardoned in failing to notice the fact of its dropping and renewal.

The yearling cows retain the colors of the old coat in the new, when they shed it for the first time, and from that time on, year after year, as they live and grow old. The young three-year-olds and the older cows look exactly alike, as far as color goes, when they haul up at first and dry-out on the rookeries, every June and July.

The yearling males, however, make a radical change when they shed for the first time, for they come out from their "staginess" in a nearly uniform dark gray, and gray and black mixed, and lighter, with dark ocher to whitish on the upper and under parts, respectively. This coat, next year, when they appear as two-year-olds, shedding for the three-year-old coat, is a very much darker gray, and so on to the third, fourth, and fifth season; then after this, with age, they begin, to grow more gray and brown, with rufous-ocher and whitish-tipped over-hair on the shoulders. Some of the very old bulls change in their declining years to a uniform shade all over of dull-grayish ocher. The full glory and beauty of the Seal's moustache is denied to him until he has attained his seventh or eighth year.

COMPARATIVE SIZE OF FEMALES AND MALES.—The female does not get her full growth and weight until the end of her fourth year, so far as I have observed, but she does most of her

[1] ROBERT COLLETT: On the Gray Seal. Proceedings Zoölogical Society London, part ii, 1881, p. 387.

growing longitudinally in the first two; after she has passed her fourth and fifth years, she weighs from thirty to fifty pounds more than she did in the days of her youthful maternity.

The male does not get his full growth and weight until the close of his seventh year, but realizes most of it, osteologically speaking, by the end of the fifth; and from this it may be perhaps truly inferred, that the male Seals live to an average age of eighteen or twenty years, if undisturbed in a normal condition, and that the females attain ten or twelve seasons under the same favorable circumstances. Their respective weights, when fully mature and fat in the spring, will, in regard to the male, strike an average of from four to five hundred pounds, while the females will show a mean of from seventy to eighty pounds.

I did not permit myself to fall into error in estimating this matter of weight, because I early found that the apparent huge bulk of a sea-lion bull or fur-seal male, when placed upon the scales, shrank far below my notions: I took a great deal of pains, on several occasions, during the killing season, to have a platform scale carted out into the field, and as the Seals were knocked down, and before they were bled, I had them carefully weighed, constructing the following table from my observations:

Table showing the weight, size, and growth of the Fur Seal (Callorhinus ursinus), from the pup to the adult, male and female.

Age.	Length.	Girth.	Gross weight of body.	Weight of skin.	Remarks.
	Inches.	*Inches.*	*Pounds.*	*Pounds.*	
One week	12 to 14	10 to 10½	6 to 7½	1½	A male and female, being the only ones of the class handled, June 20, 1873.
Six months	24	25	39	3	A mean of ten examples, males and females, alike in size, November 28, 1872.
One year	38	26	39	4½	A mean of six examples, males and females, alike in size, July 14, 1873.
Two years	45	30	58	5½	A mean of thirty examples, all males, July 24, 1873.
Three years	52	36	87	7	A mean of thirty-two examples, all males, July 24, 1873.
Four years	58	42	135	12	A mean of ten examples, all males, July 24, 1873.
Five years	65	52	200	16	A mean of five examples, all males, July 24, 1873.
Six years	72	64	280	25	A mean of three examples, all males, July 24, 1873.
Eight to twenty years.	75 to 80	70 to 75	400 to 500	45 to 50	An estimate only, calculating on their weight when fat, and early in the season.

WEIGHT OF FEMALE SEALS.—The adult females will correspond with the three-year-old males in the above table, the younger cows weighing frequently only seventy-five pounds, and many of the older ones going as high as one hundred and twenty, but an average of eighty to eighty-five pounds is the rule. Those specimens of the females which I have weighed were examples taken by me for transmission to the Smithsonian Institution, otherwise I should not have been permitted to make this record of their weight, inasmuch as weighing them means to kill them; and the law and the habit, or rather the prejudice of the entire community up there, is unanimously in opposition to any such proceeding, for they never touch females here, and never set their foot on or near the breeding-grounds on such an errand. It will be noticed, also, that I have no statement of the weights of those exceedingly fat and heavy males which first appear on the breeding-grounds in the spring; those which I have referred to, in the table above given, were very much heavier at the time of their first appearance in May and June, than at the moment when they were in my hands, in July; but the cows, in the other class, do not sustain protracted fasting, and therefore their weights may be considered substantially the same throughout the year.

CHANGE IN WEIGHT.—Thus, from the fact that all the young Seals and females do not change much in weight from the time of their first coming out in the spring, till that of their leaving in the fall and early winter, I feel safe in saying that they feed at irregular but not long intervals,

during the time that they are here under our observation, since they are constantly changing from land to water and from water to land, day in and day out. I do not think that the young males fast longer than a week or ten days at a time, as a rule.

DISPERSAL OF THE "HOLLUSCHICKIE."—By the end of October and the 10th of November, the great mass of the "Holluschickie," the trooping myriads of English Bay, Southwest Point, Reef Parade, Lukannon Sands, the table-lands of Polavina, and the mighty hosts of Novostashnah, at Saint Paul, together with the quota of Saint George, had taken their departure from its shores, and had gone out to sea, spreading with the receding schools of fish that were now returning to the deep waters of the North Pacific, where, in that vast expanse, over which rolls an unbroken billow, five thousand miles from Japan to Oregon, they spend the winter and the early spring, until they reappear and break up, with their exuberant life, the dreary winter isolation of the land which gave them birth.

TASTE OF THE SEALS IN THE MATTER OF WEATHER.—A few stragglers remain, however, as late as the snow and ice will permit them to, in and after December; they are all down by the water's edge then, and haul up entirely on the rocky beaches, deserting the sand altogether; but the first snow that falls makes them very uneasy, and I have seen a large hauling-ground so disturbed by a rainy day and night, that its hundreds of thousands of occupants fairly deserted it. The Fur Seal cannot bear, and will not endure, the spattering of sand into its eyes, which always accompanies the driving of a rain-storm; they take to the water, to reappear when the nuisance shall be abated.

The weather in which the Fur Seal delights is cool, moist, foggy, and thick enough to keep the sun always obscured, so as to cast no shadows. Such weather, which is the normal weather of Saint Paul and Saint George, continued for a few weeks in June and July, brings up from the sea millions of Fur Seals. But, as I have before said, a little sunshine, which raises the temperature as high as 50° to 55° Fahr., will send them back from the hauling-grounds almost as quickly as they came. Fortunately these warm, sunny days on the Pribylov Islands are so rare that the Seals certainly can have no ground of complaint, even if we may presume they have any at all. Some curious facts in regard to their selection of certain localities on these islands, and their abandonment of others, I will discuss in a succeeding chapter, descriptive of the rookeries; this chapter is illustrated by topographical surveys made by myself.

ALBINOS.—I looked everywhere and constantly, when treading my way over acres of ground which were fairly covered with seal-pups, and older ones, for specimens that presented some abnormity, that is, monstrosities, albinos, etc., such as I have seen in our great herds of stock; but I was, with one or two exceptions, unable to note anything of the kind. I have never seen any malformations or "monsters" among the pups and other classes of the Fur Seals, nor have the natives recorded anything of the kind, so far as I could ascertain from them. I saw only three albino pups among the multitudes on Saint Paul, and none on Saint George. They did not differ, in any respect, from the normal pups in size and shape. Their hair, for the first coat, was a dull ocher all over; the fur whitish, changing to a rich brown, the normal hue; the flippers and muzzle were a pinkish flesh-tone in color, and the iris of the eye sky-blue. When they shed the following year, they are said to have a dirty, yellowish-white color, which makes them exceedingly conspicuous when mixed in among a vast majority of black pups, gray yearlings, and "Holluschickie" of their kind.

MONSTROSITIES AMONG THE SEALS.—Touching this question of monstrosities, I was led to examine a number of alleged examples presented to my attention by the natives, who took some interest, in their sluggish way, as to what I was doing here. They brought me an albino fur-seal

pup, nothing else, and gravely assured me that they knew it owed its existence to the fecundation of a sea-lion cow by a fur-seal bull; if not so, how could it get that color? I was also confronted with a specimen—a full and finely grown four-year-old *Callorhinus* which had, at some earlier day, lost its testicles either by fighting or accident while at sea; perhaps shaven off by the fangs of a saw-toothed shark, and also gravely asked to subscribe to the presence of a hermaphrodite!

Undoubtedly some abnormal birth shapes must make their appearance occasionally; but at no time while I was there, searching keenly for any such manifestation of malformation on the rookeries, did I see a single example. The morphological symmetry of the Fur Seal is one of the most salient of its characteristics, viewed as it rallies here in such vast numbers, but the osteological differentiation and asymmetry of this animal are equally surprising.

WHERE DO THE SEALS DIE?—It is perfectly evident that a large percentage of this immense number of Seals must die every year from natural limitation of life. They do not die on these islands; that much I am certain of. Not one dying a natural death could I find or hear of on the grounds; they evidently lose their lives at sea, preferring to sink with the *rigor mortis* into the cold, blue depths of the great Pacific, or beneath the green waves of Bering Sea, rather than to encumber and disfigure their summer haunts on the Pribylov Islands.

THE REPRODUCTION OF THE FUR SEAL.[1]—By treating this subject at length, my object is to fix attention upon several points connected with the reproduction of the Fur Seal which have vital importance to its relation with, and residence upon, the breeding-grounds of these islands under discussion. In the first place, naturalists generally have taken notice of the generative apparatus exhibited by the *Phocidæ;* and, while they have spoken at length in anatomical detail and discussion of the male organs of the *Otariidæ*, yet they exhibit a strange neglect or oversight with respect to those of the female. The singular cloacal arrangement of the female organs of generation in the *Phocidæ* has excited comment and description from the earliest times.

The modification of the generative apparatus peculiar to the male *Otariidæ*, in contradistinction to those organs possessed by the male *Phocidæ*, has been noticed to some extent by several authorities[2] prior to the date of this publication; but, while calling attention to this marked change in the morphology of the male organs of the *Otariidæ*, they are silent in regard to the fact that, though the *Phocidæ* are very distinct, by the armature of the males, from the *Otariidæ*, yet the cloacal arrangement of the females in both genera is identical. This is in itself, as I view it, quite as remarkable with regard to the females as it is noteworthy in respect to the males. Surely the wonderful modification of the physical structure of the male Fur Seal from that of his kindred, the Hair Seal, is very great; and we are not surprised to find that his generative organs are pronounced, in common with all the others, distinct. So the females differ, physically, in every respect, to as great a degree, with the solitary exception of the intra-uterine life, and the cloacal form of the external generative organs.

NECESSITY OF UNDERSTANDING THE SUBJECT.—This subject of the method of reproduction,

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[1] When they the approaching time perceive,
They flee the deep, and watery pastures leave:
On the dry ground, far from the swelling tide,
Bring forth their young, and on the shores abide
Till twice six times they see the Eastern gleams
Brighten the hills, and tremble on the streams,
The thirteenth morn, soon as the early dawn
Hangs out its crimson folds or spreads its lawn,
No more the fields and lofty coverts please,
Each hugs her own, and hastes to rolling seas.
—*Old Roman poem: Hair Seals of the Mediterranean.*

[2] ALLEN: North American Pinnipeds, 1880. MURIE: Trans. Zool. Soc., 1869–'72.

as carried out by the Fur Seals on the breeding-grounds of the Pribylov Islands, should be understood distinctly and authoritatively, before the truth or falsity of certain hypotheses, which depend upon it, can be intelligently discussed. The general impression and commonly-received opinion in the popular, as well as the scientific world, is that the amphibian life of the ocean breeds in the water thereof; or, in other words, that the fertilization of the seal-life takes place by coition therein, and that the young may be born in this watery element, safely nurtured and cared for by their mothers.[1] No end of fanciful rumor and romance has been published touching this point. We are told that some man of great credibility has seen Seals in the water, with their new-born clasped to their bosoms, rising in the waves to look at their disturbers, and then sinking, to carry away their young to safety and quiet. To this fanciful description, undoubtedly, the mermaid owes its origin in our recent mythology; for the Hair Seal, in especial, has a bland, round, full physiognomy; the large circular eyes are placed more in front of the skull than in the crania of any other genera of its kind. Such a head popping up suddenly in front of the mariner might naturally suggest a human face; and it needs but a very little embellishment to trim it with long hair, place mammæ on its bosom, and all the other peculiar attributes of the yellow-haired mermaid so celebrated in song and art.

FINE OPPORTUNITIES FOR OBSERVATION.—Therefore, what I wish to distinctly settle with regard to the reproduction of the Fur Seal, which I now have under consideration, is that mooted question as to the place, the manner, and the time of the union of the two sexes necessary for the reproduction of its kind. I have no personal knowledge of the system of fertilization employed, with reference to it, by the *Phocidæ;* hence I shall not attempt to describe it.[2] What I have

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[1] Reasonably enough, the closet naturalist, no matter how able, will be deceived now and then in this manner by untrustworthy statements made by those who are supposed to know by personal observation of what they affirm.

As an apt illustration of this confusion which the best of closet naturalists are thrown into by untrustworthy information touching this very matter, I may cite the case of Hamilton, who, in 1839, while writing of the Fur Seal of Cook and Forster, discovered in particular by them on South Georgia, in 1771, declares it to be no Fur Seal at all! He feels warranted in doing so, because one Captain Weddell says so. This authority was a hardy sailor who made sealing a specialty in the Antarctic during 1823–'26. Hamilton, after specifying the wide range of this *Arctocephalus*, "at Dusky Bay, New Zealand, in New Georgia, Staten Land, Juan Fernandez, and the Gallapagos," goes on to say:

"It will be observed that several of these authorities, particularly Dampier and Cook, speak of the fineness of the fur of this Seal. It is probably these statements which have led the able author of the article *Phoque* in the "Dict. Classique d'Hist. Naturelle" to state that this Seal is the Fur Seal of commerce. His words are: 'L'otarii de Forster est le Phoque à fourrures des pêcheurs européens.' But this, we suspect, is a mistake. No one will doubt that Captain Weddell was familiar with the Fur Seal. He was also familiar with the Ursine Seal, both as encountered in its haunts and as described by naturalists; and yet, when speaking of the Ursine Seal (so denominated by him), he never once hints that its fur has any peculiar value, but the contrary."—Amphibious Carnivora. Edinburg, 1839, p. 265.

