

SOME PACIFIC SHARKS AND ACCOMPANYING FISHES.

BY PROF. CHAS. FRED'K HOLDER.

The coast of California abounds in many different kinds of sharks, from the small Port Jackson variety to the giant bone shark, but so far as known fatalities from this cause have not been reported. Of all the sharks seen here the bone shark, or basking shark, is the most interesting, and the least common, being found in greatest numbers in the vicinity of Monterey, where at certain seasons of the year they are seen lying five or six miles off shore, at the surface, when they can be approached without difficulty. So valuable are these sharks for their oil that a company was formed among the Japanese for their capture, but a number of fatalities dampened the ardor of the men. One shark was apparently killed, and two boats had fastened to it to tow it in when it began to thrash about, completely wrecking the boats and killing several of the men, the others nearly dying of exposure in clinging to the wreckage before they were rescued. This shark attains an undoubted length of forty or fifty feet, but the average specimen is the north Pacific is not over thirty feet in length. Its teeth are small, the gill openings enormous, and its food is composed of very small animals. This shark is a northern form, and comparatively little is known concerning its habits. It is supposed that it breeds in deep water, as its young have never been seen. In the last century this shark was so common on the New England coast that there was an established fishery, and fishes of enormous size were taken for their oil. They were always found lying upon the surface, hence the popular name, basking shark.

The large shark found around the Californian islands is commonly known as the white oil shark, and by some the sand shark. It attains a length of nine or ten feet, and being of considerable bulk, presents a formidable appearance in the water when swimming about. Such a shark weighs from two hundred and fifty to three hundred pounds. It is provided with several rows of sharp teeth, and could make a desperate fight; but an instance of its attacking a human being has never been known. A photograph of a large specimen is shown in the accompanying illustration; it was captured at Santa Catalina Islands, Cal.

The most characteristic shark of these waters is the hammerhead Zygenid Sphyrna, its head being produced into a perfect hammer, giving the animal a most savage appearance. These sharks are extremely powerful, well illustrated by the maneuvers of an individual taken by me. In its rushes the fish nearly dragged the light boat under water, and was only stopped in its seaward rush after five boats had fastened to it. It towed my own boat with one man rowing against it and four others pulling at the top of their speed; even then we were nearly an hour dragging it into the bay where it made a vigorous resistance. This shark had six or seven remoras, *Remora remora*, clinging to it when hauled upon the beach.

Off the coast of California certain sharks apparently affect certain localities. Thus in water four or five hundred feet in depth, a mile or two east of Avalon Bay, the dredge comes up filled with a small cat shark, *Catulus xaniurus*, about two feet in length, several of which were kept alive in the zoölogical station. Another interesting shark common here is *Catulus uter*, of a dark brown color marbled with dark spots, its head very flat. A small dark grey shark, the California dog shark, *Galeus californicus*, is common along shore with the leopard shark, *Triakis semifaciatum*, not however, to be confused with the great leopard or tiger shark of southern waters. It is very abundant in the narrow bay known as Catalina Harbor, on the west side of the island of that name, where it schools in water a few inches in depth in July and August. In this bay with the above is found the oil shark, *Galeorhinus zyopterus*. In the summer months it can be seen here moving about in the muddy water within two or three feet of the shore, and in such shallow water its dorsal fin is fully exposed. The largest specimen I have taken here was six feet in length and weighed sixty-three pounds. This shark is highly valued by the Chinese who take its oil and fins, the latter being made into gelatine for soup.

One of the fiercest sharks is the Tigrone, or tiger shark, *Galeocendo tigrinus*, common in many seas and occasionally observed at San Diego. It is a giant of the tribe, individuals having been seen measuring thirty feet in length. As its name suggests, it is marked with spots over the entire surface, giving it a striking appearance. The strength of these monsters is marvelous. In attempting to take one in Florida, to obtain the skin, the fish towed my boat with such

force that it was impossible to bring it alongside. Finally as we were going out of the channel an eight-oared barge intercepted us and threw us a rope, and ten men pulled against the shark but could not stop it; ultimately the tug of war ended by the breaking of the rope.

The great blue shark, *Prionace glauca*, is seen, though rarely, on the Californian coast, its color, a light bluish-gray, making it easily recognized. I have observed



WHITE OIL SHARK.

but one specimen in Southern California, that being brought into Avalon bay in 1898. It is a large powerful creature. The bay shark, *Carcharhinus milberti*, is often seen off San Diego, and is the "maneater" of the region, seemingly very similar to the *C. lamia* of Florida waters, though the shark has never been known to attack any one on the Californian coast. In appearance it is a savage creature, with its rounded head and enormous mouth, the latter filled with rows of large teeth.

The term maneater is applied to several sharks, but it properly belongs to *Carcharodon carcharias*, the



SOME PACIFIC COAST SHARKS—SHORT NOSE SHARK.

white or maneater shark of nearly all seas. It attains a length of thirty, possibly more feet. A specimen in the British Museum is twenty-five feet in length. One caught near Australia, which was thirty feet long, had devoured an entire horse. The largest specimen ever seen in California waters was caught at Sorquel; its length was thirty feet, and it had just dined on a sea lion which weighed one hundred pounds.

