

Article XXXIII.—NATURAL HISTORY NOTES ON THE DEVIL-FISH, *MANTA BIROSTRIS* (WALBAUM) AND *MOBULA OLFERSI* (MÜLLER).

By RUSSELL J. COLES.

"The story of the devilfish" by the late Dr. Theo. Gill (1) cited practically all the literature on the devilfish prior to 1908 and little has been written on the subject since. These notes are confined to some comparisons and observations by the author upon both *Manta birostris* and *Mobula olfersi*.

My observations on *Manta* are based upon eleven specimens as follows: one in July, 1909; two in June, 1914, which I killed for the American Museum of Natural History and as the water was exceptionally clear on both of the days on which these were killed, I observed them for some time at very close range before harpooning them. On April 6, 1915, I killed two large male *Manta* under conditions favorable for observation, and on April 11, 1915, I spent more than two hours moving my boat slowly around among six *Manta*, three of which were of very large size. I selected and killed a large female *Manta* 18 ft. 2 in. in diameter (body curve measurement) after a long and dangerous fight. I made a complete plaster-cast mold of this fish and, together with material parts of this specimen as well as of the two killed on April 6, sent them to the American Museum of Natural History.

My opportunities for observing *Mobula* have been much more extensive, as during the past five years I have killed about seventy-five examples (21 during July, 1914) and I have published some observations on this species (2).

Both *Manta* and *Mobula* manifest so little fear of either man or boat that they offer exceptional advantages for observation at very close range. I have spent hours in watching *Mobula* in the Bight of Cape Lookout, North Carolina, which region they visit during July.

In July, 1909, I saw a *Manta* in the Bight of Cape Lookout, North Carolina make its awkward leap and repeat the operation in less than a minute. At that time I thought that the *Manta* leaped clear of the water and so published (3) but later observations, and especially on April 11, 1915, when I saw three *Manta* leap, during more than two hours that I was among six of them, have convinced me that *Manta* never leaps clear of the water. Capt. J. J. McCann of Punta Gorda, Florida, informs me that he has never

seen a *Manta* leap clear of the water, although in his thirty years of fishing on the Florida coast he has seen a great many, and his evidence is supported by others of the best type of native fishermen. I may also state that *Manta* does not produce the loud sound in leaping which has been credited to it by some writers.

In leaping, *Manta* rushes head first, until approximately half its body extends above the surface of the water, and its movements may then be likened to the rapid turning of a wheel on its axle, as it revolves rapidly, edge-wise, one pectoral disappearing as the other rises straight up and describes the arc of a circle, to be followed in like manner by the tail, which



Fig. 1. *Manta*, side view. After 'Museum Journal.'

stands out absolutely rigid in the adults. The revolution was from left to right in all of my observations.

The leaping of *Mobula olfersi* is entirely different and very graceful. They leap at frequent intervals, rising lightly and rapidly until the entire body is at times more than five feet above the water, and they strike the water on returning to it with a loud noise.

Manta birostris and *Mobula olfersi* use the cephalic fins, extending forward at each side of the mouth, as an aid in securing food, yet the methods employed differ greatly. While feeding, *Mobula* are usually seen in small schools of from three to five, rapidly swimming in the shallow water near the beach. They carry their cephalic fins tightly curled up to a sharp point, until a school of small 'minnows' are sighted, then the *Mobula*