Thus Hamilton quotes this old sailor, Weddell, throughout his whole memoir, with the utmost trust; and in the same manner others have been cited. They are worthless, unless taken "cum grano salis." The "long and short" of it is this: when most of the seafaring sealers and whalers are in the field, they are blind to everything except the mere capture of their quarry. When they return, they are importuned, usually at first, for details which, in fact, they have never thought of, while away.

[2] "The inconsequential numbers of the Hair Seal around and on the Pribylov Islands, seem to be characteristic of all Alaskan waters and the northwest coast; also, the *Phocidæ* are equally scant on the Asiatic littoral margins. Only the following four species are known to exist throughout the entire extent of that vast marine area, viz:

PHOCA VITULINA—Everywhere, between Bering Straits and California.

PHOCA FŒTIDA—Plover Bay, Norton's Sound, Kuskokvim mouth, and Bristol Bay, of Bering Sea; Cape Seartze Kammin, Arctic Ocean to Point Barrow.

ERIGNATHUS BARBATUS—Kamtchatkan coast, Norton's Sound, Kuskokvim mouth, and Bristol Bay, of Bering Sea.

HISTRIOPHOCA FASCIATA—Yukon mouth, and coast south to Bristol Bay, of Bering Sea and drifting ice therein.

Then, in addition to this, Mr. Ivan Petrov, the special agent of the Tenth Census, United States Army, reports the presence of a land-locked Seal in the fresh waters of Iliamna Lake, and also in Lake Walker. It may be as distinct from any of the *Phocidæ* above enumerated as is the Baikal or the Caspian Seals; and, as such, I suggest that it shall receive the name of *Phoca petrovi*, when it is eventually secured, and if identified as new to our lists.—Preliminary Report of Progress, Census of Alaska: Ivan Petrov, Washington, December, 1880, p. 45.

In this connection, it is a somewhat curious fact that the description which Aristotle [300 B. C.] gives of the

heard from the natives would point clearly to the fact, that they know nothing really worthy of scientific attention; but in regard to the Fur Seal I have had unusual advantages, and an extended experience, ranging over four consecutive breeding-seasons, in which thousands of these animals, all perfectly in accord, have passed within the scope of my observation and record.

GENITALIA OF THE MALE AND FEMALE FUR SEAL.—Considering the male *Callorhinus:* When it is first born the external organs of generation are not evidenced to the sight, and it requires a nice touch to find them under the skin. It is not until this animal has rounded off the second year of its existence, that the testes descend and become externally exposed: first faintly, but rapidly succeeding to the same prominence and same relative position that they occupy in the example of the dog. When this creature becomes three and four years old, its testes hang pendant in a somewhat flabby scrotum, which in the old male is as pendulous as that of an ordinary bull; *the sack is smooth and shiny, entirely devoid of hair, and black, with a slightly wrinkled* surface. The sheath of the penis is so merged with the skin of the abdomen that it does not lie ribbed there and prominent as in the other carnivora; but it is an erectile organ, with a bony skeleton, *measuring, when fully developed, from five to seven inches in length.* The *females* have their parts of generation exactly as they are described by Owen and Huxley—which descriptions are based upon examples of the well-known *Phocidæ;* their external organs are entirely concealed, by the fact that the rectum terminates on the opposite side of the vulva; and a common, somewhat flaccid, sphincter closes both apertures. In other words, the anal and genital openings of the female are united into a single one, through which the regular secretions of the body pass, and the forces of reproduction are received and introduced. Thus, while the female *Phocidæ* correspond in this respect with the female *Otariidæ*, yet the extraordinary development of the male organs in the *Otariidæ* are quite marked, when contrasted with those peculiar to the *Phocidæ*.[1]

NO EVIDENCE OF RUTTING ODORS: SPEEDY BIRTH OF PUPS.—When the male Fur Seals or "Seecatchie," as the natives call them—a term implying strength and virility—arrive first upon the breeding-grounds, long before the coming of the females, as described in a preceding chapter of this monograph, they give no evidence of being in rut; nor do they emit any odor during the rest of the season which at all resembles the "rutting odor" ascribed to many animals. I call attention to this because a common blunder has been made, and likely will be made, whereby the smell upon the rocks, so far-reaching and so offensive, is called the "rutting funk." It is, as I have also stated, due to other causes which are conspicuous and which have been specified heretofore. When the females came to land upon the breeding grounds, I noticed that, with the exception of the virgin cows, they were heavy with young; that the period of their gestation must soon culminate by the birth of their offspring, which usually took place within a couple of hours after they reached the shore, or within as many days at the most. Frequently I have observed the mothers land, and ere they were dry the young would be expelled; and the thought rose then to my mind "how wonderfully well-timed the return of those gravid cows was"—for, in spite of tempests and currents, and *many of them quite two and three thousand miles from their winter*

Hair Seal (*Monachus albiventer*, very likely) is, in most respects, correct; while Buffon, the celebrated French zoölogist, as late as 1785, has not, despite his vast advantages, been nearly as accurate in his treatment of the Pinnipeds. That *this old Grecian philosopher, three hundred years before the Christian era, should have done better in this respect* than that world-wide distinguished academician did more than two thousand years afterward, affords an entertaining suggestion as to the alleged degeneracy of the present age, especially so since the monument erected over Buffon's remains bears an inscription which declares that he possessed "a mind equal to the majesty of nature." (!)

[1] See Owen's Anatomy of Vertebrates," vol. iii, p. 699, London, 1868. The *Phocidæ* are the subject of this eminent author's examination and report.

feeding-places, yet they reach this land-speck in Bering Sea just in season for instant delivery after arrival![1]

PANGS OF IMPENDING PARTURITION ALONE PROMPT FEMALES TO LAND.—The females do not land until they are obliged to by the precipitation of this event of parturition. They land upon the breeding-grounds of Saint Paul just as they come in contact with the shore—guided and influenced at the moment of approach to the islands by only one ruling thought, and that is, to reach as near as possible the locality upon which they resided in former years. Soon after landing, which I have heretofore described, the birth of the young takes place, and in this wise: the cow shows, an hour or so prior to delivery, great nervous agitation; she trembles all over; her eyes blinking, and flippers twitching; rolling, stretching, and thoroughly uneasy, until the labor-pains. If the ground where she happens to rest is rocky, she manages to lie upon the top of a bowlder, her hind-flippers working spasmodically with a wavy, fan-like motion backward and forward, as she rests full upon her stomach, with the fore-flippers alternately pressed tightly to the rock or closely to her sides, like pectoral fins; she sways her head, her eyes are partly closed and her mouth slightly opened in panting, during the fifteen or twenty minutes which usually ensue between the first contraction of the uterus, until the expulsion of the intra-uterine life takes place. These labor-pains are not, in my opinion, at all very severe or abnormal in any respect. The pup carries with it, at the moment of birth, the entire placental pouch or "after-birth." This envelope is broken, usually by the mother, in forcing the labor and during the first expulsion of the pup's head, which is always presented in advance. The little "Kotick" may be said to fairly drop upon

[1] If there is any one faculty better developed than the others in the brain of the intelligent *Callorhinus*, it must be its "bump" of locality. The unerring directness with which it pilots its annual course back through thousands of miles of watery waste to these spots of its birth—small fly-dots of land in the map of Bering Sea and the North Pacific—is a very remarkable exhibition of its skill in navigation. While the Russians were established at Bodega and Ross, California, sixty years ago, they frequently shot Fur Seals at sea, when hunting the Sea Otter off the coast between Fuca Straits and the Farallones. Many of these animals, late in May and early in June, were so far advanced in pregnancy that it was deemed certain by their captors that some shore must be close at hand upon which the near impending birth of the pup took place; thereupon, the Russians searched over every rod of the coast-line of the mainland and the archipelago, between California and the peninsula of Alaska, vainly seeking everywhere there for a fur-seal rookery. They were slow to understand how animals, so close to the throes of parturition, could strike out into broad ocean to swim fifteen hundred or two thousand miles within a week or ten days ere they landed on the Pribylov group, and almost immediately after gave birth to their offspring.

There is no record made which shows that the Fur Seals have any regular or direct course of travel up or down the northwest coast. They are principally seen in the open sea, eight or ten miles from land, outside the heads of the Straits of Fuca, and from there as far north as Dixon Sound. During May and June they are aggregated in greatest numbers here, though examples are reported the whole year around. The only Fur Seal which I saw, or which was noticed by the crew of the Reliance, in her cruise, June 1 to 9, from Port Townsend to Sitka, was a solitary "Hollu-schack" that we disturbed at sea well out from the lower end of Queen Charlotte's Island; then, from Sitka to Kadiak, we saw nothing of the Fur Seal until we hauled off from Point Greville, and coming down by Ookamok Islet, a squad of agile "Holluschickie" suddenly appeared among a school of hump-back whales, sporting in the most extravagant manner around, under, and even leaping over the wholly indifferent cetacea. From this eastern extremity of Kadiak Island clear up to the Pribylov group we daily saw them here and there in small bands, or also as lonely voyageurs, all headed for one goal. We were badly outsailed by them; indeed, the chorus of a favorite "South Sea pirate's" song, as incessantly sung on the cutter's "'tween decks," seemed to have special adaptation to them:

"For they bore down from the windw'ard,
A sailin' seven knots to our four'n."

The ancient Greeks seemed to have been impressed somewhere by rookery odors, for old Homer says—

"The web-footed seals forsake the stormy swell,
And, sleeping in herds, exhale nauseous smell."

Where this illustrious bard sniffed up this characteristic unpleasantness of breeding-seals, I am at loss to say. The Pribylov Islands and the great Antarctic grounds were as far from that poet then as the moon is from us to-day. He must have been introduced to it within the confines of the Caspian Sea, or else credibly informed, by trustworthy authority, of this peculiarity of the large herds of *Phocidæ* in those waters. Small bands, however, of Hair Seals breed now, as they bred then, in the Mediterranean and Black Seas. He may have stumbled upon a few of them while provoking his muse in lonely travels over Grecian pelagic shores.

its feet, for the moment it appears from within the natal walls it seems to be in full possession of all its faculties; its eyes are wide open, and its voice is raised in weak, husky bleatings, as it feebly paddles around, still attached to the umbilical cord, which it, by its own efforts, pulls asunder as it flounders about on the rocks or ground of the rookery. The mother, in the mean time, gives her offspring none of that attention so marked in the case of the *Canidæ* and other carnivores, not even turning to look at it; but she draws herself up with an expression of intense comfort and relief, throwing her head back with a gentle, swaying motion, as she fans herself slowly with either one or both of the hind-flippers. She also pays no attention to the cleansing of her own person, the after-birth lying undisturbed by her, it being speedily trampled under foot and ground out of recognizance by the restless multitudes around her, which pass to and fro. The pup quickly dries off, with rapid alternations of short naps with awakenings, in which it gets up and on its flippers to essay brief scrambles over the rocks and ground until, in nosing about, it claims the attention of its mother (sometimes hours after birth): this she gives by gently elevating her abdomen and turning her parts posteriorly, so that one or two of the obscure teats, filled with milk, can be seized by the hungry pup, which now nurses therefrom greedily, even to gorging itself.

MILK OF THE FUR SEAL.—The milk of the Fur Seal mother is very rich and creamy, and the secretion is always abundant, but there is not, under any circumstances, the enlarged udder and mammæ peculiar to dogs and similar animals; the nipples are scarcely distinguishable, even when exposed to the reach and notice of the young.

IRREGULAR FEEDING OF THE PUPS.—The umbilicus of the pup rapidly sloughs off, and the little fellow grows apace, nursing to-day heartily in order that he may, perhaps, go the next two, three, or four days without another drop from the maternal fount; for it is the habit of the mother Seal to regularly and frequently leave her young, on this spot of its birth, to repair for food in the sea; she is absent on these excursions, on account of the fish not coming inshore within a radius of at least one hundred miles of the breeding-grounds, through intervals varying, as I have said, from a single day to three or four, as the case may be. The manner in which she returns after feeding, and in which she singles out by scent, and at a glance, her own offspring from many thousands surrounding it, I have clearly described in a foregoing chapter.[1]

PRELIMINARY ADVANCES OF THE SEXUAL UNION.—The pup being born, the cow rapidly passes into "heat." I have noticed examples where ten hours only elapsed between the event of the birth and that of copulation, and I doubt not of full impregnation for another period. But as a rule forty-eight hours is a fair figure to express the time from the birth to the state known as "being in heat." The cow always makes the first advances to the bull. If she is one of the earlier subjects for his attention, the union is soon accomplished; but should she be of the later applicants in his

[1] When the females first come ashore there is no sign of affection manifested, whatever, between the sexes. The males are surly and morose, and the females entirely indifferent to such reception. They are, however, subjected to very harsh treatment sometimes in the progress of battles between the males for their possession, and a few of them are badly bitten and lacerated every season.

One of the cows that arrived at Nah Speel, Saint Paul Island, early in June, 1872, was treated to a cruel mutilation in this manner, under my eyes. When she had finally landed on the barren rocks of one of the numerous "Seecatchie" at the water front of this small rookery, and while I was carefully making a sketch of her graceful outlines, a rival bull, adjacent, reached out from his station and seized her with his mouth at the nape of the neck, just as a cat lifts a kitten. At the same instant, almost simultaneously, the old male that was rightfully entitled to her charms, turned, and caught her in his teeth, by the skin of her posterior dorsal region. There she was, lifted and suspended in mid-air, between the jaws of her furious rivals, until, in obedience to their powerful struggles, the hide of her back gave way, and, as a ragged flap of the raw skin more than six inches broad and a foot in length was torn up and from her spine, she passed, with a rush, into the possession of the bull who had covetously seized her. She uttered no cry during this barbarous treatment, nor did she, when settled again, *turn to her torn and bleeding wound to notice it in* any way whatsoever that I could observe.

When severe inflammation takes place, they seek the water, disappearing promptly from your scrutiny.

harem, after he has been more or less exhausted by the vital drafts made upon him, she must wait. I have observed instances of this character in which the female teased the male for hours and hours before arousing him.

