

Basking Shark

Cetorhinus maximus (Gunnerus) 1765
[Bigelow and Schroeder, 1948 p. 147.]

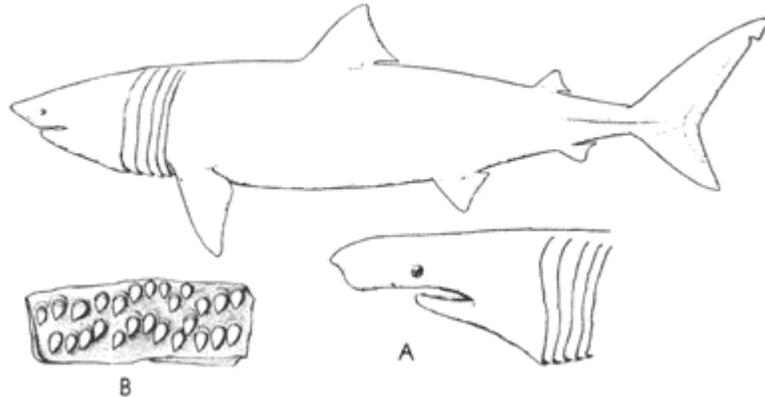


Figure 8 - Basking shark (*Cetorhinus maximus*),
26-foot female, Martha's Vineyard.

A, side view of head of 12-foot Long Island specimen;
B, a group of the teeth of the same, about 1.2 times natural size.

From Bigelow and Schroeder. Drawings by E. N. Fischer.

Description

The basking shark resembles the mackerel sharks in the lunate shape of its caudal fin, with lower lobe nearly as long as upper; also in the presence of a noticeable lunate furrow above and one below on the root of the tail, and in the wide lateral expansion of the latter, forming a pronounced "fore and aft" keel on either side; also in the facts that the second dorsal fin and the anal fin are much smaller than the first dorsal, that its fifth gill opening is situated in front of the origin of the pectoral fin; in the position of the mouth on the under side of the head; and in the wide separation of the nostrils from the mouth. But the teeth of the basking shark are minute and very numerous (large and few in number in the mackerel sharks); its gill openings are so large that they extend right around the neck, with those of the first pair almost meeting below on the throat; and the inner margin of each gill arch bears a great number of horny, bristle-like rakers, directed inward-forward, that correspond to the rakers of various bony fishes in their position and in their function (see p. 30). It was the fancied resemblance of these rakers to the whalebone of the whalebone whales that suggested the vernacular name "bone shark" to the whalers of olden times.

Corresponding to its feeding habits, the mouth of the basking shark is very large and widely distensible at the corners. The snout is short, conical, with rounded tip on large specimens. But it is much longer, relatively, on small ones, [page 29] projecting far beyond the mouth, obliquely truncate in front, terminating above in a sharp point, and with the head strongly compressed sideways abreast of the front of the mouth. This results in so bizarre an appearance that the young basking shark was thought at first to represent a separate species. A gradual transition takes place from the juvenile shape of head to the adult shape when a length of 12 to 16 feet has been reached. We need only note further that the triangular first dorsal fin stands midway between pectorals and pelvics; though not so high in proportion as that of the mackerel-shark tribe, it rises high in the air when a large basking shark lies awash on the surface, as is their habit, a convenient field mark (p. 29).

Color

Upper surface grayish brown, slaty gray, or even almost black. The lower surface has been described repeatedly as white. But the Menemsha specimen described by Allen [57] was of a somewhat lighter shade below than above, without white markings, as was a Massachusetts Bay specimen recently examined by us; while one 14 feet long captured at West Hampton, L. L., on June 29, 1915 [58] had the belly as dark as the back, with a white patch underneath the snout in front of the mouth.

Size

The basking shark rivals, though it does not equal, the whale shark of tropical seas in size. Reports that an occasional basking shark may reach a length of 50 feet probably are not an exaggeration, for the catch on the coast of Norway, for the period 1884 to 1905, included one of about 45 feet and three of about 40 feet, with the six next longest ranging between 36 feet and 30 feet 3 inches. The three longest for which we find definite measurements for the western Atlantic were of 32 feet 2 inches, 32 feet, and 30 feet 3 inches. But others up to 35 feet long have been credibly reported as killed near Eastport, Maine, many years ago; and one captured at Musquash Harbor, New Brunswick, near the mouth of the Bay of Fundy in 1851 was said to have been about 40 feet long. It is probable that they are at least 5 to 6 feet long when born, the three smallest so far reported having been between 5 feet 5 inches and about 8 feet 6 inches long. Matthews [59] concluded from studies of basking sharks taken near the Isle of Skye that fish up to 10 feet are in their first year, those of 15 feet in their second year. Males mature sexually at about 18 to 20 feet as indicated by the lengths of their claspers, females at about 20 to 23 feet; i. e., when 3 years old or perhaps 4, according to Mathews' estimate.

