WHALES AND WHALE FISHERIES OF THE NORTH PACIFIC.

BY

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Captain George Vancouver, under a Commission from the Government of Great Britain, in 1792, 1793 and 1794, explored the Northwest Coast of America from north latitude 30° to north latitude 60°, in a search for the Strait of Anian, afterwards known as the North West Passage. For a number of years I have been making a study of his explorations, and in doing so have made five voyages to Alaska, the fourth of which extended to the head of Cook Inlet in north latitude 61°. The following paper is based on observations made while making those voyages, supplemented by a study of various authorities upon the subject of whales.

On the 7th of April, 1792, Vancouver reached latitude 35°25′, longitude 217°24′, where he found himself in the midst of immense numbers of the sea blubber of the species Medusa Villilia. The surface of the ocean, so far as the eye could reach, was covered with these creatures in such abundance that even a pea could hardly be dropped clear of them. In the afternoon his ship passed within a few yards of about twenty whales of the anvil headed or spermaceti species playing in the water. His conclusion was, that these whales were induced to resort hither to feed upon the immense number of the Medusa, with which the region abounded.

On Monday, the 25th of June, he had reached a point in the Strait of Georgia beyond the present site of the City of Vancouver. In his record of that day, he says: "In the course of the forenoon a great number of whales were playing about in every direction; and though we had been frequently visited by these animals in this inland navigation, there seemed more about us now than the whole of those we had before seen, if collected together." He also says, "That in sailing from Desolation Sound to Menzies Bay, numberless whales, enjoying the season, were playing about the ship in every direction." These quotations from Vancouver's Journal, and many others that might be made, show the great abundance of whales that were to be found in the North Pacific Ocean a century and a half ago and how tame they were at that time.

The first of these animals that I have had the privilege of seeing was that of a dead one which was brought from the East to Indianapolis, many years ago on two open flat cars, for exhibition. The next one was seen July 11, 1911, sporting in the Strait of Georgia, between Vancouver and Active Pass. After that I saw many of them, singly and in pairs, but I have never seen a "school" of them. I saw a Beluga, or white whale, near to Kodiak, October 1, 1914. On my return trip of that voyage I formed the acquaintance of Alfred Hanger, an intelligent man, who had long been engaged in whale fishing, and from him gained much information about whales and whale fishing. The following are the whales which he said are found on the Northwest Pacific Coast: Right Whale, Bowhead Whale, Sulphur Bottom Whale, Fin Whale, California Gray Whale, Sperm Whale,

Bottle-nose Whale, White Whale and Killer Whale. His story of whales and whale fishing, in the main, corresponds very much with what I have found in the authorities that I have consulted.

The mammalia is constituted of the highest order of the animal kingdom. Strange as it may seem, a whale belongs to this order, and not to that of the fishes which in form and habitat, it so much resembles. It is a hot, red blooded creature, breathing by means of lungs, which lie in the interior of the body in a definite chest cavity, shut off from the rest of the cavity of the body by a large muscular partition or diaphragm. Frequently it has vestiges of the hairs which cover the bodies of other mammals and the presence of a few scattered hairs in the neighborhood of the mouth. It brings forth its young alive and suckles them with milk. At Kyuquot Whaling Station I saw the foetus of one that was six feet long that had been taken from a slaughtered mother whale. The bones of the skull are precisely like those of other mammals, and only differ slightly in their relative arrangement.

Whales are the giants of creation; they are not only the largest of the living animals, but of all animals that have existed, except perhaps the one hundred and thirty foot Dinosaur, recently described, and in many respects are the most interesting and wonderful of all creatures. They are all fish-like in form with tapering bodies, one pair of paddles, no apparent vestige of hind limbs, no external ears, tiny eyes, and black piebald or white coloration. They are divided into two families, namely, Mystacoceti, or toothless whalebone whales, and Odontoceti, or toothed whales. All of the members of the first family are called whales, but of the second only certain of the larger ones are so termed, the smaller species being popularly spoken of as "Bottlenoses", "Dolphins" and "Porpoises".