PELAGIC COITION IMPOSSIBLE.—In this act of coition on these breeding-grounds of Saint Paul and Saint George, I have noticed the fact that, whenever the female was well covered by the male on the flat or smooth shelves of rock or earth, they moved and shuffled about without any particular effective coition until brought up against a rougher inequality, or some fragments of lava shingle, so characteristic of the rookery grounds. The reason for this is due to the fact, that in spite of the great weight of the male, six times more than that of the female which he covers, the orgasms are so rapid and violent that, unless the female is held by some other agency than the weight of the male, she is literally shoved ahead and away from under him. This fact I call attention to, as it alone is sufficient, upon the slightest reflection, to satisfy any judicial mind that it is a physical impossibility for these Seals to copulate in the water. Under no conceivable position assumed for this supposed pelagic coition could effectual sexual connection be made.[1]

ACTION OF REPRODUCTION.—The male serves the female exactly as a big Newfoundland dog would serve a small terrier slut. The "Seecatchie" draws his heavy body over and upon the outstretched spine of the female, who lies prone before him on her stomach; so that when the male has adjusted himself, which he does by arching his back from the shoulders to the *os coccyx*, he covers her so completely that nothing of her body can be seen, except a portion of her head just peering out from between his fore-flippers and under his broad chest.

Notwithstanding their great rapidity and the muscular power employed, the orgasms last, without interruption, for the surprising space of from eight to fourteen minutes—not a second's intermission. Of course, toward the close of the season, when the male is tired, he does not remain *in coitu* longer than three or four minutes. On account of the vigor and duration of this first coitus, I am inclined to think that that female has no further intercourse with that male, or any other one, during the rest of the season. She is satisfied, and passes rapidly out of heat. Certain it is that she is not noticed by him again; she goes up to his seraglio-grounds, to and from the sea, seeking her young and feeding undisturbed for the balance of the time; also, that the other bulls seem to recognize this condition of passed sexual requirement and satisfaction, in her case, by paying her no attention.

PERIOD OF GESTATION.—Thus it is apparent that the period of gestation in the Fur Seal is nearly, lacking a few days, twelve calendar months; for the next year finds her again heavy with young at almost exactly the same day that she gave birth to her previous offspring in the prior season. The systematic and regular appearance of the females every year upon the Pribylov Islands at such a time, usually in June or July, without the slightest regard to what the weather

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[1] Those extremely heavy adult males which arrive first in the season, and take their stations on the rookeries, are so fat that they do not exhibit a wrinkle or a fold of the skins enveloping their blubber-lined bodies; most of this fatty deposit is found around the shoulders and the neck, though a warm coat of blubber covers all the other portions of the body save the flippers; this blubber thickening of the neck and chest is characteristic of the adult males only, which are, by its provisions, enabled to sustain the extraordinary protracted fasting periods incident to their habit of life and reproduction.

When those superlatively fleshy bulls first arrive, a curious body tremor seems to attend every movement which the animals make on land; their fat appears to ripple backward and forward under their hides, like waves; as they alternate with their flippers in walking, the whole form of the "Seecatchie" shakes as a bowl full of jelly does when agitated on the table before us.

There is also a perfect uniformity in the coloration of the breeding coats of the Fur Seals; and it is strikingly manifest while inspecting the rookeries late in July, when they are solidly massed thereon. At a quarter mile distance, the whole immense aggregate of animal life seems to be fused into a huge homogeneous body that is alternately roused up in sections and then composed, just as a quantity of iron filings, covering the bottom of a saucer, will rise and fall, when a magnet is passed over and around the dish.

may have been during the winter and spring previous, or is when they land, establishes without doubt this exact limit of their gestation.

IMPORTANCE OF THIS SERVICE.—The reason why I dwell upon these details is because they have a very important bearing upon the question as to what ratio of males every year is needed for service on this great breeding-ground of Bering Sea. If the common opinion, hitherto entertained, was tenable, of free and effective pelagic coition, then it will be readily understood that nearly all the males from four years up, and on, could have easy access to the females; and that it would be a matter of very small concern how many old males, or rather those males upon the land located over the rookeries, were fit for service. But understanding, as I now do, without a shadow of tenable contradiction, that these "Seecatchie" which receive, fight for, and cover the females on the rookeries, are the only active fertilizing powers toward the reproduction and perpetuation of their kind, the importance of my detailed description of the method of coition is evident; for it shows conclusively that unless we see every year, long prior to the arrival of the females, a full supply of able-bodied "Seecatchie" holding out upon and located over the rookeries of Saint Paul and Saint George—unless we see such a number in good condition—we may safely count upon the fact that danger will arise of imperfect and nugatory fertilization for the coming year. It will not do to indulge the hope, should a scarcity or diminution of the old males ever occur, when the rookeries are mapped out in spring, of the deficiency being made good by the young males which are swimming around everywhere in the water.

VITALITY OF THE MALE.—I believe that an able-bodied adult "Seecatchie" is capable of serving well from the 14th June to the 14th July, during which period the height of the breeding season occurs, one hundred females. If he is, however, as he frequently is, enfeebled by previous fighting and struggling with other males to hold the station which he has selected and fought for, it is more than likely that his virility will not extend beyond the proper serving of twenty or thirty cows. As I have said in another place, I found great difficulty in finding, to my own satisfaction, a fair number of females as the average to every harem on the rookery.[1] Some instances occur where the male treats forty-five or fifty females, owing to the peculiar configuration of the landing grounds; but most generally, and as the rule, I think fifteen or twenty cows to every bull is a true computation; hence I do not believe, under any normal circumstances and all normal disadvantages, such as fighting involves by weakening the males, that, when the females arrive, there is the least risk of a single one of them getting back to the water without a perfect and effectual impregnation. A common opinion was prevalent on the islands among the employés touching this matter, that, when the female was not instantly covered during her first heat, she went to the water, cooled off, and on returning, sexual desire never reappeared, and she became a *farrow* or barren cow from that time to the end of her natural life. Analogous physiology confutes this

[1] This striking and accurate average is still further complicated by that unknown distribution of the virgin females which come up to the rookeries every year for their first meeting with the virile males. What proportion of them reach the rear of the breeding-grounds compared with their numbers which are served at the water-line? I surely am at fault to say, for they do not leave that tangible evidence which the other older cows do in the forms of their young. One of the curious contradictions to generally received ideas of the habit of Seals is the fact that the Fur Seal will not rest either upon snow or ice; it seems to positively avoid all contact with either of those substances upon which the *Phocidæ* wholly, and the Sea Lions to some degree, delight in hauling over. *Callorhinus* has the warmest of seal coats, by all odds, yet it dreads a snowy or an icy bed with as much sincerity as any habitué of the tropics can. The Sea Lions and Hair Seals have often been surprised in sporting, or sleeping on the ice floes of Bering Sea in the spring, by whalemen while cruising at the edge of the frozen pack, waiting for the channel to open, clear into the Arctic Ocean; as neither *Eumetopias* nor *Phoca* has any under wool, their sea-jackets are not half as heavy as those peculiar to the bodies of Fur Seals; hence in taking personal notice of this odd aversion of the *Callorhinus* to snow and ice, I believe that its dislike is one of pure sentimentality rather than one based on physical inability to rest upon as cold surfaces, for there is not much difference between the water's temperature and that of the snow and ice in the spring—10° Fahr., perhaps—both cold enough at all events.

completely; that such warm-blooded, highly-organized creatures should never have a rapid recurrence of sexual desire, in common with all other animals of their class, until it is gratified in the usual way, is not at all probable, though it may be possible.

SMALL NUMBER OF BARREN FEMALES.—To show, however, that a very small proportion of the myriads of breeding females are barren, I have only to present this illustration, which is happy in its conclusion, and easily portrayed: Whenever a female ceases to breed she refuses to haul up on the rookeries; she roams with the "Holluschickie," or the "Bachelors," growing a third heavier and marked with corresponding darker tones to her coat, yet still preserving the familiar pattern of the female, so that she can be picked out quickly by an experienced eye from the old and young males around her. In driving up every season the "Holluschickie" to the killing-grounds, the natives noticed, and pointed out to me, those barren females in the drive, several of which were secured for my examination and measurement; but the proportion of barren females is not more than one in a thousand to the "Holluschickie" with which they consort.

6.—THE SIRENIANS OR SEA-COWS.

By FREDERICK W. TRUE.

31. THE AMERICAN MANATEES.

SPECIES OF NORTH AMERICAN MANATEES.—The numerous zoölogists and travelers who have written upon the American Manatees are not agreed as regards the number of existing species. In the many and oftentimes discordant descriptions and observations extant, some see but the variations of a single species;[1] others discern two species,[2] one of Florida, the other of South and Central America; and others still are able to distinguish three species, one, as before, in Florida, but two in South America, a marine and a fluviatile species. I have satisfied myself by examination of specimens in the National Museum that there are at least two species, and that both occur within the borders of the United States. Regarding the Manatee of the upper water-courses of South America I am still in doubt. In the following pages I shall refer to the southern form, *Trichechus manatus*, Linné, as the South American Manatee, and to the Floridan form, *Trichechus latirostris*, (Harlan) True, as the Florida Manatee.

DISTRIBUTION OF THE FLORIDA MANATEE.—We have, then, upon our coasts two representatives of the Sirenians. The Florida Manatee, the least widely spread species, apparently inhabits only the Floridan Peninsula and the eastern Gulf States. Regarding its distribution Mr. Silas Stearns of Pensacola, Fla., contributes the following notes:

"It is generally supposed in Florida and the Gulf States that there are very few Manatees in existence in this country, and that these are to be found in the southern portion of the Florida Peninsula, in the fresh-water rivers, both on the Atlantic and Gulf sides. I have heard of their being taken or seen in the Myakka River, Peace Creek, Caloosahatchie River, and other small streams south of Charlotte Harbor and Okeechobee Lake, on the Gulf side, and in the Sainte Lucie River on the Atlantic side.

"On the Gulf coast (where I am better acquainted) the oldest settlers say that ten, fifteen, or twenty years ago Manatees were occasionally seen in nearly all the inland waters from Key West westward to civilization at Pensacola, Mobile, and New Orleans. It is evident that they have been abundant along the entire Gulf coast, and probably on the Atlantic as far north as the Carolinas, for their bones can be found along the shore nearly everywhere that civilization has not reached.

"Those generally found in the salt water along sand-beaches are petrified and black. I have reason to think that there are still scattering individuals all through Florida, for during the summer of 1880 I saw one in Santa Rosa Sound, some twenty miles east of Pensacola, where there has been none seen for many years. While landing a sail-boat on the island we surprised the animal in shoal water and had a fine opportunity to examine it as it swam by into deeper water. As they are so shy, there may be many more existing in the State than we are aware of, and their range may include the whole State of Florida."

Mr. Goode informs me that specimens could be taken from time to time in the year 1878 near Sainte Lucie on Indian River.

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[1] GRAY: Cat. Seals and Whales, Brit. Museum, 1866, p. 358, and others. (*Manatus australis.*)
[2] HARLAN: Journal Acad. Nat. Sci. Philadelphia, first series, iii, 1824, pp. 390–394.

A writer in the journal "Forest and Stream," of June 11, 1874, under the heading "The Manatee at Saint Augustine, Fla.," quotes from the Saint Augustine "Press," as follows:

"The Manatee continues her domicile in Bar Creek (Saint Augustine). Fishermen have again reported it and citizens are anxious to go after it. . . . There are also vague rumors of a very large animal of the same species having been seen roaming about a place on the North River called Oleander Town. If so, the one is probably the dam and the other the calf that have become separated. It is also probable that during some of the heavy blows along the coast between here and Indian River some herd of these animals has become dispersed and these two may have wandered into our harbor. It will be remembered that two or three years ago a very large one was seen in this harbor, which came up to the water-battery of the fort, where it remained until pelted by the boys. Fishermen report them as having been frequently seen in the harbor."

Mr. C. J. Maynard, who has been much in Florida, has recorded some valuable notes on the distribution of the Florida Manatee. He writes: "This singular animal is found in large numbers about the inlets of Indian River, and Capt. Dummett informs me that he has captured specimens as far north as his place, which is within five miles of the head of the river. I have been informed by creditable authorities that it is remarkably abundant upon the western coast in the various rivers and creeks which abound between Tampa Bay and Cape Sable. I have never seen it in Mosquito or Halifax Lagoons, and am confident that it does not occur there. This species is said to feed upon the leaves of the mangrove during the night."[1]

Dr. von Frantzius stated some years ago, in an essay on the mammals of Costa Rica, that the Florida Manatee was the only species found in that country. He writes as follows: "If we recognize *M. latirostris* as a separate species, we shall be able to say that only this species is found on the coast of Costa Rica."[2] It is evident, however, that he has confounded the two species, for a few lines further on he says: "Nearly all the museum specimens arriving in Europe in later years come from Surinam and belong to the species known as *M. latirostris;* so far as I know no specimens from the coast of Costa Rica or from Greytown have ever been sent to Europe. I had but one opportunity of seeing the Manatees on the shores of the Sarapiqui, and that at a distance."[3]

This statement is in part erroneous; a large proportion of the different figures of specimens in European museums are those of the southern form, *Trichechus manatus.*

DISTRIBUTION OF THE SOUTH AMERICAN MANATEE.—The South American Manatee is most abundant in the northern part of that continent and in Central America. Its range extends much farther north, I believe, than is generally supposed. A skull in the National Museum, belonging undoubtedly to this species, was received from Texas in 1855. It would seem that the animal must occur in some abundance along the Mexican coast. Its range extends on the south at least as far as the Saint Matthew's River in Brazil.[4] Manatees are found in nearly all the rivers of northern South America, particularly in the Amazon and its tributaries, and in the Orinoco. Those which are found in the upper water-courses, as has been already stated, are by some regarded as distinct, and by others as identical with those of the lower regions and the sea.

THE *MANATEE OF THE* WEST INDIES.—A species of Manatee occurs more or less abundantly in the West Indies, particularly about Cuba, San Domingo, and Porto Rico, but whether it is the Florida or South American species seems not to have been ascertained. It is supposably, however, the Florida Manatee.

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[1] MAYNARD, C. J.: Cat. Mammals of Florida. Ex. Bull. Essex Institute, iv, 9–10, 1872, pp. 8–9.
[2] VON FRANTZIUS: Säugethiere Costa Ricas, in Wiegmann's Archiv, XXXV, Jahrg. i, pp. 304–307.
[3] *Loc. cit.*
[4] Prince Maximilian.