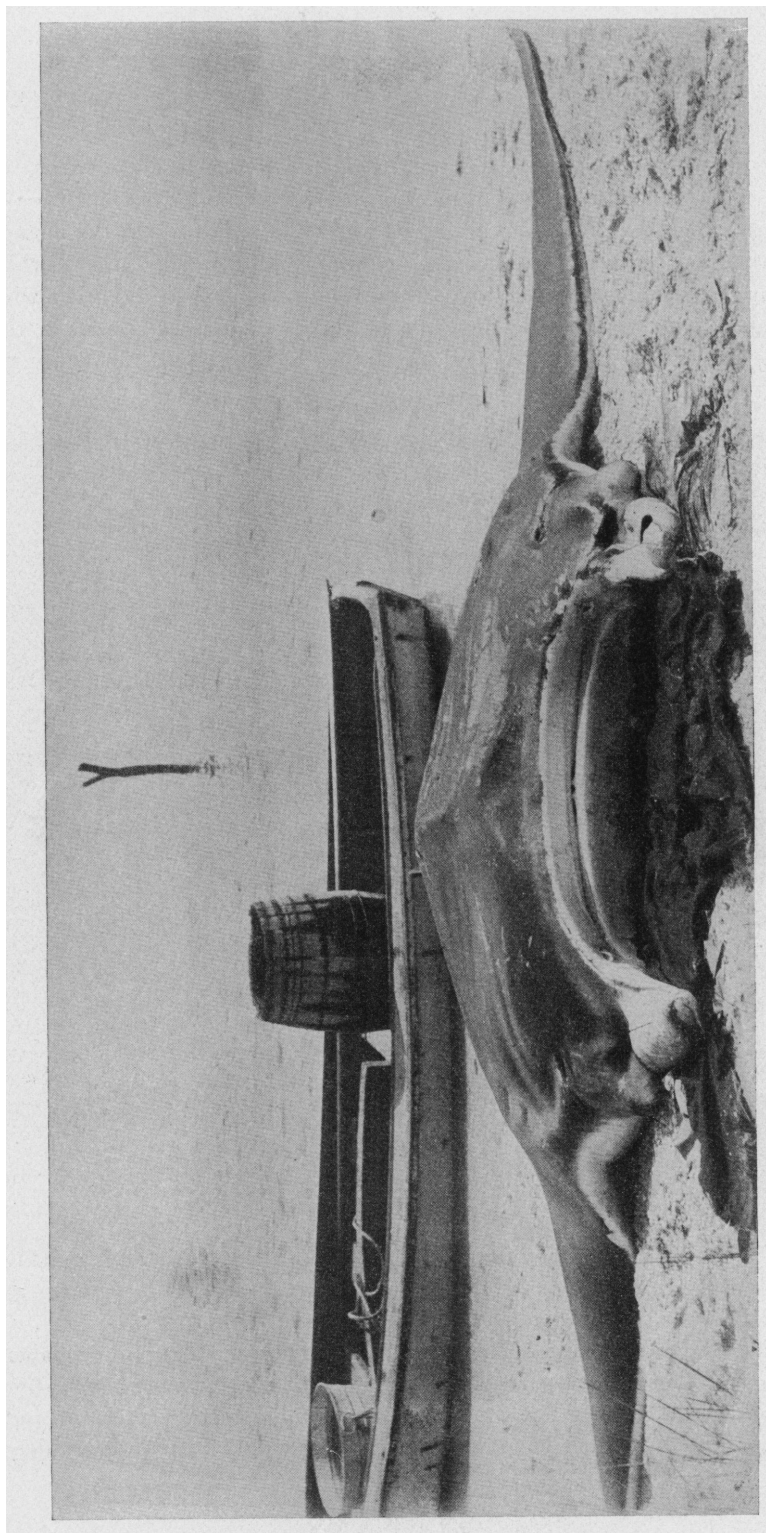


Fig. 2. *Mania*, front view. After 'Museum Journal.'

swing round in a semicircle and rush them to the beach, and at that instant these fins flash open and, meeting below the mouth, form a funnel, through which the 'minnows' are carried into the mouth. On the instant that this rush is over these fins again close up tightly. The *Manta*, while feeding, go alone, moving slowly, turning from one side to the other with constantly moving cephalic fins, one of them being used almost in the manner in which a hand is used, to throw the food, and, the other fin