The family Mystacoceti, or whalebone whales, is subdivided into three genera, (1) Balaena, (2) Megaptera, and (3) Balenoptera. The Balaena consist of the Greenland, or more properly Arctic right whale, and several other species described according to their geographical distribution. In the Greenland or Arctic right whale all the peculiarities which distinguish the head and mouth of the whales from those of other mammals have attained their greatest development. The head is of enormous size, exceeding one-third of the whole length of the creature. The cavity of the mouth is actually longer than that of the body, thorax, and abdomen altogether. The upper jaw is very narrow, but greatly arched from before backwards, to increase the height of the cavity and allow for the great length of the baleen, or whalebone; the enormous rami of the mandibles are widely separated posteriorly, and have a still further outward sweep before they meet at the symphysis in front, giving the floor of the mouth the shape of an immense spoon. In front of the door to "Ye Old Canosity Shop" on the wharf at Seattle, I saw a pair of jaw bones of a whale which were marked as being twenty feet and one inch long and weighing one thousand pounds each.

The Baleen blades of these whales, or whalebone, as known in common parlance, attain the number of three hundred and eighty or more on each

side, and those in the middle of each series have a length of ten to twelve feet. It is by means of this apparatus that the whale is enabled to avail himself of the minute, but highly nutritious, crustaceans and Medusa Villilia which swarm in immense shoals in the seas it frequents. These plates of baleen or whalebone act as strainers. The food thus filtered off by the action of the whale bone and the raising of the tongue and shutting of the jaws is left stranded upon the gigantic tongue and then swallowed down the narrow throat. This whale attains a length of fifty to sixty-five and occasionally seventy feet. It produces a single foal or "sucker" at a birth, which at birth is ten to fourteen feet long. The bowhead whale, whose range is circumpolar, probably belongs to this species. According to Scammon, it is seldom seen south of the fifty-fifth parallel north latitude, which is about the farthest southern extent of winter ice. In other words, it is an "ice whale". This whale and the southern right whale resemble each other in the absence of a dorsal fin and longitudinal furrows in the skin of the throat and chest, but they differ in that the southern right whale possesses a smaller head in proportion to its body, shorter baleen, a different shaped contour of the upper margin of the lower lip, and a greater number of vertebrae.

The Megaptera, commonly called the "humpback" whale, is characterized from all others of the group, especially by its immense length of the pectoral fins or flippers, which are indented or scalloped along their margins, and are, except at the base, of a white color, nearly all the rest of the body being black. It differs from the right whale and resembles the rorqual in having the skin on the throat and chest marked with deep longitudinal furrows. The Baleen or whalebone plates are short and broad and of a deep black color. The usual length of the adult ranges from forty to fifty feet. The production of its oil varies more than in all other whales. Scammon reports having seen individuals which yielded but eight or ten barrels of oil and others as much as seventy-five. Whalemen distinguish this mammal at a considerable distance by its undulating movement. They are found in both the North and South Pacific. During the breeding season this species is remarkable for its amorous antics. At such times their caresses are of the most amusing and novel character. When lying side by side of each other they frequently administer alternate blows with their long fins, which love pats may, on a still day, be heard at a distance of miles.

The Balaenoptera composed of the rorquals or fin whales have the plicated skin of the throat like that of the megaptera, the furrows being more numerous and close-set; but the pectoral fin is comparatively small and the dorsal fin distinct and falcate. This whale is comparatively small, flat and pointed in front, the baleen or whalebone short and coarse, the body long and slender, and the tail very much compressed before it expands into the flukes. The rorquals are perhaps the most abundant and widely distributed of all the whales, being found in some of their modifications in all seas, except the extreme Arctic, and probably Antarctic regions. They yield