BOUNDARIES OF THE RANGE OF AMERICAN MANATEES.—The entire range, therefore, of the American Manatees extends over about forty-nine degrees of latitude—that is, from 30° north to 19° south. It is probable, as Mr. Stearns surmises, that the existing species ranged farther north in former days, and, furthermore, it is not definitely known that the southern Manatee does not extend south of 19° south in Brazil. It is certain, however, as Burmeister distinctly states, that it is not found on the coast of the Argentine Republic.[1]

As an instance of the unusual wandering of (probably) the Florida Manatee, it may be noted that an animal, the description of which fairly portrayed the appearance of that species, was cast on the coast of Shetland in 1785. It was described by the British zoölogist Fleming as probably being a Rhytina, but this seems very unlikely to one acquainted with the facts of the geographical range and size of that animal. Gray refers it to his *Manatus australis*, which includes both the Florida and South American Manatees. It seems to me that if it was carried across the ocean by the Gulf Stream, as Gray suggests, it most probably "set sail" from the Floridan coast.[2]

Dr. Leidy has described the teeth of two fossil species, *Manatus antiquus*[3] and *Manatus inornatus*,[4] from the "phosphate beds" of the Ashley River, South Carolina, showing that, as in the case of many other American genera, there has been a movement southward in geological time.

ORIGIN OF THE NAME "MANATEE."—I doubt if it is possible to arrive at any satisfactory conclusion regarding the origin of the name Manatee. Certain it is that it was first used by the early Spanish and Portuguese explorers. Pietro Martire, who is the first to record the existence of the animal, in 1500, as I gather from Ramusio's collection of early voyages, does not give it a name.[5] The notes which he gives regarding the animal were probably taken from the original records of Columbus's fourth voyage, in the midst of the narrative of which they are given. Oviedo, in 1535, calls it "Manati";[6] Exquemelin, about 1650, states that the Spanish call it "Manentine";[7] Atkins in 1735 uses "Manatea"; Gumilla, in 1741, uses "Manati."[8] The French writers, beginning with Biet, in 1664, employ the names "Lamantin," "Lamentin" (Condamine, 1745), and "Manaty" (Du Tetre, 1667). The appellation "Manatee" occurs for the first time, so far as I am aware, in 1703, in Dampier's account of his voyages round the world. The word in this form, or as "Manati," has been used by most English writers. Whether this name, in its various forms, refers to the peculiar fore-legs of the Manatee or to its means of suckling its young, can only be decided by the investigations of philologists more learned and more zealous than myself.

DIFFERENT NAMES OF THE MANATEE.—Other names for the Manatee occur, most of which define, as it were, the characteristics of the animal. Such are "Pegebuey," a native Amazonian name, employed by Acuña in 1641, and its translations: "Ox Fish," as written by Sloane in his natural history of Jamaica, in 1725, and "Poisson bœuf," as given by Condamine, in 1667, in his history of the Antilles. The French name, "Vache marin," and the corresponding English word, "Sea-cow," occur in numerous instances in scientific literature. In Guiana the natives use the name "Cojumero" (Gray). Bellin (1763) alludes to "Lamenum." The term "Petit Lamentin du nord," used by French writers to distinguish the South American Manatee from the Floridan species, is, I believe, of later origin.

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[1] BURMEISTER: Description physique, Répub. Argentine, iii, part i, 1879, p. 530.
[2] FLEMING: British Animals, p. 30. GRAY: Cat. Seals and Whales, Brit. Museum, 1866, p. 359.
[3] LEIDY, in Proc. Acad. Nat. Sci. Philadelphia, viii, 1856, p. 165.
[4] LEIDY, in Rept. U. S. Geological Survey, 4°, i, 1873, p. 376, pl. xxxvii, figs. 16, 17.
[5] Oceani Dec. Hispali, 1500, fol., libr. 8, *fide* Brandt.
[6] OVIEDO: Hist. general de las Indias, 1535, lib. xii, c. 10.
[7] EXQUEMELIN: Buccaneers of America, English translation, 1684, p. 92.
[8] GUMILLA: El Orinoco Illustrado, 1741.

SIZE OF THE FLORIDA MANATEE.—In treating of the size of the American Manatees, it will be necessary to consider the two species separately, although the adults seem to attain nearly equal proportions. Harlan gives, as the maximum length of the Florida Manatee, eight or ten feet, but these measurements were not made by himself.[1] Mr. W. A. Conklin, director of the Central Park menagerie, in New York City, gives the following dimensions of a specimen kept alive in that establishment in 1873: "The following are its absolute dimensions: length, 6 feet 9½ inches; circumference around the body, 4 feet 9 inches; length of flipper, 1 foot; width of same, 4¾ inches; width of tail joining body, 1 foot 6¾ inches; greatest width of tail, 1 foot 8½ inches; weight, 450 pounds."[2]

I am not aware that any other measurements of the Florida Manatee, under its proper name, are on record.

SIZE AND WEIGHT OF THE SOUTH AMERICAN MANATEE.—The size of the South American Manatee has been differently estimated by different observers. "This Creature," says Dampier, "is about the bigness of a Horse, and 10 or 12 foot long. . . . I have heard that some have weighed above 1200 L. but I never saw any so large."[3]

Stedman, alluding to a Manatee which floated past his encampment on the river Cottica, in Surinam, says: "This Manatee was exactly sixteen feet long, almost shapeless, being an enormous lump of fat, tapered back to a fleshy, broad, horizontal tail."[4]

Smyth and Lowe captured a Manatee in 1835 in Peru, at their encampment at Sarayacu, on the Ucayali. "We had one opportunity," they relate, "while at this place, of examining a *vaca marina*, or manatee, that was just caught; but, not being anatomists, are unable to give a scientific account of it. The animal was seven feet eight inches long from the snout to the tip of the tail. . . . This was not considered a large one. . . . When the animal was killed, it took the united strength of at least forty men to drag it up from the water to the town, which they effected by means of our ropes."[5]

In 1872 Dr. Murie published a valuable memoir on the South American Manatee, in which he gives measurements of two specimens which reached London in 1866, fresh but not alive. The length of one, a young male, from the Maroni River, in Surinam, was forty eight inches or four feet; that of the second specimen, a young female, from Porto Rico, sixty-five inches, or five feet five inches. In his remarks on these animals, Dr. Murie says: "When studying in the Stuttgart Museum, I derived much information from Professor Krauss, the able director. Among other things he mentioned that their large stuffed specimen of Manatee was the mother of our Society's young male, as attested by Herr Koppler, of Surinam, who transmitted it. The length of the female mounted skin I ascertained to be 122 inches [ten feet two inches], therefore twice and a half the length of the young animal possibly six or eight months old. Another stuffed male specimen at Stuttgart measures 94 inches. Both of the above are doubtless stretched to their fullest extent; still, one is justified in assuming the adult *Manatus* to be from 9 to 10 feet long."[6] Of the weight of the specimens he remarks: "According to Mr. Greey, the entire carcass of the Zoölogical Society's female, when weighed immediately after death on board ship, was 228 lbs. That of the young male as ascertained by myself was 61 lbs."[6]

[1] HARLAN: Fauna Americana, 1825, p. 277.
[2] CONKLIN: The Manatee at Central Park, in "Forest and Stream," i, 1874, p. 166.
[3] DAMPIER: A New Voyage round the World, i, 1703, pp. 33, 34.
[4] STEDMAN: Narrative of an expedition to Surinam, ii, 1796, p. 175.
[5] SMYTH and LOWE: Journey from Lima to Para. London, 1836, p. 197.
[6] MURIE: On the form and structure of the Manatee. Transactions Zoölogical Society of London, viii, 1873, pp. 129–131.

Another specimen, a female, received by the same society from Surinam, measured eighty inches, but no indication of its age is given.[1] Still another specimen, this time a male, arrived in London. When dead, measurements showed its length to be ninety-four and five-tenths inches or seven feet ten and one-half inches.[2]

Of two male Surinam specimens which died in the Zoölogical Gardens at Philadelphia, one measured exactly six feet from snout to tip of tail, the other six and a half feet.[3]

General Thomas Jordan, writing in "Forest and Stream," in 1873, says: "Three of these huge mammals I saw on Indian River, in 1849–'50, each weighing at least fifteen hundred pounds, and between fifteen and twenty feet in length." He adds: "The Florida species (*T. latirostris*) are *much larger than those found in the Antilles, South America, or Africa."*[4] *This last statement can* scarcely be strictly correct. Other writers, as we have seen, have found quite as large specimens as those here referred to in South America.

BREEDING HABITS OF MANATEES.—In relation to the breeding of Manatees, and the size and habits of the young, almost nothing is known. Ogilby, in his account of Cuba, says: "No less wonderful is the Fish *Manate;* it breeds for the most part in the Sea, yet sometimes swimming up the Rivers, comes ashore and eats Grass."[5]

This account, however, is of little value, as it was copied by Ogilby, who does not state whence he derived it. Du Tertre states that two calves are born at a time. "If the mother is taken," he writes, "one is assured of having the young: for they follow their mother and continue to move about the canoe until they are made companions of her misfortune."[6]

Descourtlitz, writing regarding his own observations in 1809, says: "The Manatees possess a gentle and amiable nature, and lament when they are separated from their young, which the mother nourishes with much tenderness. They appear sensitive and intelligent; they weep when *they are taken without having received any bad treatment, seeming to regret that they can never* return to their haunts. Although sometimes they appear to avoid man, at other times they regard him without suspicion and seem to implore his pity. The young do not quit the mother for many years, and, sharing her dangers, often become the victims of their filial devotion."[7]

Brandt, who has examined much of the literature of the subject, states that it is said that the period of gestation lasts eleven months, and that the young follow the mother a half year.[8]

FOOD OF SIRENIANS.—The Sirenians, as a group, are very strictly graminivorous, and the American Manatees form no exception. The structure of their lips and teeth is such that this fact might be surmised were nothing known of their habits. Living as they do at the mouths of rivers and about the coast, or in the upper waters of streams, they find no lack of aquatic vegetation on *which to subsist. Exactly what plants they thrive best upon has been the subject of inquiry by* several observers, especially those who have been interested in the attempt to keep the Manatee in captivity. Mr. Chapman informs us that the specimen at the Philadelphia gardens ate freely of various garden vegetables—cabbage, celery tops, spinach, kale, baked apples, and others, while they devoured as well quantities of the aquatic plant *Vallineria spiralis*, and the sea-weed *Ulva latissima.*[9] The Central Park specimen seems to have been more dainty. "A variety of aquatic

[1] GARROD: Transactions Zoölogical Society of London, x, 1877, p. 137.
[2] MURIE: Transactions Zoölogical Society of London, xi, 1880, p. 27.
[3] CHAPMAN: Proc. Acad. Nat. Sci. Philadelphia, xxvii, 1875, p. 452.
[4] Forest and Stream, i, 1873, p. 169.
[5] OGILBY: America, 1671, p. 315.
[6] DU TERTRE: Histoire Nat. des Antilles, 1667, pp. 201, 202.
[7] DESCOURTLITZ: Voyage d'un Naturaliste, ii, 1809, pp. 274, 275.
[8] BRANDT: Symbolæ Sirenologicæ, fasc. iii, 1861–'68, p. 256.
[9] CHAPMAN, H. C., in Proc. Acad. Nat. Sci. Philadelphia, xxvii, 1875, pp. 459–461.

plants were placed before its mouth," says Mr. Conklin, "and each in turn rejected. At length some canna, *Canna indica*, was procured, which it devoured greedily, and which it continues to use alternately with sea-weed, *Fucus vesiculosus*, obtained in the East River."[1] The process of eating takes place under water, which seems strange, in view of the fact that the animal cannot breathe while therein engaged.

Dr. Murie thus interestingly narrates the feeding habits of the Manatee at the London Zoölogical Gardens in 1878: "On first arrival at the aquarium, cabbage, lettuce, water-cress, pieces of carrot and turnip, loose and bundles of hay, and quantities of pond-weed were put into the tank, both floating and sunk by weights attached. Occasionally it would sniff or examine these by snout and lips without chewing or swallowing, until its appetite returned as above mentioned. It then showed a preference to water-cress, though often taking cabbage, but afterwards it chose lettuce, and entirely eschewed the others. When in the height of health it consumed, according to Mr. Carrington, from ninety to one hundred and twelve pounds of green food daily. As lettuce became scarce and dear it cost ten shillings a day to supply it with the French sort; and although cabbage, etc., was then cheap and abundant, it daintily chose the former, and as steadily avoided and refused the latter."[2]

EARLY ALLUSIONS TO THE HABITS OF THE AMERICAN MANATEES: BY COLUMBUS.—What relates to the food of the Manatee in the writings of travelers and explorers is so connected with observations on its habits in general, that I may be pardoned for not withdrawing the facts for insertion in the previous paragraph. We shall find in reviewing the various accounts of the habits of Sea-cows that there is not always a harmony of statements, and it will be necessary to look with a critical eye upon the narratives of some of the earlier voyagers, who seem to have been a little confused sometimes by the unfamiliar phenomena with which they were surrounded.