We find no exact weights for large basking sharks from the Atlantic. But 6,580 pounds for one of 28 feet, and 8,600 pounds for another of 30 feet, from Monterey, Calif., is doubtless a fair indication of what a fairly large one may be expected to weigh. Estimated weights for smaller ones, from the Pacific, are about 6,600 pounds at about 23 feet, 1,000 to 1,800 pounds at 13 to 15 feet, and 800 pounds at 8 feet 4 inches. [60] A young one, 12 feet long, killed off Digby, Nova Scotia, August 16, 1939, weighed 359 pounds, after it had bled, [61] and one almost 20 feet long, taken off Portland, Maine, in 1936, weighed 550 pounds, dressed.

Habits

This is a sluggish, inoffensive fish, helpless of attack so far as its minute teeth are concerned. It spends much time sunning itself at the surface of the water, often lying with its back awash and dorsal fin high out of water, or on its side, or even on its back sunning its belly; sometimes it loafes along with the snout out of water, the mouth open, gathering its provender of plankton. They pay so little attention to boats that it is easy to approach one of them within harpoon range, and excellent motion pictures have been taken of them in Irish waters. [62] But they have also been seen jumping, perhaps to shake off parasites. Those seen in the Gulf of Maine are usually traveling singly. But they are known to congregate sometimes in loose schools which may include as many as 60 to 100 in the peak years of abundance for them in regions where they are more numerous than in the Gulf of Maine. [63] It is chiefly during the warm half of the year that basking sharks are encountered off the northeastern United States and in the northern part of their range in the opposite side of the Atlantic. It is likely that those that summer in the inshore parts of the Gulf simply withdraw in the fall, to pass the [page 30] winter in deeper water where the temperature does not fall so low.

Next to its vast bulk and its curiously sluggish habit, the most interesting peculiarity of the basking shark is its diet, for it subsists wholly on tiny pelagic animals, which it sifts out of the water by means of its greatly developed gill rakers, exactly as plankton-feeders among fishes such as menhaden do, and whalebone whales with their baleen sieves. In several cases their stomachs have been found packed with minute Crustacea; this was true of the only western Atlantic specimen of which the stomach contents have been examined. And while digestion is so rapid that the food swallowed is soon reduced to a soupy mass, this usually is reddish, suggesting a crustacean origin.

All that is known of the breeding of the basking shark is that the structure of the internal sex organs of the female accords with the nourishment of the embryo within the maternal oviduct, that the ovary of a female, with empty oviduct contained something like 6 million immature ova instead of the few that are usual in sharks that bear "living" young, and that an embryo about a foot long was said, long ago, to have been taken from its mother. [64]

Basking sharks reported as "sea serpents" or as other "monsters"

The remains of basking sharks have been reported as "sea serpents" on several occasions; nor is this astonishing. "As the carcass of the shark rots on the shore, or is buffeted against the rocks, the whole of the gristly skeleton of the jaws and gill arches ... as well as the pectoral and pelvic fins, is soon washed away," [65] leaving only the cranium and the long backbone, with larger or smaller amounts of muscle, so frayed out as to suggest a hairy or bristly mane. As a recent instance from the Gulf of Maine, we may cite the newspaper and radio publicity, that was given, as a supposed sea serpent, to a basking shark skeleton, about 25 feet long, that beached near Provincetown on the outer shore of Cape Cod, in January 1937, that we examined. [66]

A more spectacular instance of the fanciful interpretation that is likely to be placed on any large stranded carcass that has decayed partially, was the famous "Animal of Stronsa," that came ashore on the island of that name in the Orkneys, in September 1808. It was pictured by an eyewitness as having three pairs of limbs, but the published illustration of its cranium, vertebrae, and pelvic skeleton [67] show that it was only the remains of some very large shark, probably a basking shark. It has also been suggested repeatedly that some of the stories of sea monsters of one sort or another may have been based on the dorsal and caudal fins of two or more basking sharks, swimming one behind another as they often do (we dare not touch further on the controversial subject of the "sea serpent").