a small quantity of inferior whalebone, and a limited amount of blubber or subcutaneous fat. There are four and probably five species of the rorqual. (1) Sibbaldi, named in honor of Sir Robert Sibbaldi; Borealis; (3) Rostrata; (4) Musculus, and (5) Sulphureus. The sibbaldi is the greatest of all the whales. Whalers know it by its large size and by the height to which it spouts. Its speed too, when going rapidly, is great—something like twelve miles an hour. It feeds upon Crustacea, lives mainly in pairs, and reproduction is said to take place every three years. The species borealis, known as Rudolph's Rorqual has a length of forty to fifty feet; color bluish black above and white below; upper surface with oblong light spots. Baleen black with white bristles; number of plates three hundred and thirty. It is inoffensive in character. It is estimated that it can remain under water eight to twelve hours. The species rostrata has a length of twenty-five to thirty-three feet, color greyish-black above, and white below; dorsal fin high at commencement of last third of the body; pectoral fin one-eighth of the total length of the body; plates of baleen about three hundred and twenty-five. This is the smallest of the rorquals, and is readily distinguished from them by the white band which crosses the pectoral limb, and by the sharp snout—hence the specific name of "rostrata". The species musculus, grows to a length of sixty to seventy feet. The color is gray-slate above, white below. The dorsal fin low with straight margins, is placed slightly in front of the last fourth of the body; the pectoral fin has a length of one-ninth of the body. The plates of baleen and bristle are of a dark bluish black color, and the number of them ranges up to three hundred and seventy. This is perhaps the commonest species of the rorquals. The species Sulphureus, commonly known as the "Sulphur Bottom" whale, is one of the longest of the whales; an example of it having been measured and found to be ninety-five feet in length with a girth of thirty-nine feet. It weighed one hundred and forty-seven tons, and yielded one hundred and ten barrels of oil. Ordinarily one of them yields about eight hundred pounds of baleen or whalebone. The name is derived from the yellowish color of the under parts of its body; the back is lighter in color than is usual, and is sometimes a very light brown, approaching to white. During the months from May to September, inclusive, these whales are found in large numbers close in with the shore.

The family Odontoceti is composed of the toothed whales. Correlated with the presence of the teeth is the absence of baleen or whalebone. Beddard says, "So sharply defined are the Odontoceti from the Mystacoceti that intermediate types are sadly to seek; and both additions, in fact, have each specialized on their account in the same kind of direction in parallel lines. We have great-headed Cetaceans in both groups. The Cachalot corresponds to the Right whale. There are giants and pigmies amongst the families of each. The small Kogia is a near ally of the bulky Cachalot. The somewhat dwarfish Neobalaena is not far off from the leviathan of the Greenland seas. There are Odontocetes without a dorsal fin, and Odontocetes with that fin. The Rorquals correspond to the latter, the Greenland whale to the former. The head of the Sperm whale or cachalot

is about one-third of the length of the body, very massive, high and truncated in front, owing to its huge size and remarkable form mainly to the great accumulation of a peculiarly modified form of fatty tissue, filling the large hollow on the upper surface of the skull. The oil contained in the cells in this great cavity, when refined, yields Spermaceti, and the thick covering of blubber, which everywhere envelopes the body, produces the valuable sperm-oil of commerce. The single blowhole is a longitudinal slit, placed at the upper and interior extremity of the head to the left side of the middle line. The opening of the mouth is on the underside of the head, considerably behind the end of the snout. The lower jaw is extremely narrow, and has on each side from twenty to twenty-five stout conical teeth, which furnish ivory of good quality. The upper teeth are quite rudimentary and buried in the gum. The pectoral fin or flipper is short, broad, and truncated, and the dorsal fin a mere low protuberance. The general color of the surface is black above and grey below, the colors gradually shading into each other. The food of the sperm whale consists mainly of various species of cephalapods, but they also eat fish of considerable size. The substance called "ambergris", formerly used in medicine and now in perfumery, is a concretion formed in the intestine of this whale, and is found floating on the surface of the seas it inhabits. Its genuineness is proved by the presence of the horny beaks of the cephalopods on which the whale feeds. The remaining Odontoceti are all animals of much smaller size than the sperm whale, but to several of them the name "whale" is commonly applied.

