

OBSERVATIONS ON LIVING WHITE WHALES (DELPHINAPTERUS LEUCAS); WITH A NOTE ON THE DENTITION OF DELPHINAPTERUS AND STENODELPHIS

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WITH ONE PLATE

In June, 1908, I had an opportunity of studying two living white whales which were kept in confinement in a large tank on one of the piers at Atlantic City, New Jersey. Although living individuals of this species have been many times exhibited to the public, very little has been published regarding them, so far as I have been able to ascertain, and it seems to me, therefore, desirable to place on record the observations which I have made.

The two specimens exhibited at Atlantic City were both youngish, and one of them (which I will designate as specimen A) was in an enfeebled condition, either through disease or lack of nourishment. It died soon after I saw it, and the remains were towed out to sea. This individual was about 10 feet long and was reported to be a female.

The second individual (specimen B) was a young female 8 feet 2½ inches long in a straight line. It was very active when I saw it, but died about a month later, and the body was presented to the National Museum by Mr. A. M. Renshaw through Mr. J. S. Young.

The larger female (specimen A) was of a purplish white color, with darker purplish gray spots, lines and mottlings. The principal mottled area was on the head. There were several straight lines on the back about a foot long, each consisting of three striæ—a central dark purplish one, with a white edging, and a lighter purplish line on either side. The dorsal fin, or ridge, and the anterior edge of the pectorals were purplish gray, and some faint purplish lines indicated the position of the digits. The posterior margin of the pectorals was white. The flukes were similar in color to the pectorals. The head presented the blunt, rounded form characteristic of the species. Its girth increased from the eyes backward, but the neck, seen from above, presented a slight constriction. The thorax was nearly flat on top. The dorsal fin, or ridge, was quite sharp and distinct, be-

ginning about opposite the tip of the pectorals when laid back against the body, and was about one foot long and of a grayish color. Beginning opposite the anterior end of the dorsal fin, the body, seen from above, assumed a form resembling a pillar consisting of three attached columns, laid horizontally. It was made up of a median dorsal rounded ridge, with a similar rounded mass below it on either side. This form, which was quite unlike that represented in any published figure of the animal, was probably due to extreme emaciation. The body tapered rapidly toward the flukes, the pedicel of which was very slender. The pectoral rested in a furrow which ran backward along the side of the body, and was probably due to emaciation.

From the same point of view, the upper lip appeared as a thick rounded ridge, above which was the protuberance of the "forehead," marked off by a concavity in front. The blowhole was nearly linear when closed, but oblong or elliptical when open.

This whale remained nearly motionless in a corner of the tank, with its head under water and its flukes held almost vertically downward, but raised its head from time to time to spout. The expiration took place as soon as the head came to the surface, and was very feeble and quick, and usually noiseless, but occasionally accompanied by a sound similar to that which a person makes in blowing dust off of an object, though rather more metallic. At the same time, drops of water ascended in a curve and fell forward some three or four feet beyond the head of the whale. Then the blowhole opened wider, the lower internal folds were seen to move, and inspiration took place with a rather faint sound. The flukes, as already mentioned, were held downward, and were waved about gently, the axis of motion being at the anterior base of the flukes. The pectorals were held horizontally and were nearly motionless.

The smaller female (specimen B) was of a light purplish color, with whitish "forehead," upper lip and blowhole. The posterior edges of both pectorals and flukes were dark purple, but with a white marginal line. On the top of the head a dark purplish band about 8 inches wide extended backward from the blowhole. Between this and the pectoral was a large oval area lighter in color than the surrounding parts, which area extended across the upper surface of the pectorals.

The external orifice of the ear was situated in a depression. The dorsal fin, or ridge, appeared smooth, except for a few cross-furrows at intervals of less than an inch apart. There appeared to be glandular openings in the longitudinal furrow below the dorsal ridge. The surface of the back along the median line began to assume a

ridge-like shape about opposite the insertion of the pectorals, while the dorsal ridge, or fin, itself began about opposite the tips of these limbs when laid backward. The sharpness of the back in front of the dorsal fin nearly disappeared when the head was raised. A rounded ridge, or swelling, extended from the pectoral to the orifice of the ear. The posterior edge of the pectorals, or that nearest the body, was curved upward, as was also the outer edge, but in much less degree.

This female (specimen B) was constantly in motion, swimming back and forth across the tank in an irregular fashion. It usually remained under water from 2 to 3 minutes, then came to the surface with the head up, and spouted 5 or 6 times irregularly, lying between times with the top of the back out of water. Its swimming movements were also irregular. It sometimes "rolled," as dolphins do at sea—that is, with an undulating motion in a vertical plane. At other times it turned about lazily from side to side. Occasionally it turned suddenly on its side and gave a sharp stroke with its flukes, causing the body to move in a curve, but much of the time it remained motionless with a curved portion of the back out of water from about opposite the insertion of the pectorals to the posterior end of the dorsal fin, and both head and flukes curved downward. The head was occasionally turned from side to side at a considerable angle.