The first apparent reference to the American Manatees in literature appears to be that in the narrative of Columbus's first voyage, at the stage of his first departure for Spain, in 1493. Taking up the thread of the narrative as given by Herrera, we read as follows:

"*Wednesday* the ninth of *January*, he hoised sail, came to *Punta Roxa*, or Red Point, which is thirty-six Leagues East of *Monte Christo*, and there they took Tortoises as big as bucklers, as they went to lay their eggs ashore. The Admiral [Columbus] affirm'd he had thereabouts seen three Mermaids, that rais'd themselves far above the Water, and that they were not so handsome as they are painted, that they had something like a human Face, and that he had seen others on the Coast of *Guinea*."[3]

The probability of the fact that the mermaids here referred to were really Manatees is in Columbus's statement of having seen others on the coast of Guinea, as it is in that region that the African Manatee, *T. senegalensis*, is abundant. Not many years later, in 1502, on the occasion of Columbus's fourth voyage to America, the Manatee became well known to the adventurers while at San Domingo. Oviedo, as quoted by Herrara, says:

"The Spaniards at this Time found a new sort of Fish, which was a considerable advantage to them: tho' in those parts there is much Variety. It is call'd Manati, in shape like a skin they use to carry Wine in, having only two Feet at the Shouldars, with which it swims, and it is found both in the Sea and in Rivers. From the Middle it sharpens off to the Tail, the Head of it is like that of an Ox, but shorter, and more fleshy at the Snout; the Eyes small, the Colour of it grey, the Skin very hard, and some scattering Hairs on it. Some of them are twenty Foot long, and ten in Thick-

[1] CONKLIN, in Forest and Stream, i, 1874, p. 163.
[2] MURIE, in Trans. Zoölogical Society London, xi, 1880, pp. 22, 23.
[3] HERRARA (STEVENS): Hist. America, i, 1725, p. 82.

ness. The Feet are round, and have four Claws on each of them. The Females bring forth like the Cows, and have two Dugs to give suck. . . . Sometimes they are taken ashore, grazing near the Sea, or Rivers, and when young they are taken with Nets."[1]

Then follows the oft repeated story of the tame Manatee of the Cazique Carametex:

"Thus the Cazique *Carametex* took one, and fed it twenty-six Years in a Pond, and it grew sensible and tame, and would come when call'd by the name of *Mato*, which signifies Noble. It would eat whatsoever was given it by Hand, and went out of the Water to feed in the House, would play with the Boys, let them get upon him, was pleas'd with Musick, carry'd Men over the Pool, and took up ten at a Time, without any Difficulty."[2]

FATHER ACUÑA UPON THE "PEGEBUEY."—In the fourth decade of the succeeding century Father Acuña, in narrating his adventures on the Amazon River, makes mention of the South American Manatee somewhat at length. Among other things he says: "But above all, the fish, that like a king lords it over all the others, and which inhabits this river from its sources to its mouth, is the *Pegebuey* (Fish Ox), a fish which when tasted only can retain the name, for no one could distinguish it from well-seasoned meat. It is large as a calf a year and a half old, but on its head it has neither ears nor horns. . . . This fish supports itself solely on the herbage on which it browses, as if in reality a bullock; and from this circumstance the flesh derives so good a flavour, and is so nutritious, that a small quantity leaves a person better satisfied and more vigorous than if he had eaten double the amount of mutton. It cannot keep its breath long under water; and thus, as it goes along, it rises up every now and then to obtain more air, when it meets with total destruction the moment it comes in sight of its enemy."[3]

ROCHEFORT UPON THE HABITS OF THE ANTILLEAN MANATEE.—After Oviedo, Gomara, and Acuña no one seems to have added any new facts, or supposably new facts, to the history of the habits of the Manatees until Hernandez and Rochefort published their narratives. The work of the former I have not had at command, but from F. Cuvier's notes it would seem that it contains nothing of importance. Rochefort, the second edition of whose work on the Antilles was published in 1665, gives the following information: "This fish feeds upon plants which it collects about the rocks and on the shallows which are not covered with more than a fathom (*brasse*) of water. The females breed at the same season as do cows, and have two mammæ with which they suckle their young. Two calves are born at a birth, which are not adandoned by the mother until they have no more need of special nourishment, or until they can browse upon plants like the mother."[4]

15. BIET'S AND DU TERTRE'S ACCOUNTS.—Biet repeats these observations, although it is to be believed independently, saying that the Manatee roams about the shores near the sea browsing on the plants which grow there.[5]

Du Tertre in effect repeats the little that his predecessors have laid down, but adds some additional observations which are interesting if sufficiently substantiated. "The food of this fish," he says, "is a little plant which grows in the sea, and on this it browses after the manner of an ox. After being filled with this food it seeks the fresh-water streams, where it drinks and bathes twice a day. Having eaten and been refreshed it goes to sleep (*s'en dort*) with its snout half out of water, a sign by which its presence is recognized by the fishers from afar."[6]

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[1] HERRARA (STEVENS): History of America, i, 1725, p. 278.
[2] HERRARA (STEVENS): History of America, i, 1725, p. 279.
[3] CHRISTOVAL DE ACUÑA: River of the Amazons 1641, pp. 68-99. (*Hakluyt Society.*)
[4] ROCHEFORT: Histoire des Iles Antilles, 2d ed., 1665, pp. 194, 195.
[5] BIET: Voyage en l'Isle de Cayenne, 1664, p. 346.
[6] DU TERTRE: Hist. générale des Antilles, 1667, p. 200.

THE BUCCANEER EXQUEMELIN'S ACCOUNT.—Only a few years later we find the buccaneers making fair use of the Manatee in replenishing their oftentimes empty larders, and, in the interval of slaughtering the defenseless Indians and colonists, one of these hardy pirates finds time to record some observations regarding the animal. After the destruction of Panama, in 1670, Exquemelin and his companions sail along the coast of Costa Rica, *en route* for Jamaica. He alludes to the Sea-cow in the following language:

"This Accident and Encounter retarded our Journey, in the space of two days, more than we could regain in a whole Fortnight. This was the occasion that obliged us to return unto our former Station, where we remained for a few days. From thence we directed our Course for a Place, called *Boca del Dragon*, there to make Provisions of Flesh. Especially of a certain Animal which the *Spaniards* call *Manentines*, and the *Dutch*, *Sea-Cows*, because the Head, Nose, and Teeth, of this Beast, are very like unto those of a Cow. They are found commonly in such places, as under the depth of the Waters, are very full of Grass, on which, it is thought, they do pasture. . . . Their manner of engendering likewise, is the same with the usual manner of the Land-Cow, the Male of this kind being in similitude, almost one and the same thing with a Bull. Yet notwithstanding they conceive and breed but once. But the space of time that they go with Calf, I could not as yet learn. These Fishes have the sense of Hearing extremely acute, in so much as in taking them, the Fishermen ought not to make the least noise, nor row, unless it be very slightly."[1]

The buccaneer seems to have gathered correct information as to the mode of life of the Manatee, but as to their breeding but once, although, as I believe, we have no facts to disprove the statement, analogical considerations would lead us to reject it.

CONDAMINE'S ACCOUNT.—Condamine is, perhaps, the only other early writer to whom it will be necessary to refer. He alludes to the South American Manatee among other fish, in which group of animals all the early explorers insisted in placing it. "It is not amphibious, properly speaking," he says, "because it never comes entirely out of the water, and cannot walk, not having but the two fins near the head, in the form of wings 16 inches long, which serve in place of arms and feet; it lifts only the head out of the water, and that to gather the plants along the shore."

In regard to the habits of Manatees in confinement, I can only quote from the writings of the American and English observers who have had the opportunity to study the specimens in the Philadelphia, New York, and London zoölogical gardens. Of the Central Park specimen Mr. Conklin states: "It manifests at times extreme playfulness, and will answer the call of the keeper by a peculiar noise, somewhat resembling the squeak of a mouse. Some time ago the epidermis on the back peeled off in small pieces, leaving a bright new skin similar to that of a snake just after shedding. It was kept out in the open air until the thermometer fell to 53°, when it was removed to a building. It appears to be very sensitive to cold, curling up its back if the water is in the least chilly. It has been observed to remain under water five or six minutes at a time without coming to the surface to breathe."[2]

MISS CRANE'S OBSERVATIONS.—Miss Agnes Crane, who attentively observed the South American Manatees at the Brighton Aquarium in 1879, has given us some interesting facts regarding the mode of respiration of the Sirenians and their attitudes when at rest. After stating that the specimens were received from Trinidad, she says:

"The young male, a fine animal in robust condition, measured, in November, 1879, four feet ten inches from snout to tail, with a maximum girth of four feet. The female was four feet eight

[1] EXQUEMELIN: Buccaneers of America, English translation, 1684, pp. 82, 83.
[2] CONKLIN, in Forest and Stream, i, 1873, p. 166.

inches in length, of a lighter slate-colour than her companion, of more slender build and proportions. Both are marked with white on the under sides of their bodies. The pair occupied a tank twelve feet six inches in length by eight feet six inches in breadth, with an almost flat bottom. Temperature of water, about 70° F.; depth, two feet six inches in the daytime, reduced to six inches at night. The water is run off daily, a fresh supply being admitted at the requisite heat from a neighboring tank filled with warmed fresh water. Although the area of these quarters appear somewhat limited when compared with the bulk of the animals, the Manatees seem perfectly comfortable, and, being of a sluggish disposition, rarely explore the whole of their small domain. Nor do they, so far as I observed, avail themselves of the shallowness of the water and, by supporting their bodies on the tail-fin, keep their heads above the surface and avoid the constant repetition of the upward movement in order to breathe the necessary air. They habitually rest side by side at the bottom of the tank, with the caudal fin stretched out quite straight, and the tips of the fore fins just touching the ground.

"Thence they rise gently, often with the least perceptible movement of the tail and flapping motion of the paddles, raising the upper part of the body until the head reaches the surface, when the air is admitted through the nostril flap-valves, which are closely shut after the operation, and the original and usual position is gently resumed. They seem generally to be compelled to rise to the surface for aërial respiration every two or three minutes, but the interval between respiration varies much at different times. In one quarter of an hour, during which one was carefully timed, it rose nine times, at very irregular intervals. I have been informed that they occasionally remain under the water for a much longer period, but have never observed them to exceed six minutes, although I have timed them before and after feeding, and at all hours of the day. The respiratory movement appears to be repeated almost mechanically and without effort."[1]

The fact that these Manatees in confinement kept constantly beneath the surface does not accord with the observations of Du Tertre, already quoted. It is probable that the air about the aquarium was not sufficiently warm to induce them to float with the head out of water, as they do in their native haunts. The same observer furnishes some facts of a highly important character regarding the attempts made by the Manatees at terrestrial progression.

"The habits of the animals in captivity, while affording occasional evidence of the ease and rapidity with which they move in the water, do not furnish much support to the views of their capability of habitual active progression on land. Yet it must be admitted that, supplied with a sufficiency of nicely varied food, they have no inducement to leave the water, and that the construction of their straight-walled tank precludes such efforts, as a rule. The male, however, has recently been observed to make some slight attempts at terrestrial movement, turning himself round and progressing a few inches when his tank was empty. With jaws and tail-fin pressed closely to the ground, the body of the animal becomes arched, and is moved by a violent lateral effort, aided and slightly supported by the fore-paddles, which are stretched out in a line with the mouth. But the effect of these very labored efforts was not commensurate with their violence; in fact, their relation to active locomotion may be compared to those of a man lying prone, with fettered feet and elbows tied to side. Nor does the Manatee seem at all at ease out of water, as he lies apparently oppressed with his own bulk, while he invariably makes off to the deepest corner of his tank directly the water is readmitted."[2]

ABUNDANCE OF THE FLORIDA MANATEE.—In the great struggle for life no animal is, in a manner, more destructive than man himself. The fierce carnivora may prey upon the more peaceful

[1] CRANE, AGNES, in Proc. Zoölogical Society of London, 1880, pp. 456–457.
[2] *Loc. cit.*, pp. 459, 460.

graminivora, but the attack must be made, one may say, in person, subject to all the dangers attendant upon an encounter with those weapons which a long course of selection has developed in the prey. Man ensnares alike the lion and the deer by the devices of his brain, with little or no danger to himself. Notwithstanding, the fleetest animals oftentimes escape him and the strongest intimidate him; but such drowsy beasts as the Sirenians fall helpless victims to his strategy. The past century witnessed the extinction of one of these animals, the Rhytina, through no other apparent agent than man. The inquiry intrudes itself, Will the Manatees succumb to the same fate which overtook their huge relative?

It is undoubtedly a fact that the American Manatees are much less abundant in many regions than they were at the time of the discovery of America. They have withdrawn before the advance of civilization into the more inaccessible places out of the reach of man.

In regard to the Floridan Manatee, the statement of Harlan (who obtained it from Dr. Burrows), made so late as 1825, namely, that an Indian could readily obtain a dozen in a year,[1] is now doubtfully true. The statements of Mr. Stearns, given in the early part of this essay, show that it has disappeared from some localities in Florida within a comparatively recent period. Nevertheless, the Florida Manatee cannot yet be considered as threatened with extinction, and in Southwestern Florida, if we may believe Mr. Maynard, is still abundant. Specimens are received from time to time for our museums and zoölogical gardens, and to satisfy the curiosity of the gaping crowds at the circus. The prices obtained for specimens of both American Manatees in this country and in England show, however, that they are not to be obtained without difficulty.[2]

Gundlach refers to the abundance of the Manatee in Cuba in the following terms: "In former times very abundant; at present much reduced in numbers, but not rare though difficult to capture."[3]

According to Dr. Von Frantzius, the South American Manatee was abundant along the western shores of the Gulf of Mexico, especially in Costa Rica. "They are still very common," he says, "along the Atlantic coast, where they find abundant nourishment in the numerous lagoons (*Haffbildungen*), and likewise the needed protection; they pass into the rivers and are found abundantly in San Juan and neighboring streams, the Rio Colorado, Sarapiqui, and San Carlos. Apparently they are prevented from going far into the San Carlos on account of the rapids which occur near its mouth, and hence are not found in the Rio Frio nor in Lake Nicaragua itself."[4]

ABUNDANCE OF THE SOUTH AMERICAN MANATEE.—In relation to the present abundance of Manatees in South America, it is perhaps unnecessary for me to enter into details here. Brandt has reviewed the subject at length quite recently, giving many particulars.[5] His investigations show that in many regions, particularly about the mouths of rivers and in other places where sufficient shelter is wanting, the Sea-cows are disappearing or have become entirely extinct. In the upper waters of the rivers, however, where the native Indians are few and civilization has not reached, little diminution is probable.

PROBABILITY OF EXTINCTION.—Putting all the facts together, it seems evident that not many centuries will pass before Manatees will be extremely rare, especially in our own country. More specimens should be accumulated in our museums, both of the entire animal and of its bones, and its wanton destruction should cease.