The Beluga or White whale is entirely northern in its range. Its name "Beluga" is derived from the Russian and signifies white. The young is blackish, the older whale a mottled, and finally a yellowish hue is arrived at, which is gradually blanched to pure white. It reaches a length of sixteen to twenty feet. It is a singular fact that these whales, unlike many Cetacea, have a distinct noise which has earned for them the name of "Sea Canary". They live in companies and feed upon fish, cephalopods and crustacea. Though this is a marine whale, it sometimes ascends rivers, it is said, in pursuit of salmon. It has been known to ascend the Yukon River for a distance of seven hundred miles.

The Orca or Killer whales grow to a length of twenty to thirty feet. They are powerful, rapacious animals, and are the only whales that feed upon their own kind and upon large prey. They are a species of rapacious, carnivorous whale, whose upper and lower jaws are armed with sharp, saw-like teeth. They are known as the tiger-hearted gladiators of the sea. The Killer whale never hunts alone. It pursues its titanic quarry in couples and trios, and sometimes in veritable wolf-like packs of a half dozen. I witnessed one of these attacks in Queen Charlotte Sound. They have been known to assault the largest whales of the sea. Burns tells of an attack of this nature upon a large bowhead whale and Scammon of one upon a Californian Grey whale which he witnessed. He says, "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 limbs. 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."

The common porpoise is a gregarious whale found in both the Atlantic and Pacific. It reaches a length of five to six feet and is generally blackish, but white on the belly. Like the stormy petrel they have the reputation of presaging foul weather, when they sport and chase one another about vessels, an instance of which I witnessed in Lynn Canal.

It seems to be hardly a matter of doubt that whales were first utilized only when stranded on shore. The discovery thus made of the economic value of many parts of these huge monsters led naturally to their pursuit, either from the shore or open sea. As to the actual date of the first active hunting of them there is dispute, the real date of the origin of this pursuit being difficult to ascertain. Hakluyt thinks it was practiced on the Norway coast as early as A. D. 890. In the first place it probably was practiced from the shore. Beddard says, "No doubt as soon as the value of stranded whales was ascertained they would be hunted in this fashion, and then as the shore-coming whales got scarcer they would be pursued by the whalers further and further into the ocean". The American whale fishing began as early as the year 1614. At first the animals were pursued from the shore; and Nantucket Island was the headquarters of the industry. The whales were watched for from a "tall spar", and when an animal was seen to spout the boats immediately set out in pursuit. The whale when captured was towed into shore, and the flensing done on the beach. Verrill says that, at that time no ships had set forth in quest of whales and the whalemen depended upon those which could be captured from small boats and it was not until 1688 that the first whaleship set forth on a true whaling cruise. Within a dozen years the sails of the sloops, brigs and schooners from Nantucket and other Massachusetts towns were spread to the winds of the Atlantic from the Equator to the Arctic Circle.

Never very abundant, the right whales, that is the Arctic right, or Greenland whale, and the North Atlantic whale, of which the oil served to light the way of our ancestors and the whalebone to give shapely form to the women, have become very rare. In our time the Greenland whale is not regularly hunted except in Davis and Lancaster Straits, Hudson Bay, on the Northwest Coast of North America about Point Barrow. Even in those places it is no longer abundant. The second species of right whale, the North Atlantic right whale is at present scarcely more abundant than the Greenland whale. In contrast with the foregoing, finbacks and Humpbacks abound in all seas, such as the blue whale, the rorquals, the pollack whale, the common humpback, and many other less well-known species. The cetaceans are at present relentlessly pursued for commercial purposes.