General range

This enormous fish, formerly thought to be an Arctic species, straying southward, is now known to be an inhabitant of the temperate-boreal zone of the North Atlantic. [68] It is represented in the corresponding thermal belts of the South Atlantic and of the North and South Pacific by a similar great shark (or sharks), whose exact relationship to the basking shark of the North Atlantic is still an open question.

The northern boundary of the normal range of the basking shark of the North Atlantic appears to follow the line of transition from waters of predominately Atlantic influence to those of Arctic origin. This, roughly, runs from the outer coast of Nova Scotia (1 record), and from southern Newfoundland (4 positive records) to western and southern Iceland, to the Orkney and Faroe Islands, and skirts the Norwegian coast to the North Cape, while basking sharks stray now and then to the Murman coast. To the southward, in the North Atlantic, they range as far as the Mediterranean and Morocco in the east, to North Carolina in the west.

Occurrence in the Gulf of Maine

Before the coming of the white man this great shark seems to have been a regular inhabitant of the southern part of the Gulf of Maine. And tradition has it that large numbers were taken in Massachusetts waters, especially off the tip of Cape Cod, during the first half of the eighteenth century, for their liver oil which was then in demand for illuminating purposes. However, the local stock seems soon to have gone the same way as the local stock of the North Atlantic right whale; that is, into the try pot. And basking sharks seem never to have [page 31] visited the northeastern part of the Gulf in any numbers, there being only a few records for the vicinity of Eastport, Maine, and three from within the Bay of Fundy. At the present time the Gulf appears to harbor a sparse and fluctuating population, occasional members of which are encountered from time to time, here or there, but whether as immigrants into the Gulf from the open ocean is not known.

The list of specimens, the capture or stranding of which in the Gulf has come to our attention for the period 1908-1951 is as follows:

1908. One, 18 feet long, near Provincetown, taken in a fish trap; measured by J. Henry Blake.
1909. One, about 22 feet, in Provincetown Harbor. 1913. One, about 29 feet, Provincetown.
1925. One, about 29 feet, near Monhegan Island, Maine. 1931. Female, 12½ feet long, York Harbor, Maine.
1934. One, 29 feet, Whale Cove, Grand Manan Island, and one, 28 feet, Back Bay, Bay of Fundy. [69]
1936. Two off Portland, Maine; the first about 20 feet long, weighing 550 pounds dressed, about May 1; the second, much larger (reported as of about 40 ft.), August 2.
1939. Skeleton of one of about 25 feet, examined by us, found on the beach near Provincetown in January. One of about 25 feet, Yarmouth, Nova Scotia. One of 12 feet, Bay of Fundy off Digby Gut. [70]
1947. Female, about 13 feet long, examined by us, harpooned by W. T. Reid 3rd, near Boston Lightship, August 5th.
1949. A small one (size not recorded), near Rockport, Mass., September; identified from a good photograph by Miss D. E. Snyder of the Peabody Museum, Salem.
1951. One, 12 feet, near Bar Harbor, Maine, harpooned July 28. [71]
[69] McKenzie. Proc. Nova Scotia Inst. Sci., vol. 20, 1939, p. 14.
[70] McKenzie, Proc. Nova Scotia Inst. Sci., vol. 20, 1939, p. 14.
[71] Personal communication from J. W. Burger.

Occasional basking sharks also visit the shores of the southern coast of Massachusetts, westward from Cape Cod; one, for example, 12 to 14 feet long was taken at Menemsha on Marthas Vineyard, August 16, 1916; another of 20 feet 6 inches at that same locality on June 24, 1920; [72] one 20 feet 2 inches long was stranded in Hadleys Harbor, Naushon Island, July 1937; and one of 8 feet (among the smallest on record) was taken in a fish trap near Woods Hole on June 15, 1948.