MODES OF CAPTURE.—The methods of capturing Manatees are numerous. In Florida, Mr. Goode informs me, strong rope nets, with large mesh, are often employed. The details of this

[1] HARLAN: Fauna Americana, 1825, p. 277.
[2] Trans. Zoölogical Society London, xi, 1880, p. 21. Edwards' Guide to Florida, 1875, p. 69.
[3] GUNDLACH: Revista y Cat. de los Mamiferos cubanos. Repert. Fisico-nat. de Cuba, ii, no. 2, 1866, p. 56.
[4] VON FRANTZIUS: Säugethiere Costa Ricas. Archiv für Naturgeschichte, xxxv, i, 1868 (f), pp. 304–307.
[5] BRANDT: Symbolæ Sirenologicæ, fasc. iii, 1861–'68, p. 253.

method are given in the notes of an observer, Mr. J. Francis Le Baron, writing from Titusville in 1880. His account of the fishery, given with much fullness, bears all the evidences of correctness. I may be allowed to quote the part which pertains to my subject: "The manatee hunter aims to catch the animal alive, and for this purpose quite an extensive outfit is required. It consists, first, of a large seine net, about one hundred yards long and six or eight feet wide, made of 'spun yarn,' so called, which consists of three or four rope yarns spun into one line, about the size of a clothes-line, and very strong. The meshes are fifteen inches wide. The head-line consists of a strong rope, and floats made of wood, shaped like a double-ended boat, are placed at intervals along this to keep the top of the net near the surface of the water. The bottom is weighted with small pieces of brick or stone, just enough to cause the net to hang perpendicularly in the water. A large sail-boat is also required. The hunter, taking the net in the boat, proceeds quietly to the part of the river frequented by the manatee, and keeps a sharp lookout for the animals, which have a habit of passing up and down the river by certain points. If the lookout perceives a manatee in the river above him he knows that sooner or later the animal will take a cruise down the river, and he proceeds accordingly to stretch his net across the channel. One end of the net he first makes fast to a small bush or twig, or, if no tree is available, to a stake driven for the purpose into the bank. To this the shore end of the net is fastened by a small cord secured to the head-line, and the stake or bush before mentioned, care being taken to use a cord so small that in its struggles it will be easily broken by the animal, for a reason which will appear hereafter. The boat is then rowed across the stream with the other end of the net, and when the latter is stretched to its full length, the boat is anchored and the net secured by a similar easily broken cord to the boat in such a manner that the first struggle of the animal will be felt by the occupants of the boat, being communicated by the cord to a tell-tale, or the cord is fastened to the body of one of the hunters, who now go to sleep if night has come on, or perhaps while away the time by a game of cards, keeping perfectly quiet. There are very likely several manatee in the river, and before long one attempts to pass by the boat. His progress is of course arrested by the net, and his struggles to force a passage are at once communicated by the tell-tale cord. Unsuccessful in his first attempt to effect a passage, the manatee increases his efforts, and the result is that the slender cords holding the net to the shore and the boat are broken, and the net with the manatee entangled drifts away with the current. The frantic efforts of the animal only serve to closer enwind him in the meshes of the net, which doubles and wraps itself around him closer and closer. It is now that the objects of the light sinkers and slender holding cords are apparent. The manatee is a warm-blooded animal and must come to the surface for air every few minutes. If the sinkers are too heavy, or if the net is immovable in the water, he is unable to do this and is drowned. The large floats serve now to show the hunters the location of the prey, and they bear down upon it and tow it with the confined animal into shoal water. Here a large box or tank is ready. The net is unwound, ropes are placed around the animal, and by the united efforts of the hunters, he is transferred to the box. The box is then towed to the 'crawl,' which is an inclosure formed by driving stakes close together in the water with their tops projecting several feet above, and is generally near the home of the hunters. The box is floated into the crawl and the animal let out. He is there kept and fed daily until an opportunity occurs for shipment. This is made in the same large box, which is water-tight and about half filled with water. Such is the method employed by the Indian River hunters for catching the manatee alive. It is, however, often shot with a rifle, from the shore or a boat, when feeding or coming to the surface to breathe, but the hunter must be very quick and expert with his weapon, as they show only one-third of the head, and that only for a second. The profits of manatee hunting are large. The skeleton, if properly cleaned, will readily bring a hundred

dollars, and the skin a like sum if taken off whole, being in demand by scientists for museums all over the world."[1]

"So valuable an animal," says Wood, alluding more particularly to the South American Manatee, "is subject to great persecution on the part of the natives, who display great activity, skill, and courage in the pursuit of their amphibious quarry. *The skin of the Manatee* is so thick and strong that the wretched steel of which their weapons are composed—the 'machetes' or sword-knives, with which they are almost universally armed, being sold in England for three shillings and six pence *per dozen—is quite unable* to penetrate the tough hide. Nothing is so effectual a weapon for this service as a common English three-cornered file, which is fastened to a spear-shaft, and pierces through the tough hide with the greatest ease."[2]

Many of the early explorers give lively accounts of the manatee fishery in South America. "Diuers other fishes," says Oviedo, in alluding to the fishes of the Orinoco River, as quaintly translated by Purchas, "both great and small, *of sundrie sorts and kinds*, are accustomed to follow the ships going vnder saile, of the which I will speak somewhat when I haue written of *Manatee*, which is the third of the three whereof I haue promised to entreat. *Manatee*, therefore, is a fish of the sea, *of the biggest sort*, and much greater than the *Tiburon* in length and breadth, and is very brutish and vile, so that it appeareth in forme like vnto one of those great vessels made of Goats skins, wherein they vse to carry new wine in *Medina de Campo* or in *Arenale*: the head of this beast is like the head of an Oxe, with also like eyes, and hath in the place of armes, two great stumps wherewith he swimmeth. It is a very gentle and tame beast, and commeth *oftentimes out* of the water to the next shoare, where if he finde any herbes or grasse, he feedeth thereof. Our men are accustomed to kill many of these, and diuers other good fishes, with their Crosse-bowes, pursuing them in Barkes or Canoas, because *they swim in* manner aboue the water, the which thing when they see, they draw them with a hooke tyed at a small corde, but somewhat strong. As the fish fleeth away, Archer letteth goe, and prolongeth the corde by little and little, vntill he haue let it *goe many fathoms*: at the end of the corde, there is tyed a corke, or a piece of light wood, and when the fish is gone a little way, and hath coloured the water with his blood, and feeleth himselfe to faint and draw toward the end of his life, he resorteth *to the shoare*, and the Archer followeth, gathering vp his corde, whereof while there yet remaine sixe or eight fathoms or somewhat more or lesse, he draweth it toward the Land, and draweth the fish therewith by little and little, as the waues *of the Sea helpe him* to doe it the more easily: then with the helpe of the reste of his companie, he lifteth this great beast out of the Water to the Land, being of such bignesse, that to conuey it from thence to the Citie, it shall be requisite to haue a Cart with a good *yoke of Oxen*, and sometimes more, according as these fishes are of bignesse, some being much greater then other some in the same kinde, as is seene of other beasts: Sometimes they lift these fishes into the Canoa or Barke without drawing them to the Land *as before, for as soone* as they are slaine, they flote aboue the water: And I beleeue verily that this fish is one of the best in the world to the taste, and the likest vnto flesh, especially so like vnto beefe, that who so hath not seene it whole, *can iudge it to be* nother when hee seeth it in pieces then very Beefe or Veale, and is certainly so like vnto flesh, that all the men in the world may herein be deceiued: the taste likewise, is like unto the taste of very good Veale, and lasteth long, if it be powdred: so that in fine, the Beefe of these parts is by no means like vnto this. The *Manatee* hath a certaine stone, or rather bone in his head within the braine which is of qualitie greatly appropriate against the disease of the stone, if it be burnt and ground into small powder, and taken fasting in the morning

[1] LE BARON: In Forest and Stream, xiii, 1880, p. 1005, 1006.
[2] WOOD: Illustrated Natural History. Mammals, p. 548.

when the paine is felt, in such quantities as may lye vpon a peny with a draught of good white wine. For being thus taken three or foure mornings it acquieteeth the griefe, as diuers haue told me which haue proved it true, and I my selfe by testimonie of sight doe witnesse that I have seen this stone sought of divers for this effect."[1]

Du Tertre, whose narrative we have already several times quoted, gives an account of the mode of capture, which has all the tokens of accuracy. He writes:

"Three or four men go in a small canoe (which is a small boat, all of one piece, made of a single tree in the form of a canoe). The oarsman is at the back of the canoe and dips the blade of his paddle right and left in the water in such a way that he not only governs the course of the canoe but makes it advance as swiftly as if it were propelled by a light wind or under reef. The Vareur (who lances the beast) stands on a small plank at the bow of the canoe holding the lance in his hand (that is to say, a sort of spear, at the end of which a harpoon or javelin of iron is fastened). The third man, in the middle of the canoe, arranges the line, which is attached in order to be paid out when the animal is struck.

"All keep a profound silence, for the hearing of this animal is so acute that the least noise of water against the canoe is sufficient to cause it to take flight and frustrate the hopes of the fishers. There is much enjoyment in watching them, for the harpooner is fearful lest the animal escape him, and continually imagines that the oarsman is not employing half his force, although he does all that he is able with this arms and never turns his eyes from the harpoon, with the point of which the harpooner points out the course he must follow to reach the animal, which lies asleep.

"When the canoe is three or four paces away the harpooner strikes a blow with all his force and drives the harpoon at least half a foot into the flesh of the animal. The staff falls into the water, but the harpoon remains attached to the animal, which is already half caught. When the animal feels itself thus rudely struck it collects all its forces and employs them for its safety. It plunges like a horse let loose, beats the billows as a negro beats the air, and makes the sea foam as it passes. It thinks to escape its enemy, but drags him everywhere after it so that one might take the harpooner for a Neptune led in triumph by this marine monster. Finally, after having dragged its misfortune after it, and having lost a great part of its blood, its power fails, its breath gives out, and being reduced to distress, it is constrained to stop short in order to take a little rest; but it no sooner stops than the harpooner draws in the line and strikes it a second blow with a harpoon better aimed and more forcibly thrown than the first. At this second blow the animal makes a few more feeble efforts, but is soon reduced to extremities, and the fishermen readily drag it to the shore of the nearest island, where they place it in their canoe, if the latter is of sufficient size."[2]

Barbot, after quoting the account of the fishery by Acuña, in the quaint translation which I shall quote on a following page, adds some valuable notes on the commercial transactions which are carried on in connection with salted Manatee meat. He says:

"The *Manati's* flesh used at *Cayenne* is brought ready salted from the river of the *Amazons;* several of the principal inhabitants sending the barks and brigantines thither with men and salt to buy it of the *Indians* for beads, knives, white hats of a low price, some linen, toys, and iron tools. When those vessels are enter'd the river of the *Amazons*, the *Indians*, who always follow the *Manati* fishery, go aboard, take the salt, and with it run up the river in canoes or *Piraguas* to catch the *Manati's;* which they cut in pieces, and salt as taken, returning with that salt fish to the brigantines; which go not up, because the *Portuguese* who dwell to the eastward, at *Para*, and other places of *Brazil*, claim the sovereignty of the north side of that river, and give no quarter

[1] Purchas his Pilgrimes, iii, 1625, pp. 987, 988.

[2] Du Tertre: Histoire des Antilles, ii, 1667, pp. 200, 201.

to the *French* or other *Europeans* they can take in their liberties, which has occasion'd many disputes and quarrels between them, as I shall observe hereafter.

"That controversy was decided by the treaty of *Utrecht*, in the year 1713. The *Portuguese* some years since designing to settle on the west side of the *Amazons*, cruelly massacred many, who before used to go unmolested, and consequently mistrusting no danger.

"The brigantines having got their lading of salted *Manati*, return to *Cayenne*, and sell it there, commonly at three pence a pound."[1]

"The flesh of the Manatee being much esteemed," writes Descourtilitz, in 1809, from his own observations, "and its fat never becoming rancid, the negroes employ many means to destroy them, sometimes by the use of nets, in the places where they feed, sometimes by shooting them from canoes; more commonly they harpoon them when they are able to approach sufficiently near, but as the animal, although seriously wounded, does not die immediately, they let out a cord in order not to lose so precious a prey, which one sees reappear at the surface of the water, drowned and lifeless."[2]

PRODUCTS FURNISHED BY MANATEES.—The Sirenians possess the quality, most fatal to them, of furnishing palatable food for man. The huge Sea-cow of Bering Sea disappeared from this cause, and the Dugong, the Sirenian of the Indian Ocean, and the Manatees suffer not less on the same account. For the Indian of South America the Manatee is a fund of wealth. On its flesh he subsists, with its oil he anoints himself, from its skin he makes shields and cords, in its bones he finds medicine. The early explorers were not long in discovering its virtues. Herrara gathers the following estimate of its importance from their accounts of America:

"The Taste of it is beyond Fish: when fresh it is like Veal, and salted like Tunny-Fish, but better, and will keep longer: the Fat of it is sweet, and does not grow rusty. Leather for Shoes is dress'd with it. The Stones it has in the head[3] are good against the Pleurisy and the Stone."[4]

Rochefort is not less impressed with the good qualities of the animal. He exclaims: "Among all the fishes there is none having so good flesh as the Lamantin. Two or three of these beasts will fill a large canoe, and the flesh is like that of a land animal, firm, pink and appetizing, and mixed with fat, which being rendered never becomes rancid. When it has been two or three days in pickle, it is better for the health than when eaten entirely fresh."[5] He also gives some very good advice in regard to the use of the ear bones for medicine. "The superstitious," he says, "lay great store by the stones which are found in the head, because they possess the power, they say, when reduced to powder, to stop the formation of calcareous deposits, and to remove those already formed; but, since the remedy is very violent, no one ought to use it without the advice of a wise and experienced physician."[6]

Biet mentions the Manatee first in his list of the fishes [*sic*] of the Ile de Cayenne. Alluding to the flesh, he says: "It is very excellent, and although one may have other provisions, it will be preferred to beef. Its fat, also, is as sweet as butter, and can be used to advantage in all kinds of pastry, fricassees, and soups."[7]

Barbot seems to have summed up all that was known of the Manatee of South America up to his time, early in the eighteenth century, and quotes, also, Father Acuña, in a translation which,

[1] BARBOT: Op. cit., p. 563.
[2] DESCOURTILITZ: Voyage d'un Naturaliste, ii, 1809, p. 276.
[3] The ear bones.
[4] HERRARA: History of America, i, 1725, p. 278.
[5] ROCHEFORT: Nat. Histoire des Iles Antilles, 2d ed., 1665, p. 195.
[6] *Loc. cit.*, p. 195.
[7] BIET: Voyage en l'Ile de Cayenne, 1664, pp. 346, 347.

according to my notion, is preferable to that of the Hakluyt Society. Having alluded to its small eye, but quick ear, and to other characteristics of its organization, he says:

"The flesh of this creature is excellent, very wholesome, and tastes very much like veal of *Europe*, when young: for the biggest are not so delicate and agreeable to the palate. Their fat is hard, and very sweet, as that of our hogs; the flesh resembles veal. It dies with very little loss of blood, and is not observ'd to come upon dry land; nor is there any likelihood it should, considering its shape, as in the cut, whence it is concluded not to be amphibious.