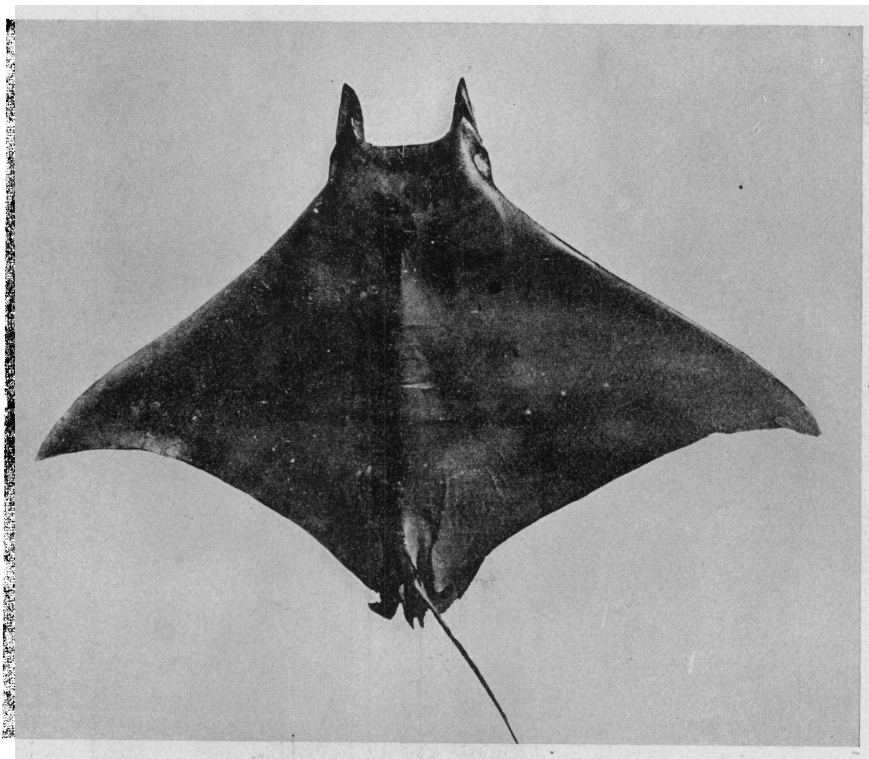


Fig. 3. *Mobula*, dorsal view.

aiding in the operation, they for an instant form a funnel, which is quickly relaxed. The cephalic fins of *Manta* do not curl up as tightly or form as sharp a point as do those of *Mobula*.

Mobula migrate in large schools and although they break up into smaller schools while feeding they re-assemble, if only for a movement of a few miles along the coast. The *Manta* are much more solitary in habit and although quite a number have been observed in one day, they were widely

scattered, except in the case of a mated pair. My observations of this ray on the coast of North Carolina are confined to one example, although they are seen there occasionally.

The skin of *Mobula* is smooth, while that of *Manta* is rough, being entirely covered with almost uniformly distributed, small, sharp, many-pointed tubercles.

The color of the back of *Mobula* is black, but on dying the fish becomes

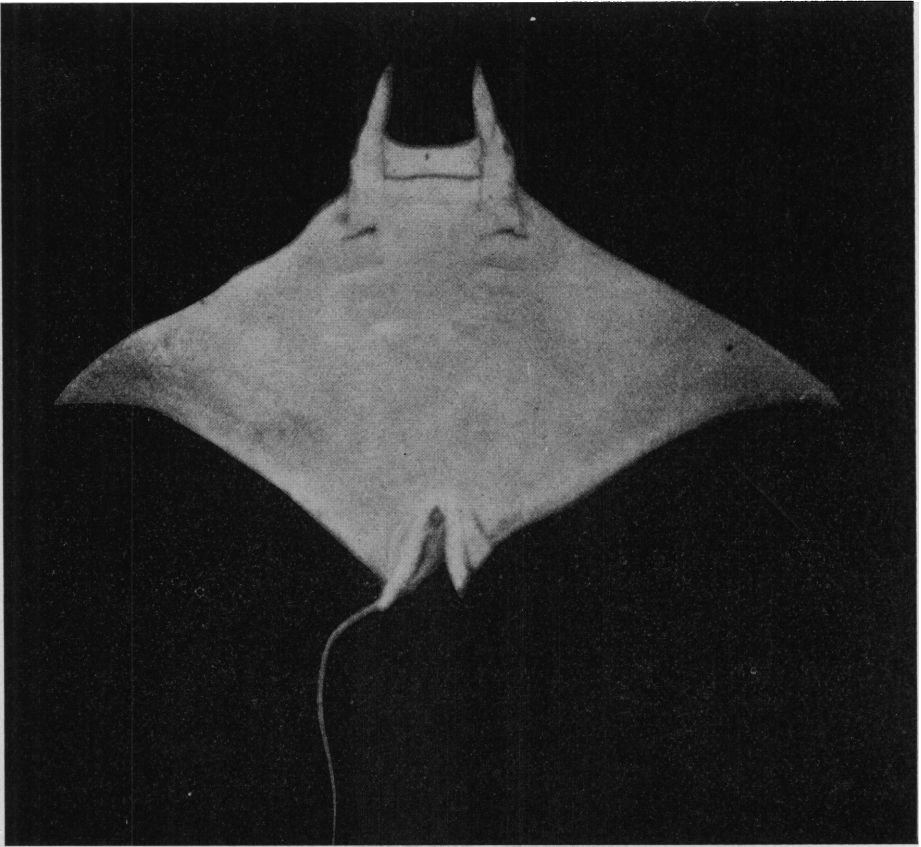


Fig. 4. *Mobula*, ventral view.