The dog fishes are represented by *Squalus sucklii*, easily recognized by the dorsal spines. Another spined shark is the bull head, *Gyropleurodus francisci*, a slug-like creature two or three feet in length, common among the rocks along shore but rarely seen during the day.

Nearly all sharks of large size are accompanied by one or more attendants, either remoras, "sucking

fishes," or the pilot fishes, or both. The remora is a large-mouthed dark-colored fish with a remarkable sucking disk on top of the head, really a modification of the spinous dorsal fin. It is made up of a series of cartilaginous plates, which are placed transversely, and are movable and serrated on the free edges. The fish follows sharks and when tired attaches itself by the sucking disk and is thus towed along. I have seen half a dozen remoras clinging to the sides of a large shark, looking like gigantic leeches. I have also observed them on turtles and the large porgy in the Gulf of Mexico. The one common on the Californian coast, is *Remora remora*, while another, *Echeneis neurates*, recognized by white stripes on the sides, is often seen on large sharks off the islands. With many sharks is found the young of the so-called pilot fish, *Naukrates ductor*. Those seen with sharks are three or four inches in length, easily distinguished by their bluish color and pronounced vertical stripes. The young *Seriola zonata* has a similar habit. Those observed by me were always playing about the head of the shark, or swimming beneath it, darting out at any foreign object as though to examine it. This habit has given rise to the legend that the fishes pilot the sharks to their prey; but the scent of sharks is very acute, and the pilots merely dart at bait because they possibly see it quicker than the shark, and being timid, they are continually venturing forth and darting back, easily conveying the impression that they are urging their protector on. The pilots and remoras take the crumbs from their hosts' table as their share.

Archæological News.

The yield of the ruins around Mugheir or Ur of the Chaldees in Babylonia will be deposited with the Smithsonian Institution at Washington.

Dr. A. M. Stein, Registrar of the Punjab University, has applied for and obtained the permission of the government of India, and also that of the Chinese government, to explore Khotan, in Chinese Turkestan, this summer. This is to be done for the purpose of scientific investigations.

The Quarterly Statement of the Palestine Exploration Fund contains a minute account of the life of the country women of Palestine, which is particularly interesting as adducing facts to show that the Canaanite at the time of Abraham and Ruth has been transformed with slight changes into the modern Fellah.

The American school for classical studies in Rome has just issued a circular outlining its programme of work for the ensuing year. The resident staff will consist of the director, Prof. Richard Norton, and Prof. Francis W. Kelsey. Prof. Norton will give regular courses in ancient archæology, art and topography, and monuments of ancient Rome. Prof. Kelsey's course will be on Roman architecture and Latin epigraphy. It is expected that other archæologists will give short courses, including Prof. Mau on "Pompeii and Herculaneum," and Prof. Orazio Marucchi on "Roman Numismatics," and others. The larger part of these lectures will be given in the field or in museums, and much of the time will be devoted to excursions from Rome to Naples and other places and will include an annual excursion to Greece. Only those who are specially qualified are admitted to the school.

The Current Supplement.

The current SUPPLEMENT, No. 1273, is of unusual interest. The "Engines and Boilers of the 'Deutschland'" describes and illustrates the six-cylinder quadruple expansion engines of 33,000 horse power and the boilers. "Some Useful Photographic Formulæ" is a choice collection of receipts. "Regulations Concerning the Prize Offered by the Aero Club" gives in full all of the details of this important competition for a \$20,000 prize. "Where the Day Changes" is an interesting article by Dr. A. M. W. Downing, and is accompanied by a map. The usual Trade Suggestions

from the United States Consuls, Trade Notes and Receipts, and Selected Formulæ are published.

Contents.

(Illustrated articles are marked with an asterisk.)

Air pump, electric*.....	324	Locomotives, center of gravity	330
Airship, Von Zeppelin's*.....	325	Of.....	330
Automobile news.....	326	Oranges, seedless.....	326
Borax industry, California*.....	327	Paris Exposition notes.....	327
Canal, Sault, power*.....	328	Plants, coloring matter of.....	329
Cape Nome emigration.....	329	Postal service, English.....	322
Car, shouldering*.....	324	Proposal, presumptuous.....	322
Chemistry, modern needs of.....	322	Science notes.....	327
Conduits, interior.....	329	Sharks, Pacific*.....	331
Cotton picker*.....	330	Shouldering car*.....	324
Detonator, waterproof.....	330	Supplement, current.....	331
Dunes of Gascony*.....	324	Textile manufacture in the	322
Engineering notes.....	327	South.....	322
Heavens in June.....	323	Tunnel, rapid transit.....	332
Inventions, index of.....	323	Turret arrangement and guns.....	330
Inventions recently patented.....	332	Yew tree*.....	329