"The *Spaniards* about the island of *St. Margaret*, or *Margarita*, called the *Manati Pece-Buey*, that is, Ox Fish; and particularly value the stomach and belly part of it, roasted on spits. Others cut long slices of the flesh of its back, which they salt a little, only for two days, and then dry it in the air; after which it will keep three or four months. This they roast and baste with butter, and reckon delicious meat. A gentleman has assur'd me, that at *Jamaica* they give eighteen pence a pound for young *Manati*. At *Cayenne* it yields but three pence a pound salted.

"F. *Christopher de Acunna*, in the relation of his voyage on the river of the *Amazons*, chap. 25, describes this fish as follows:

"The *Pece-Buey*, says he, is of a delicious taste; any one that eats it, would think it to be most excellent flesh well season'd. This fish is as big as a heifer of a year and a half old; it has a head and ears just like those of a heifer, and the body of it is all cover'd with hair, like the bristles of a white hog; it swims with two little arms, and under its belly has teats, with which it suckles its young ones. The skin of it is very thick, and when dressed into leather, serves to make targets, which are proof against a musket bullet. It feeds upon grass, on the bank of the river, like an ox; from which it receives so good nourishment, and is of so pleasant taste, that a man is more strengthen'd and better satisfy'd with eating a small quantity of it, than with twice as much mutton.

"It has not a free respiration in the water, and therefore often thrusts out its snout to take breath, and so is discover'd by them that seek after it. When the *Indians* get sight of it they follow it with their oars in little canoes; and when it appears above water to take breath, cast their harping-tools made of shells, with which they stop its course, and take it. When they have kill'd it, they cut it into pieces, and dry it upon wooden grates, which they call *Boucan*; and thus dressed, it will keep good above a month. They have not the way of salting and drying it to keep a long while, for want of plenty of salt; that which they use to season their meat being very scarce, and made of the ashes of a sort of palm-tree, so that it is more like salt-petre than common salt."[1]

For the Romanist of South America the Manatee is, as the old voyagers persisted in calling it, a fish. It is, therefore, eaten on days when a meat diet is forbidden by the rites of the church.

CONCLUSION.—In the Manatee, then, we have an animal of great size, of gentle disposition and apparently of rapid growth, which lives in places readily accessible to man, and is easily captured, and which furnishes meat which is not inferior, oil which is remarkably fine, and leather which possesses great toughness. From these considerations it would seem evident that, with the proper protection, it would furnish no small revenue to the people in those portions of our country which it inhabits, for centuries to come.

32. THE ARCTIC SEA-COW.

THE EXTINCTION OF SPECIES IN HISTORICAL TIME.—The catalogue of animals which are known to have become extinct within historical times is not a long one. I do not allude, of

[1] BARBOT: A Description of the Island of Cayenne, in Appendix to Description of the Coasts of North and South Guinea, 1732, p. 563.

course, to those animals which have been driven from their native haunts before advancing civilization, and which with its decline would flourish again amidst the fallen columns and crumbling walls, but to those of which no remnant remains, whose existence as the representatives of certain definite stages of organic development is forever closed. Such a one is the Rhytina (*Rhytina gigas*, Zimmermann), which inhabited Bering Sea until within about a century. The story of its discovery and extermination forms one of the most interesting pages of zoölogical history.

THE GREAT NORTHERN EXPEDITION.—At the opening of the last century the northeastern portion of the Russian Empire was one of the least known quarters of the globe. The barrenness of the land, the dreadful winter, and the almost impassable sea, had deterred travelers and voyagers to a large extent from penetrating into its wilds. Those who adventured in the frozen seas went principally in search of a northwest passage, or in pursuit of other matters relating to geography and commerce, and paid little attention to the products of the land or of the waters. Early in the seventeenth century, however, Peter the Great, desirous of knowing whether Asia and America were contiguous, gave orders that an expedition should proceed to ascertain the truth. Before they could be executed he died, but the Empress Catherine commanded that they should be fulfilled. Capt. Vitus Bering was placed in charge of the expedition, and Gmelin, of the St. Petersburg Academy, was appointed chief naturalist. After several preliminary cruises had been made which extended over a number of years, two ships set sail from Kamtchatka on the 15th (4th) of June, 1741. Before the departure of this final voyage, however, Gmelin had withdrawn on account of ill-health, and George William Steller, who had been sent out by the St. Petersburg Academy as his assistant, was commissioned to complete the scientific researches.

THE DISCOVERY OF BERING ISLAND AND WRECKING OF THE "ST. PETER."—The two vessels, the "St. Peter," commanded by Bering, and the "St. Paul," in charge of Tschirikov, sailed eastward toward the American continent. Before arriving, however, on the 1st of July (20th of June) a storm separated them. Having touched at Alaska, Bering started westward again, encountering before long the most tempestuous weather. The crew grew weak and sick through long-continued hardship. On the 10th of November (30th of October) the ship approached Bering Island, then unknown. A few days after the storm drove her upon the rocks, and the crew were forced to take up winter quarters on the island.

DEATH OF BERING.—Many of the sick died as soon as they were removed to the land, and on the 19th (8th) of December the commander also perished. After some days "it was resolved to examine what store of provisions there was, and compute how long they would last, to regulate the distribution of the shares accordingly, notwithstanding which thirty persons died on the island. They found the stores were so much exhausted that if they had not been supplied with the flesh of sea-animals they must have all perished for want of food."[1]

USE OF THE RHYTINA TO THE SURVIVORS.—Prominent among the animals which served them as food was the Rhytina. Its well-flavored flesh and pleasant fat proved a great boon to them. "And the sick found themselves considerably better, when, instead of the disagreeable hard beaver's flesh, they eat of the Manati, tho' it cost them more trouble to catch than one of the beavers. They never came on the land, but only approached the coast to eat sea-grass, which grows on the shore, or is thrown out by the sea. This good food may, perhaps, contribute a great deal to give the flesh a more disagreeable[2] taste than that of the other animals that live on fish. The young ones, that weighed 1,200 pounds and upwards, remained sometimes at low water on the dry land between the rocks, which afforded a fine opportunity for killing them; but the old ones,

[1] MÜLLER: Voyages from Asia to America. English translation, Jefferys, 1761, p. 58.
[2] This is surely a typographical error for *agreeable*.

which were more cautious, and went off at the right time with the ebb, could be caught no otherwise than with harpoons fixed to long ropes. Sometimes the ropes were broke, and the animal escaped before it could be struck a second time. This animal was seen as well in the winter as in the summer time. They melted some of the fat, with which, like hogs, they are covered from three to four inches thick, and used it as butter. Of the flesh, several casks full were pickled for ship's provision, which did excellent service on their return."[1]

STELLER'S OBSERVATIONS.—In the midst of these privations, Steller did not fail to make and record observations relative to the animals which came about the island. To his most praiseworthy perseverance we owe all that we know of the appearance and habits of the Rhytina. Not a word has been added to his account of the characteristics of the animal, which a few years later became extinct.

THE RETURN TO KAMTCHATKA; MISFORTUNES OF STELLER.—In the summer of 1742 the shipwrecked crew of the "St. Peter" built a boat from the wreck of their vessel, and on the 21st (10th) of August sailed toward Kamtchatka. "The next day at noon they were in sight of the southeast point of *Bering's* Island, at a distance of four leagues N. by E., to which they gave the name of *Cape Manati;* from the above-mentioned Sea-cows, which herd more here than in any other parts."[2] Shortly after they arrived safely in Kamtchatka. But while some of the crew soon afterward reached St. Petersburg, and had distinctions conferred upon them by the government, Steller was most shamefully treated because he dared to condemn the abuses of the officials, and finally died, in November, 1746, in an obscure town, with but a single friend to sympathize with him.[3] His observations on the Rhytina, which I shall quote at length, together with those on other marine animals, were published by the St. Petersburg Academy in 1751.

His statements, it should be remembered, relate to the occurrence of Rhytina on Bering Island only. The somewhat numerous facts which have accumulated regarding the reality or probability of its occurrence in other regions, I shall cite on another page.

After giving a table of measurements, and a very detailed description of external and internal parts, which I am not at liberty to quote in this connection, Steller expands upon the natural history of the Sea-cow.[4] The following translation of the original Latin is the product of the unremunerated labor of my brother, Mr. A. Charles True, of the State Normal College, Westfield, Massachusetts, who has taken pains to make it as accurate as possible.

STELLER'S OBSERVATIONS ON THE NATURAL HISTORY OF THE SEA-COW.—"It was my fortune on an unlucky occasion," writes the naturalist, "to observe daily during ten months the habits and

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[1] *Loc. cit.*, pp. 61, 62.

[2] *Loc. cit.*, p. 64.

[3] "As to the academical company of travellers," says Müller, "*Gmelin* and I arrived at *Petersburg* on *Feb.* 15 [26], 1743, having passed through all the ports of *Siberia*. But *Steller*, who stayed in *Kamtschatka* after *Waxel*, to make researches in natural history, did not enjoy this good luck. He immerged himself without necessity, though with good intention, in matters that did not belong to his department; for which he was called to an account by the provincial chancery at *Jakutsk*. *Steller* vindicated himself so perfectly that the Vice Governor there gave him permission to proceed on his journey. The proceedings were not sent to the Senate at *Petersburg* so soon as transacted. The Senate, who had intelligence of his passing through *Tobolsk*, sent an express to meet him, and to carry him back to *Jakutsk*. And soon after advice being received from *Irkutzk*, of his acquittal, another express was dispatched to annul the first order. In the mean time, the first express met *Steller* at *Solikamsk*, and had carried him back as far as *Tara*, before the second express overtook him. He then proceeded without delay on his return for *Petersburg* by the way of *Tobolsk*, but got no farther than *Tumen*, where he died of a fever in *November*, 1746, in company of one *Hau*, a surgeon, who had been with him in the *Kamtschatka* expedition. I have thought it necessary to relate these circumstances, because many falsities have been propagated abroad concerning him, nay, even his death has been doubted. He was born on the 10th of *March* (21st), 1709, at *Winshcim* in *Franconia*."—MÜLLER: *op. cit.*, pp. 65, 66. Scheerer (*fide* Nordenskiold), in his biography, attached to Steller's account of Kamtchatka, states that Steller got as far as Moscow when ordered to return, and was frozen by the way.

[4] STELLER, GEORGE WILLIAM: De bestiis marinis auctore Georgio Wilhelmo Stellero. <Nov. Comm. Acad. Imp. Petropolitanæ, tom. ii, 1751, pp. 289, 294, et seq.

manners of these animals before the door of my hut. Hence in a few words I will subjoin the facts which were most faithfully observed by me.

"These animals love shallow and sandy places about the shore of the sea, but most willingly spend their time about the mouths of rivers and small streams, allured by the pleasant motion of the running waters, and they are always found in herds. In feeding they drive before them those who are tender and not yet full grown, surround them carefully on the flanks and in the rear, and always keep them in the middle of the herd, and when the tide is risen they approach so near the shore that they not only have been often attacked by me with a stick or a spear, but sometimes I stroked their backs even with my hand.

"Having received any severe injury, they do nothing else than to depart farther from the shore, and after a short time; having forgotten the injury, they again approach nearer. Whole families of them live most harmoniously as neighbors, the male and female with one full-grown and one young offspring. They seem to me to be monogamous; they produce their young at any season of the year, but most commonly in the autumn, as I inferred from the number of new-born young seen about that time; and from the fact that I observed them in sexual intercourse most especially in the early spring I concluded that the period of gestation covers more than a year, and from the shortness of the horns and the dual number of the breasts I conclude that they produce not more than a single calf, and besides I never observed more than one calf near a mother.

"Moreover, these animals eat most voraciously and without limit, and on account of too great greed have the head always under the water. They are not at all anxious about life or safety, so that in a boat or as a naked swimmer you can go into their midst and safely select whichever one you wish to strike with the harpoon. Four or five minutes having been passed in this intense devotion to eating, they breathe out air and a little water with a noise like the neighing of horses. While feeding they move one foot after another slowly forward and so partly swim quietly, partly, as it were, walk after the manner of feeding cows or sheep. Half of the body, the back and sides, always rises above the water. During the feeding of the Rhytina, gulls are wont to sit on his back and refresh themselves with the fleas clinging to his skin in the same way as crows are wont to feed on the fleas which infest hogs and sheep. Moreover, they do not devour all sea-plants promiscuously, but especially, (1) a fucus with the crisped leaf of the Savoy cabbage, (2) a club-shaped fucus, (3) a fucus with the form of an ancient Roman whip, (4) a very long fucus with wavy edges whose sinuses reach to the nerves.

"Where they have pastured even for a single day great heaps of roots and stems are seen thrown out by the waves upon the shore. When their bellies are filled some among them, lying on their backs, sleep, and retreating farther from the shore, lest they should be left on dry ground by the receding tide, are often choked in winter by the ice floating around the shore, which also happens if, caught by the waves dashing violently about the rocks, they are thrown against the latter. In winter these animals are so lean that besides the spine all the ribs appear. Coition takes place in the spring, and especially about evening, in a tranquil sea. They perform many gambols in anticipation. The female swims quietly hither and thither in the sea while the male continually pursues. For a long time the female eludes him with many turnings and meanderings until herself impatient of further delay, as if wearied and overpowered, she throws herself on her back, when the male, rushing upon her furiously, extorts the *tributum Veneris* and both mutually embrace.

"Their capture was accomplished with a great iron harpoon, the point of which resembled the flattened blade of an anchor fluke, and the other extremity, with the aid of an iron ring, was fastened to a very long and strong cable. A vigorous man took this harpoon, and, together with four or five others, embarked in a boat, and while one guided the helm and three or four rowed

hastened out to the herd. The striker stood in the prow, held the harpoon in his hand, and, as soon as he was near enough to strike the animal from the boat, hurled his weapon. As soon as this was done thirty men standing on the shore, seizing the other extremity of the rope, held the animal, and in spite of his desperate efforts to resist drew him with great labor toward the shore. Those who were in the boat re-enforced themselves with another rope and wearied the animal with repeated blows until, exhausted and quiet, he was dispatched with dirks, knives, and various weapons, and was drawn to the shore. Some cut great pieces from the living animal. All that the animal did was violently to move his tail and struggle so with his fore-limbs that often great pieces of the skin split off. He breathed heavily, and as with a groan. From his wounded back the blood was thrown in a spray high up after the manner of a spouting fountain. As long as the head was *hidden under the water the blood did not flow, but as soon as he raised his head and breathed the* blood gushed out. The reason for this is that the lungs, situated on the back, were wounded first, and as often as these were afterward filled with air they increased the strength of the flow of blood. *From this phenomenon I almost came to the conclusion that the circulation of the blood in this* animal, as in the seal, is completed in a twofold manner—in the open air through the lungs, but under water through an oval aperture (*foramen ovale*) and arterial duct, though I did not find both. But that they at the same time respire in a different way from fishes I think happens on account of the deglutition of solid food rather than because of a forward-moving circulation.