dark blue, and when first placed in formalin solution the color becomes more distinctly blue, of a somewhat lighter shade, and when changed into alcohol, the original black color is restored. But these changes are not accompanied by loss of pigment. The color of the back of *Manta* is dead

black, although specimens are frequently observed with dirty white patches showing on the dorsal surface. This change of color is due to the scraping off of the superficial coloring layer when the fish has been swimming at the surface for some time; the black color is restored when the *Manta* has remained beneath the surface for some time. While washing off the surface of a *Manta*, both the cloth and the water used became colored black by pigment, and the whole dorsal surface became lighter in color. I have also placed a handkerchief upon the skin of a dying *Manta* and observed that it was heavily coated with black coloring matter discharged from the skin.

The dying *Mobula* occasionally make a musical, bell-like sound. But three of five dying *Manta* emitted a harsh bear-like cough, somewhat similar although in greater volume, than that which is at times made by both *Dasyatis hastata* and *Aëtobatus narinari*, when dying.

Mobula olfersi has no tail-spine but it is apparent that *Manta* has at one time possessed a tail-spine although they do not now have such a spine. In the case of the five *Manta* killed by me, and several others which I have observed at close range, each had, near the base of the tail, a knob-like structure containing a bony substance, the tip of which was just protruding, and just back of this there appeared a deep trough, which was unquestionably a relic of the resting place of a spine in past ages.

In regard to the teeth: in *Mobula* there exists a small band of teeth in both the upper and lower jaws, which differ in the male and female as has been described by Dr. Jacques Pellegrin from specimens which I furnished (4). In *Manta* there is a small band containing many easily detachable teeth, but only in the lower jaw. I have found that a difference exists between the teeth of the male and female. This dentition will be fully described by Dr. L. Hussakof who has examined the dental strips of all five of the above mentioned *Manta*.

Mobula reaches maturity with a width of forty-four inches, or slightly less, and the width of adult specimens rarely exceeds four feet. The *Manta* do not reach maturity until they attain a width of more than eleven feet, and the average width of adults appears to be slightly under fifteen feet. However, I have observed for two hours one example (and was frequently in such close proximity to it that it at times touched my boat), which had a width of approximately twenty-five feet.

The tail of *Mobula* is very slender, smooth and flexible in both juvenile and adult, while the tail of *Manta* is always rough and only slender and flexible in juveniles. In adults it is thick and rigid, being flexible only at its origin.

After many tests I have found that the eyes of *Mobula* have independent action and although at times they are concentrated upon one object,

at others they have double vision. After closely instructing my crew, who were in boat with me, to watch for this peculiarity in *Manta*, I and they, on several occasions clearly observed that they also have the same double vision.

I have published on the embryology of *Mobula* (5) and have since made observations on this point from which it is evident that *Mobula* gives birth to but a single embryo and that this is always contained in the left uterus. During capture it always expels the embryo, even if it is in an early stage of development.

I have made one observation on the young of *Manta*. It was made while killing the large female now in the American Museum of Natural History, as follows: Almost immediately after being struck by the harpoon, the *Manta* made the sidewise revolution alongside the boat, and just before the tail had reached the perpendicular an embryo was violently ejected to a distance of about four feet. The embryo appeared tail first, folded in cylindrical form, but it instantly unfolded and its pectorals, moving in bird manner, retarded its descent until the mother fish had disappeared beneath the surface. I was almost in the act of securing this embryo when it was swept below by a pectoral of the large male mate which was near the big female. This embryo was well advanced, with a width of more than three feet and a tail approximating eight feet in length. An examination of the uteri, which are now in the Museum, showed that the embryo had been contained in the left uterus, and the uterine filaments were richly charged with the thick creamy substance absorbed through the spiracles during the later stages of embryology.

I have captured *Mobula* with seine, harpoon, and with rod and reel, and find them exceedingly violent in their efforts to escape. But they die quickly when brought into the boat or landed on the beach. *Manta* has great vitality and the capture of the larger examples is attended with danger as they continue to fight violently for some time after receiving several whale lance wounds. In order to secure *Manta* specimens I have invented several devices, one of which was a very large drogue attached to a short harpoon line, which retarded the rushes of the fish; and another an enormous spade lance with which I sever the backbone of the *Manta* just back of the brain.