Probably the basking shark is no more plentiful near shore in our Gulf in most years than the paucity of the recent records suggest, for popular interest in sharks is now so keen, as represented by newspaper publicity given to any unusual capture, that any well-grown one is apt to be seen in these frequented and hard-fished waters. We do not find evidence of any considerable incursion by them into coastal waters farther west since 1878, when 20, at least, were found dead in the fish traps near Woods Hole during the summer. And the only report that might be based on the basking shark on the offshore fishing banks that we have received from fishermen has been of a number of unusually large sharks of some sort, seen by Capt. Henry Klimm on the southeast part of Georges Bank during late June and early July 1947.

Importance

The day of any regular fishery for the basking shark is long since past in New England waters, probably never to return. And no use is made there, nowadays, of the occasional specimens that are captured. But it may be of interest to point out that it was always hunted of old by the sperm whalers from New Bedford, for its liver oil was considered nearly or as good as sperm oil for illuminating purposes. Basking sharks are still the object of intermittent small vessel fisheries off the coast of Iceland, around the Orkneys, off western Ireland, and off southern Norway; also off Ecuador and Peru in the Pacific. And increasing numbers have been landed during the past few years in northern California, where they are considerably more plentiful than they are in the Gulf of Maine, [73] for fish meal and for the liver oil. The yield of oil per fish varies from about 80 gallons to about 200, occasionally to 400 gallons, with as much as 600 gallons reported. The liver of a 30-foot fish weighing 6,580 pounds, taken off Monterey, Calif., had a liver weighing 1,800 pounds, 60 percent of which was oil. [74] But, sad to say, it is very low in vitamin A.

The fishery, wherever carried on, is by harpoon. And basking sharks are so sluggish and so unsuspecting of a boat, large or small, that it usually is a simple matter to harpoon one that is seen at [page 32] the surface. Once struck, however, a large one is likely to put up an astonishingly active and enduring resistance. We read, for example, of one of 35 to 38 feet harpooned by Capt. N. E. Atwood off Provincetown, Mass., about 1863, that towed the fishing smack all night, and broke loose finally. [75]

[57] Bull. Boston Soc. Nat. Hist., No. 24, March 1921, p. 5.

[58] Described by Hussakof, Copeia, No. 21, 1915, pp. 25-27.

[59] Philos. Trans. Roy. Soc. London, Ser. B., vol. 234, 1950, pp. 247-316.

[60] For further details as to sizes of basking sharks, see Bigelow and Schroeder, Fishes, Western North Atlantic, Pt. I, 1948, pp. 151-152.

[61] Referred to by McKenzie, Proc. Nova Scotia Hist. Sci., vol. 20, 1940, p. 42.

[62] Shown in the film "Men of Arran."

[63] See Bigelow and Schroeder, Fishes Western North Atlantic, Pt. 1, 1948, pp. 153, 154, for details as to their centers of population and secular fluctuations in abundance in north European waters.

[64] See Matthews, Philos. Trans. Roy. Soc. London, Ser. B, No. 612, vol. 234, 1950, pp. 347-366 for detailed account.

[65] Norman and Fraser. Giant Fishes, Whales and Dolphins, 1937, p. 21.

[66] For account and photograph, see Schroeder, New England Naturalist, No. 2, 1939, p. 1.

[67] Barclay, Mem. Wernerian Soc., Edinburgh, vol. 1, 1811, p. 418.

[68] It has long been realized that old tales of a tremendous whale-eating shark, on which Fabricius based his statement that the basking shark occurs in Greenland waters, were fiction.

[72] This specimen, mounted, in the New England Museum of Science and described by Allen (Bull., Boston Soc. Nat. Hist., No. 24, March 1921, pp. 3-10), served as chief basis for the illustration given here of the adult basking shark.

[73] According to MacGinitie (Science, N. Ser., vol. 73, 1931, p. 496), 21 basking sharks were landed in Monterey, Calif., between November 22, 1930 and February, 1931.

[74] MacGinitie, Science, N. Ser., vol. 73, May 1931, p. 496.

[75] Goode, Fish. Ind. U. S., 1884, Sect. 1, p. 669.

Fishes of the Gulf of Maine by Bigelow & Schroeder is the seminal work on North Atlantic fishes. It was originally published in 1925 with William Welsh, a Bureau of Fisheries scientist who often accompanied Henry Bigelow on his research cruises. In the late 1920's, Bigelow began a long association with William C. Schroeder, publishing a number of papers and reports on fishes of the North Atlantic, including the first revision of *Fishes of the Gulf of Maine*. This excerpt is from that 1953 edition.

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