"The full-grown and very large animals are captured more easily than the calves, because the calves move with a far more violent motion; and though the harpoon remains intact, yet when the skin is broken they easily escape, a thing which is repeatedly attempted.

"But if an animal captured by the harpoon begins to move quite violently, those near or in a neighboring herd are frequently stirred and are aroused to bear aid to the captive. On account of this, sometimes they attempt to overturn the boat with their backs, sometimes they fall upon the rope and strive to break it, or, by the vibration of the tail, labor to extract the harpoon from the back of the wounded animal, which oftentimes they attempt not without success. It is a most curious proof of their disposition and conjugal affection that when the female has been taken and drawn in with the harpoon, the male, after he has attempted her liberation with all his strength, *but in vain, and has been struck many blows by us, none the less will follow* her even to the shore, and sometimes unexpectedly and suddenly will approach her when she is already dead. On the next day at early dawn when we came to cut the flesh in pieces and carry it home we have found *the male still standing near his female, and I have even seen this on the third day when I* approached alone for the sake of examining the intestines.

"As regards voice, the animal is mute and does not give forth any sound, but only breathes heavily, and when wounded sighs.

"How much power lies in his eyes and ears I dare not affirm, but frequently he sees and hears very little for the reason that he keeps the head continually under water; nay, the animal himself seems to neglect and despise the use of these organs. Among all who have written concerning Sea-cows,[1] no one has produced a more full and careful account than the most curious and diligent Captain Dampier in the narrative of his travels published in London in 1702. As I read his account, nothing seemed to me to be worthy of censure, although some few things did not agree with our animal. For he says that two species of Sea-cow exist, one of which has stronger eyes than ears and the other stronger ears than vision. What he says concerning the hunting of this animal, namely, that the Americans approach it without any noise or talking lest the Sea-cow flee,

[1] The allusions to the "Sea-cow" in this paragraph relate to the American and African Manatees. Steller at this time seems to have regarded both these and the Rhytinia as forming but a single species.

is without doubt so in localities where they are frequently captured and by long experience have learned that men are hostile to them, in the same way as others, otters and seals, which in this deserted island never before have seen men, nor have been disturbed in their enjoyment of secure peace, and were killed by us strangers on Bering's Island without any labor, have already been rendered equally wild, and in the Kamtchatkan land, not only when an enemy is seen, but when they scent his tracks, hastily commit themselves to flight. It happens sometimes that these animals are thrown out dead by the tempests around the promontory called Kronozkoi Nos, and also around Awatscha Land, and are called by the Kamtchatkans, on account of their use for food, in their language, Kapustnik, 'Kraut Emser,' which fact I learned after my return in 1742. Finally, concerning the use of the parts of this animal, according to Hernandes, the thick, firm, and tough skin is used by the Americans for the soles of shoes and for belts. I hear that the skin is used by the Tschuktschi for boats. They are accustomed to stretch the skin on sticks, and to treat it in the same way as the tribe of Koraeccica do the skins of the very large seals called Lachtak.

"The fat encircling the whole body under the skin, a span, and in some places almost nine inches thick, glandulous, consistent, white, when exposed to the sun turning yellow like hog's lard, of a very pleasant odor and flavor, is to be compared with the fat of no marine animals, nay, rather much to be preferred to the fat of quadrupeds; for besides that it can be heated for a very long time on the warmest days and not become rancid or otherwise offensive to the smell, when tried out it is so sweet and palatable that it took from us all desire for butter; in taste it comes very near to the oil of sweet almonds, and can be applied to the same uses as butter; in a lamp it burns brightly without smoke or smell. Nor, indeed, is its use for medicine to be despised, since it gently relaxes the bowels; drunk from cups it causes neither nausea nor loss of appetite, and, as I think, for those afflicted with gravel the Sea-cow would be of more benefit than the masticatory bones or stones (*masticatoria ossa seu lapides*), so called. The fat of the tail is harder and more consistent, and when cooked more delicate. The flesh consists of fibers somewhat more stout and thick than those of neat cattle, is a deeper red than the flesh of terrestrial animals, and, what is wonderful, even in the hottest days warms in the open air a very long time without stench, though it is beset on every side with worms. The reason I allege for this fact is, that since the animal subsists only on marine fuci and herbs, and these fuci are more sparingly composed of sulphur and more largely of sea salt and niter, these salts prevent the exhalation of sulphur and the softening and resolution of the flesh in the same way as salts or salt brine sprinkled on flesh, and the more because these salts are mingled intimately with the substance of the flesh and cohere very strongly to sulphurous parts. Though the flesh must be cooked a longer time, yet when cooked it is of the best flavor and not easily to be distinguished from the flesh of neat cattle. The fat of the calves so resembles fresh hog's lard that you can scarcely perceive the difference; and the flesh does not differ at all from veal, is quickly softened with cooking, and, that continuing, so swells, like the flesh of a young pig, that it claims for itself very much greater room in the pot than before. The tendinous fat about the head and tail is scarcely fit for boiling; on the other hand, the muscles of the abdomen, back, and sides are far to be preferred. It not only does not resist salting, as many have thought, but only grows soft; so that it comes out like salted beef in all respects, and very palatable. The viscera, heart, liver, and kidneys are too hard, and were not much sought after by us because there was a very abundant supply of flesh.

"The full-grown animal weighs about 8,000 pounds (eighty hundredweight), or 200 Russian puds.

"There is so great a multitude of these animals about this single island that they continually suffice to support the inhabitants of Kamtchatka.

"The Rhytina is infested with a peculiar insect, like a louse, which is wont to occupy and inhabit in large numbers especially the wrinkled limbs, breasts, nipples, pudendum, anus, and the rough cavities of the skin, and which bore through the cuticula and cutis. From the extravasated lymphatic fluid conspicuous warts arise everywhere; the gulls (*Lari*) are also allured to hunt with their sharp beaks these insects (clinging to the backs of these animals), a pleasant food, and moreover the birds perform a friendly and grateful office for the animals troubled by these parasites."[1]

ADDITIONAL OBSERVATIONS.—This narrative, as I have already stated, contains all that we know of the natural history of the Arctic Sea-cow, and, I venture to say, all that we shall ever know from visual observation. There are a number of facts, however, bearing upon the mode of capture, geographical distribution, and the history of the extinction of this animal which have been the theme of writers after Steller. Dr. Brandt, a celebrated naturalist of St. Petersburg, and the Danish explorer Nordenskiöld, have taken pains to bring together all that is known on these topics up to the present time. Most of the books and manuscripts from which they have gathered their information being inaccessible to me, I must content myself with summing up the results of their investigations.

THE EXTINCTION OF RHYTINA.—The extinction of the Rhytina followed close upon its discovery. If we may accept the results of Nordenskiöld's investigations upon this point, the animal was last seen in 1854, or a little more than a century after its discovery. Long before this, at all events, it had become so diminished in numbers as not to furnish any considerable food supply.

It appears that the existence of the Sea-cow on Bering Island had no sooner been made known in Russia than the vessels engaged in the fur trade in Bering's Sea began to make a practice of wintering on the island, in order to take in a supply of the flesh of the animal for food. That this custom became general in a few years, appears from Scherer's narrative of the first Russian hunting expeditions to the Aleutian Islands. "Ivan Krasselnikoff's vessel," he writes, "started first in 1754, and arrived on the 8th October at Bering Island, where all the vessels fitted out for hunting the sea-otter on the remote islands are wont to pass the winter, in order to provide themselves with a sufficient stock of the flesh of the Sea-cow."[2]

The next year, 1755, the engineer Jakovlev, who visited Bering Island and the adjacent Copper Island, in search of copper, recorded in his journal the mode of capturing Rhytina, which differs in no way from the method employed by Steller and his companions. Jakovlev, however, was so impressed with the rapidity with which the Sea-cow was disappearing from the islands that he petitioned the Kamtchatkan authorities that its capture might be restricted. It appears that at the time of his visit the Rhytina had been driven away from Copper Island.[3]

Scherer informs us of the landing of three other hunting expeditions at Bering Island, between 1757 and 1762, for the purpose of capturing Sea-cows, implying at the same time, as in the instance already quoted from him, that such was the custom of all expeditions sent thither. His allusions to the subject are as follows: "The autumn storms, or rather the wish to take on board a stock of provisions, compelled them (a number of hunters sent out by the merchant Tolstyk under command of the Cossack Obeuchov) to touch at Commander's Island (Bering Island), where, during the winter up to the 24th (13th) June, 1757, they obtained nothing else than sea-cows, sea-lions, and large seals."

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[1] Specimens of this crustacean were found in a small piece of Rhytina skin discovered in the British Museum.

[2] SCHERER: Neue Nachrichten von denen neuentdeckten Inseln in der See zwischen Asien und Amerika, 1776, p. 38, *fide* Nordenskiöld.

[3] Jakovlev's diary was published in Russian in 1867, by Pekavski, and translated into Latin and republished in 1868 by Brandt. See BRANDT: Symbolæ Sirenologicæ, fasc. iii, pp. 295, 296.

Again: "They (a Russian hunting vessel under Studenzov, in 1758) landed on Behring Island to kill Sea-cows, as all vessels are accustomed to do." On another page he states that "after Korovin, in 1762 (on Bering Island), had provided himself with a sufficient stock of the flesh and hides of the Sea-cow for his boats . . . he sailed on."[1] Sauer, in his account of Bering's voyages, published in 1802, alluding to the Rhytina, says: "The last was killed on Behring Island in 1768, and none has been seen since then."[2]

In this conclusion most authorities are agreed. Nordenskiöld, however, obtained information, of a character which he regards reliable, which would seem to show that the Sea-cow was not entirely exterminated before 1854. The first informant was a creole. Nordenskiöld writes: "A *creole* (that is, the offspring of a Russian and an Aleutian), who was sixty-seven years of age, of intelligent appearance, and in the full possession of his mental faculties, stated 'that his father died in 1847 at the age of eighty-eight. He had come from Volhynia, his native place, to Behring Island at the age of eighteen, accordingly in 1777. The two or three first years of his stay there, *i. e.*, until 1779 or 1780, sea-cows were still being killed as they pastured on sea-weed. The heart only was eaten, and the hide used for *baydars*. In consequence of its thickness the hide was split in two, and the two pieces thus obtained had gone to make a *baydar* twenty feet long, seven and a half feet broad, and three feet deep. After that time no sea-cows had been killed.'

"There is evidence, however, that a sea-cow had been seen at the island still later. Two *creoles*, Feodor Mertchenin and Stepnoff, stated that about twenty-five years ago [in 1854] at Tolstoj-mys, on the east side of the island, they had seen an animal unknown to them which was very thick before, but grew smaller behind, had small fore-feet, and appeared with a length of about fifteen feet above water, now raising itself up, now lowering itself. The animal 'blew,' not through blow-holes, but through the mouth, which was somewhat drawn out. It was brown in colour with some lighter spots. A back fin was wanting, but when the animal raised itself it was horrible, on account of its great leanness, to see its backbone projecting. I instituted a thorough examination of both my informants. Their accounts agreed completely, and appeared to have claims to be regarded as trustworthy. That the animal that they saw was actually a sea-cow, is clearly proved both by the description of the animal's form and way of pasturing in the water, and by the account of the way in which it breathed, its colour, and leanness. In *Ausfürliche Beschreibung von sonderbaren Meerthieren*, Steller says, page 97: 'While they pasture, they raise every fourth or fifth minute their nose from the water in order to blow out air and a little water. Page 98: 'During winter they are so lean that it is possible to count their vertebræ and ribs'; and page 54, 'some sea-cows have pretty large white spots and streaks, so that they have a spotted appearance.' As these natives had no knowledge of Steller's description of the animal, it is impossible that their statements can be false. The death-year of the Rhytina race must therefore be altered at least to 1854."[3]

Neither of the statements appear improbable, but they should be accepted, I believe, with caution. At all events, the Sea-cow was practically extinct within four decades from the time of its discovery.

CAUSES OF THE EXTINCTION.—Two causes have been assigned for this rapid destruction. The most generally accepted notion is that the rate of capture much exceeded that of the increase of the animal, and that extinction followed as a matter of course. Nordenskiöld, however, and, in a certain way, Brandt also avows his belief that the Sea-cow had gotten out of harmony with its environment many years before the Russians discovered it, and that its extermination would have

[1] SCHERER: *Op. cit.*, pp. 40, 45, and 82, *fide* Nordenskiöld.
[2] SAUER: Bering's Voyage, 1802, p. 181, *fide* Nordenskiöld.
[3] NORDENSKIÖLD: Voyage of the Vega. English translation, ii, 1881, pp. 277, 278.

occurred within a comparatively short time without the intervention of man. The fact that in Steller's time the range of the animal was much circumscribed, seems to give weight to the latter view.

The range of the Sea-cow, when discovered by Europeans, seems to have been confined to Bering and Copper Islands, but the investigations of Brandt show that it probably extended *from Nishne-Kamtchatka or the bay of Karaguescensi to the coast of China and included also the* outermost islands of the Aleutian Archipelago. Sauer's statement that "Sea-Cows were very common on Kamtchatka and on the Aleutian Islands, when they were first discovered," seems without foundation, and is properly rejected by Nordenskiöld. Whether the Sea-cow ever occurred on the Aleutian Islands appears somewhat uncertain. Vosnessenski found a rib of the animal on Attu, the last island of the archipelago, but, as Brandt suggests, it may have been derived from a Rhytina washed thither by the waves. Mr. Lucien Turner kindly informed me that an aged Aleut woman stated that Rhytina had been seen at Attu by her father, but such testimony is, perhaps, not altogether satisfactory.