This whale, as already mentioned, spouted 5 or 6 times at irregular intervals of a few seconds each, after which it went down quite suddenly and remained under water from 1 to 5 minutes. At the expiration there was a distinct rather metallic sound, and at the same time drops of water ascended in a curve and fell forward invariably some 3 or 4 feet beyond the head of the whale. A gentler sound sometimes accompanied the inspiration, but it was usually noiseless.

The whale moved by strokes of the flukes. The flukes were held downward much of the time, with the two lobes in the same plane, but occasionally the lobes were at different angles, probably from unequal pressure of the water. The flukes were not put out of water at any time while the whale was under observation, although an attendant stated that it sometimes put them out. In sounding they were turned upward, but did not quite reach the surface. The whole tail was extremely flexible, and as it was turned about, the flukes were often at an angle with the surface of the water, but no screw-like motion was observable in them. They seemed, however, soft and flexible.

The pectorals were held out from the body, but quite close to it, with the posterior margin tilted upward. They were moved but little, and apparently only for steering and not as an aid in swimming. To turn the head down, the whale seemed to thrust the thorax upward violently, rather than to effect the movement by a stroke of the flukes. This peculiar movement was repeated many times and always in the same connection, so that it would appear to be characteristic rather than exceptional.

This whale was at times especially active, rolling and churning up the water, and on such occasions the expiration was accompanied by a louder "puff" than usual. It appeared to swim on its side under water a great deal of the time. Occasionally it made convulsive movements, as if shuddering, and moved its pectorals rather rapidly.

On one occasion I timed the movements of this whale, as regards remaining at the surface and below the surface, respectively. The results were as follows for 26½ consecutive minutes, the time under water being denoted by black-faced type and the time at the surface by light-faced type: 1, 1, 2, 1, 2, 1½, 2, 1, 1¼, 6¼, ½, 2, ½, 2, (*a trifle*), 1, 1, 1½.

The body of this whale was received at the National Museum on August 18, 1908, and the following measurements were taken:

Measurements of specimen B; female, Atlantic City, N. J., Aug. 18, 1908: Total length from tip of snout to notch of flukes in a straight line, 8 ft. 2½ in. (98½ in.); the same along the curves of the body, 8 ft. 11 in. (107 in.); greatest girth of body, 52½ in.; girth of head at eyes, 35; girth of neck, 38½; length from tip of snout to highest point of dorsal ridge (straight), 48; to blowhole, 8¼; to eye, 9; to ear, 14; to anterior base of pectoral, 22; to posterior base of pectoral, 27; to navel, 47; to anus, 71; length of pectoral along center, 12¼; length of pectoral from anterior base, 14; from posterior base, 10½; greatest breadth of pectoral, 7¾; breadth between axillæ, 17; transverse breadth of flukes, 23½; greatest antero-posterior breadth of flukes, 12½; depth of notch of flukes, 3; vertical depth of caudal peduncle, 7; length of eye, ¾; breadth of blowhole, 1¾; length of dorsal ridge, or fin, 10½; length of genital slit and anus, 9½; length of mammary slit, 1½; distance between anterior ends of mammary slits, 2½; distance between posterior ends of mammary slits, 2¾; distance from mammary slit to anus, 2; distance from notch of flukes to posterior end of pelvic bone when in the natural position, 31.

For purposes of comparison, I append measurements of a male observed at Provincetown, Mass., Aug. 16, 1893: Total length from tip of snout to notch of flukes, 13 ft. 1 in. (157 in.); length from

tip of snout to anterior base of pectoral fin, 32 in.; to eye, $14\frac{1}{4}$; to ear, $21\frac{1}{2}$; length of pectoral, 18; greatest breadth of pectoral, 13; transverse breadth of flukes, $37\frac{1}{2}$; greatest antero-posterior breadth of flukes, 17 in.; depth of notch of flukes, 4; distance from notch of flukes to anus, 41; to prepuce, $54\frac{1}{2}$.

NOTE ON THE DENTITION OF DELPHINAPTERUS AND STENODELPHIS.

In the literature relating to the white whale, the teeth are described as having simple conical crowns, like the typical dolphins. Dr. John Struthers, for example, remarked in 1895 that "the teeth of Beluga have all originally a simple conical fang and a simple conical crown."¹ An examination of young skulls in the National Museum, however, having the teeth, or a part of them, entirely unworn, shows that the crowns of at least four of the posterior teeth on either side of the lower jaw, and perhaps some in the upper jaw, are really trituberculate when perfect. The crowns of the teeth mentioned are somewhat flattened internally and curved inward at the apex. Situated on either side of the main cusp (anteriorly and posteriorly) and a little internally is a small, linear accessory cusp, which is attached to the crown of the tooth throughout its length. These accessory cusps do not reach the level of the apex of the main cusp.