Mobula is unusually free from parasites but the *Manta* which I have observed have many parasites. Parts of their bodies are thickly covered with several species of parasitic crustacea, and the dental band is especially densely infested with them. I have not observed intestinal parasites in either *Mobula* or *Manta*. "Remora" also are often present on *Manta* and I counted seven large "Remora" attached to one example.

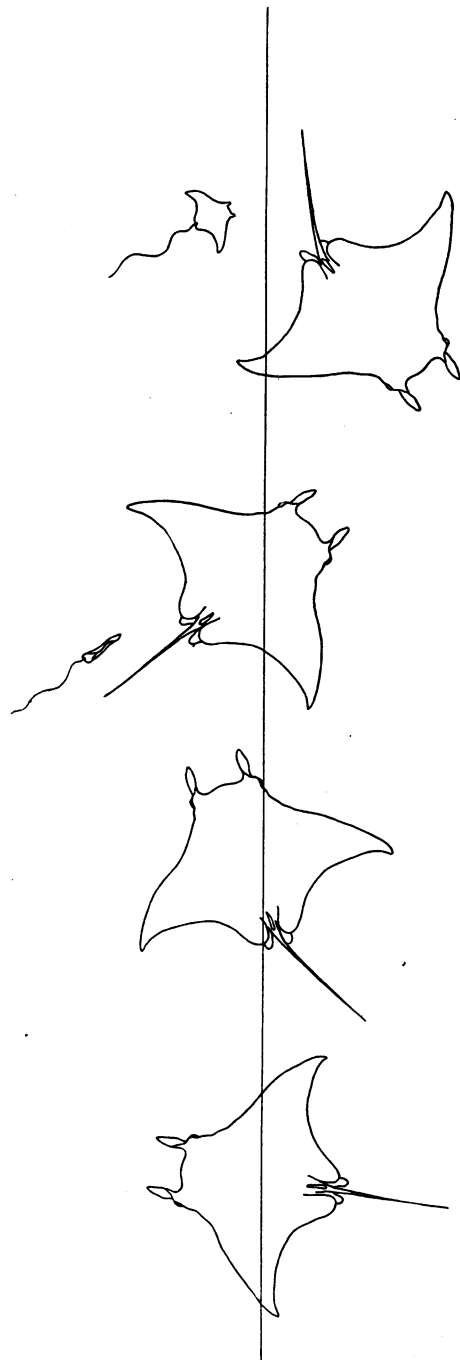


Fig. 5. Diagram illustrating birth of young *Manta*.

The weight of an adult *Mobula* is slightly under fifty pounds, while the weight of the large *Manta* in the American Museum is approximately six thousand pounds, and they occasionally attain much greater weight.

It has been frequently stated that the devilfish sometimes seizes hold of an anchor rope and tows a boat of considerable tonnage out to sea, but authenticated cases were lacking. I have whenever possible carefully investigated reported occurrences of this nature until I can now state that *Manta*, in swimming, does occasionally when striking against the cable of a vessel of small tonnage, lift the anchor from the bottom and tow the vessel for a considerable distance at a rapid rate of speed. I give below a case which I can vouch for.

In July, 1915, two native fishermen, Tilford Willis and Luther Guthrie, were lying at anchor just inside Beaufort Inlet, coast of North Carolina, when their motor fishing launch was suddenly lifted partly out of the water as the pectoral fins of a large *Manta* rose with a great splash on each side of the boat. The *Manta* then rushed against the boat cable, lifting the anchor and at great speed towed the boat out to sea against a strong wind and tide, and as it swam near the surface the anchor could be seen with one fluke hooked over the front of the head, between the extended horns or cephalic fins. The men at once started their engine and put their wheel hard over. When crossing the outer bar a heavy breaker which arose between the boat and the *Manta* threw the boat forward and to one side, and the anchor slipped off of the side of its head, freeing the *Manta*. The next day Mr. D. L. Taylor, his captain and other members of his party plainly saw from the deck of his yacht a *Manta* on the Beaufort outer bar.

The writer photographed Tilford Willis and Luther Guthrie and had them swear to their evidence before a magistrate, who also appended a statement as to the reliability of these two men.

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