The finback whale fishery began in 1867, when the celebrated Norwegian sailor, Svend Foyn with his destructive machine captured his first whale, and in the first year took thirty of them. In less than fifteen years this

fortunate inventor found himself possessed of more than $2,000,000. Encouraged by this example, companies were organized to exploit this source of profit, to such an extent that in 1887 there were no less than thirty-five whaling vessels on the coast of Finmark. In good years they captured from twelve hundred to thirteen hundred finbacks. According to the Norwegian Fisheries Journal four companies alone in 1911 captured fourteen hundred and seventy-two finback whales, and in the Antarctic seas around South America, not less than ten thousand finbacks and humpbacks were killed. In 1913 nine companies with thirty-two steamers were established in the South Shetlands, and they caught more than three thousand whales.

The early days of whaling, as we have seen, was "shore whaling" by means of small boats, and all the whales attacked and captured were those which approached close to the shores and could be seen from the land. This whaling was carried on by means of harpoons and lances. The first Nantucket whaling vessels were small, thirty-ton sloops fitted for cruises of a few week's duration and after capturing one whale they returned to port. From the small sloops of those early days the vessels were increased in size until large barks, ships and brigs were in almost universal use. The tools, weapons and implements of those early days were not well adapted to the capture and cutting up of whales, and the later whalers found it difficult to improve upon them. The most improvement made was the harpoon-gun invented by Svend Foyn in 1867. This gun is heavily constructed throughout and has a bore of three inches and placed in the extreme bow of the whaling vessel. The harpoon is a very heavy missle, weighing several hundred pounds. A bomb containing roughly a pound of powder is screwed on to the harpoon, and the latter then rammed home and in the same manner shot. Coiled upon the iron plate under the gun muzzle is the "doregoer", made of the best Italian steam tarred hemp, four and half inches in circumference, one end of which is attached to the harpoon about eighteen inches from the point. Attached to the other end of the "foregoer" is one of the main whale lines from the winch, this line being of Russian steam-tarred hemp, about four hundred fathoms in length, and of five and a half inches circumference. Thus equipped a vessel is ready for action.

Near the top of the mast head is located the lookout barrel, from which point of vantage the lookout can cover a much larger area than a man on deck would be able to do. As soon as a whale is sighted the vessel is run as close to it as possible, and when within range the gun is fired. A time fuse is attached to the bomb on the harpoon, this being ignited by the discharge of the gun, and five seconds after the discharge the bomb explodes. On the shaft of the harpoon are barbs, which expand on entering the body of the whale, making it next to impossible for the harpoon to be drawn out. As soon as struck the whale sounds and goes to the bottom. These animals have enormous strength and will at times tow the vessel several miles before beginning to weaken. As soon as the line slackens it is snubbed around a heavy steam winch on the deck just ahead of the bridge, after which the wounded whale is played in much the same manner that a fish is played by an expert angler, a continual strain being kept on

him, slackening sometimes to avoid a wild rush, but always reeling in slack at every opportunity. The strain soon begins to tell on the whale, his rushes growing shorter and less vicious, and finally he rises to the surface, lashing the water white in his struggles. Should he blow blood when he reaches the surface, the whalers know he is mortally wounded, and wait until he dies, but if he blows clear and quiet, the "pram", a peculiar spoon shaped boat adapted from a Norwegian model, is lowered and rowed along side and a long lance is driven into him until he blows blood, which shows an internal hemorrhage, from the effects of which he soon expires, rolling over on his back in his last struggle, and then sinking to the bottom. The line is now rapidly hove in until a heavy strain shows the slack is in and the weight of the whale is showing, when the line is run through a heavy iron block at the foremost head, this being heavily rigged in order to stand the tremendous strain. Fathom by fathom the line comes in until at last the dead body is alongside. A chain is attached around the tail and the winch then heaves the tail out of water, causing the animal to hang vertically head down from the bow. The vessel is then forced ahead at full speed to bring the body to the surface. The lobes of the tail are then severed and brought on board. In order to make the carcass more buoyant, air is blown into the abdominal cavity by means of a Westinghouse air pump.