The presence of these accessory cusps would at first appear to lend support to Professor Abel's opinion² that the genus *Delphinapterus* belongs in the family Iniidæ (Acrodelphidæ of Abel) rather than in the Delphinidæ. It seems to me probable, however, that the character of the teeth adds one more item to the evidence, chiefly paleontological, which is accumulating, that the two families cannot be kept separate, if the fossil forms are taken into consideration. Leaving out of account the genus *Stenodelphis*, the affinities of which are still in dispute, there are two other genera, at least, beside *Delphinapterus* in the family Delphinidæ in which the crowns of the teeth are not entirely simple cones. These genera are *Phocæna*, in which the teeth are appressed, and many of them multituberculate; and *Steno*, in which the enamel of the teeth is rugose. It is reasonable to suppose that the teeth in the earlier representatives of the Delphinidæ were furnished with a number of cusps, and I believe it will be found eventually that neither simple teeth nor conjoined cervical vertebræ can be regarded as an essential character of the

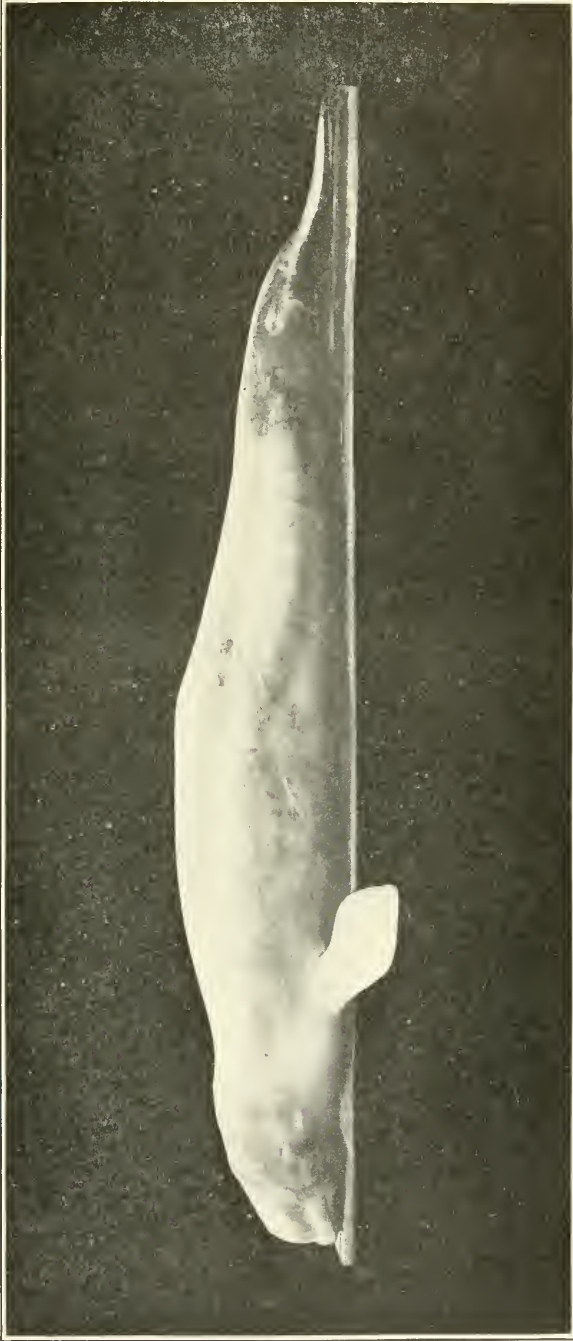
¹ Journ. Anat. and Phys., vol. 30, 1895, p. 137.

² Mém. Mus. Roy. Hist. Nat. Belgique, vol. 3, 1905, p. 129.

family. In spite of differences observable in living species, it seems to me probable that the Delphinidæ and Iniidæ were derived from common ancestors.

In accounts of *Stenodelphis* which I have examined, the teeth are described as having simple conical crowns. Professor Abel remarks regarding the dentition of the genus that it presents "pas de trace d'hétérodontie."¹ In two youngish skulls which I have examined, however, ten or twelve pairs of teeth at the posterior end of the series, in both the upper and the lower jaws, have incurved and somewhat spatulate crowns, with rugose enamel, which is raised into more or less linear denticles on the internal surface. Each tooth usually presents a median denticle and indications of another on either side of it, the general form being not unlike that occurring in *Delphinapterus*. I do not regard this character as differentiating the rather composite genus *Stenodelphis* from the Delphinidæ, but as strengthening the evidence that the Delphinidæ were derived from forms having tuberculate teeth.

¹ Mém. Mus. Roy. Hist. Nat. Belgique, vol. 3, 1905, p. 42.



YOUNG FEMALE WHITE WHALE (*Delphinapterus leucas*)