If the whaler is not ready to return to the station immediately, a buoy with the ship's flag attached, is secured to the whale, and both allowed to go adrift while the vessel continues its hunt, sometimes as many as three or more whales being brought in at one time, all with their tails out of the water, and hoisted to the bow. Upon arrival at the station the whales are attached to a buoy in front of the ship, from which a line is taken and the animal hauled into the mouth of the ship between two cribs filled with rocks, which act as guides to keep it centered, at the same time to ballast the nose of the slip under water at all stages of the tide. A large one and a half inch diameter iron chain is then attached to the tail of the whale and it is hauled out of the water under the "flensing" shed by a powerful steam winch. As soon as the whale is in place, men with long handled knives commence "flensing", that is, removing the blubber. This is a layer of fat directly under the skin, covering the whole body like a huge blanket, and varying in thickness from four to seven inches. The men walk from the head toward the tail, cutting long gashes in the blubber as they go, then a steel hook attached to a wire cable is hooked in at the end of a strip, the steam winch heaves in on the wire, and the long strips are peeled off one after another.

As fast as removed the strips of blubber are put into the slicer, or blubber cutter, and chopped into half-inch slices, which are dropped into an endless bucket elevator to be hoisted to the blubber pots, where the oil is fried out by means of steam pipes running through pots. After the blubber is exhausted in these pots, it is conveyed in a chute to a drainage tank, where the bulk of the water is separated by gravity, and then to the dryer, where, mixed with the residue of the meat, it is turned into guano. After the blub-

ber is removed from the carcass and the inside fat is taken out by chopping through the ribs, the carcass is hauled up to the carcass platform which is at right angles to and a few feet higher than the main slip. Here another gang of men remove the meat from the skeleton. This meat, which very much resembles beef both in appearance and flavor and is frequently eaten at the station, is put into pots arranged on both sides of the platform, where it is boiled and the oil extracted from it by an acid process. After the oil has been dipped from these meat pots, a sluice is opened and the residue is allowed to drop into the chute, where it is run into the drainage tank before mentioned, from thence going into the hot-air dryer with the blubber residue. Here it is made into guano by a drying process which dries the material thoroughly and then shreds it fine, after which it is ready for the market, its value as a fertilizer being very high. The blubber oil is ready for barreling as soon as it is cold, but the meat oil has to be clarified first, to remove the little particles of meat remaining in the liquid. The latter is the darker of the two oils, both before and after clarifying.

Heretofore, the parts of the whale utilized and the products prepared at a whaling station were as follows: Tails and tongues, sliced into thin strips and shipped to Japan, where they are eaten; oil, guano, bone meal, and the baleen or whalebone of commerce. A glue was also made from the residue of the blubber after boiling which was used for coating the insides of the barrels to hold the oil. In addition, experiments were made with the preparation of a meat extract from the flesh, and with the preparation of leather from the skin and stomach wall. An important addition to these uses, is the preparation and utilization of the flesh of whales as a food for the human family.

Seven whaling stations have been established along the Pacific Coast, and fully equipped for the preparation and handling of whale products. Each of these has its whaling fleet, that scours the ocean for a supply for the plant. These plants disposed of about one thousand whales during the season of 1918. It was my privilege to visit the Kyuquot Station in that year. My visit was at a fortunate time. The flenced carcass of a monster female whale was on the floor of the plant, and six others were anchored in the bay. These consisted of two Sperm whales, one Finback, one Bowhead, one Sulphur Bottom and one Humpback. They had just been brought in from a distance of sixty miles, thus showing how scarce whales are getting to be on the Pacific coast. When our vessel came into the bay and stirred the water, it was red with the blood of the slaughtered whales. I was able to examine the various processes of handling and converting whales into their various products. I was especially interested in the process of preparing and canning the flesh for human food and could see no reason why it would not be perfectly edible. In every detail it was done in a most cleanly manner. Certainly the flesh of a whale is grown or made from the cleanest of food and free from diseased conditions. Other nations use and relish the flesh of the whale as food. Why should not Americans do so? By doing so the question of meat supply will be much simplified.