A POLLACK WHALE FROM FLORIDA PRESENTED TO THE NATIONAL MUSEUM BY THE MIAMI AQUARIUM ASSOCIATION.

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Among the whalebone whales found on the Atlantic coast of North America the Pollack Whale (*Balænoptera borealis*) is the species about whose occurrence the least is known. Hitherto the only recorded eastern American specimens have been some blades of baleen from Newfoundland, in the Brooklyn Institute of Arts and Sciences, and one jaw, several blades of baleen, and two ribs from Chatham Light, Massachusetts, in the Museum of the Boston Society of Natural History. The species was omitted from the main text of Dr. F. W. True's elaborate paper on "The Whalebone Whales of the Western North Atlantic;"[1] and in Dr. Glover M. Allen's "Whalebone Whales of New England"[2] the description of it was chiefly based on the published accounts of specimens from Europe and Japan.

The generosity of the Miami Aquarium Association has now made it possible to examine the complete skeleton of an American Pollack Whale. This individual, an adult male (No. 236680, U. S. National Museum), was cast ashore at Pablo Beach, about 18 miles east of Jacksonville, Duval County, Florida, in May, 1919. The skeleton was prepared, according to directions sent from the United States National Museum, by Mr. R. J. Wallace, of Jacksonville, who, after exhibiting it during several months, finally offered it for sale. It was then purchased by the Aquarium Association through the special interest of Mr. James Asbury Allison, president, and Mr. John Oliver La Gorce, treasurer, and presented to the United States National Museum in September, 1920.

Good general accounts of the habits and distribution of the Pollack Whale are readily accessible in the paper by Dr. G. M. Allen cited above, and in Mr. Roy C. Andrews's "The Sei Whale

[1] Smithsonian Contributions to Knowledge, vol. 33. August 29, 1904.
[2] Mem. Boston Soc. Nat. Hist., vol. 8, No. 2. 1916.

(*Balænoptera borealis* Lesson)," (Monographs of the Pacific Cetacea, II).[3] These authors have so fully covered this part of the subject that it seems unnecessary to repeat the details in the present connection, especially as I have no new observations to record. The Pollack Whale was first described in 1822 from an individual cast up three years before at Grömitz, on the Baltic coast of the Province of Holstein, Germany. Since then it has become rather well known as a summer visitant to the coastal waters of the North Sea, where it is frequently taken at whaling stations in Norway, Ireland, and Iceland. The fact of its occurrence in the western North Atlantic was not established until the publication of a note by True in 1903,[4] recording the capture of four individuals in Placentia Bay, Newfoundland, during the previous summer. It is now known to frequent the Newfoundland coast regularly in small numbers. One was stranded at Chatham, Massachusetts in August, 1910, and this specimen, represented, unfortunately, by nothing more than a photograph and a few pieces of baleen and bone, is the only one hitherto recorded from the coast of the United States. While the range of the true Pollack Whale is centered in the North Atlantic, that of the group to which the animal belongs has recently been found to be much more extensive, embracing the South Atlantic,[5] the Antarctic Ocean,[6] the Indian Ocean, and the North Pacific. (See the paper by Andrews already referred to.) Whether the one species *Balænoptera borealis* occurs throughout this area or whether there are two or more nearly related local forms are questions which can not now be answered. Probably they must remain unanswered until a sufficient number of skulls from some one locality can be studied to give a definite idea of the limits of individual variation. In habits the Pollack Whale does not appear to differ conspicuously from the other finbacks. It undoubtedly moves about extensively as the seasonal food supply changes, and it may perform regular migrations; but accurate data on these subjects are at present lacking. The bristles of its baleen are fine in texture, and this may indicate that unusually much of its food consists of pelagic crustaceans. It is known, however, to feed occasionally on small fish.

I have prepared the following account of the Jacksonville specimen somewhat in the form of a supplement to Dr. F. W. True's monograph of the whalebone whales of the North Atlantic, adopting so far as possible the plan of arrangement and treatment followed in this well-known work.

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[3] Mem. Amer. Mus. Nat. Hist., n. s., vol. 1 pt. 4, pp. 291–460, pls. 29–42. 1916.
[4] Science, n. s., vol. 17, p. 150. January 23, 1903.
[5] Saldanha Bay, near Capetown; Olsen, Bergens Museums Aarbog, No. 5, p. 52. 1915.
[6] Liouville, Deuxième Expéd. Ant. Française, Cétacés, pp. 100–110. 1913.

COMPARISON OF THE POLLACK WHALE WITH THE BETTER-KNOWN NORTH AMERICAN FINBACKS.

Good photographs of the fresh specimen were not obtained at Pablo Beach, and no detailed measurements were taken. The length of the animal is said to have been 45 feet. Nothing can therefore be added to that which was previously known of the external characters. From the various published accounts it appears that stranded individuals of the Pollack Whale may be distinguished among the American finbacks by the following peculiarities.

(1) Size moderate (total length usually ranging from 35 to 50 feet), greater than in the Pike Whale (usually less than 30 feet), less than in the Common Finback (usually 55 to 75 feet), and the Blue Whale (usually 60 to 90 feet).

(2) Whalebone plates (pl. 20, fig. 2) uniformly blackish horn color, the extremely fine and hair-like bristles a very pale horn color appearing conspicuously whitish by contrast, and therefore usually described as "white" (plates and coarse bristles all pale horn color in the Pike Whale, all blackish horn color in the Blue Whale, some dark, some light, in the Common Finback).

(3) Folds on the throat in region between the flippers about 40 to 60, as in the Pike Whale, not about 60 to 80 as in the large Common Finback and Blue Whale.

(4) Flippers uniformly dark colored, as in the Common Finback and Blue Whale, not conspicuously pied as in the Pike Whale.

(5) Dorsal fin relatively high, as in the Pike Whale (its height equal to about one-third depth of body measured at base of fin; in the Common Finback and Blue Whale it is equal to only about one-fifth or one-sixth the depth of body in same region).

The structure of the skeleton in the Pollack Whale shows many pecularities as compared with that in the other American finbacks.

Skull (pls. 1–4).—The skull has the general form seen in the Pike Whale and the Common Finback—that is, the rostrum when viewed from above or below is triangular in outline, with lateral margins essentially straight or faintly curved from base to tip. It therefore differs conspicuously from the skull of the Blue Whale, in which the rostrum is not triangular, its sides being parallel, or nearly so, from the base almost to the middle, then rather strongly curved to the tip, the curve of each side following approximately the arc of a circle whose radius is about as long as the intermaxillary bone. Further comparison with the Blue Whale is scarcely necessary, as this animal is so different from the other finbacks that I do not regard it as a member of the genus *Balænoptera*. It may be mentioned, however, that in the Pollack Whale the nasals are relatively larger than in the Blue Whale (their length is contained about 9½

times instead of about 15 to 20 times in length of intermaxillary and about 6¼ times instead of 8 to 11 times in interorbital breadth); the intermaxillaries decrease gradually in breadth beyond middle; the palatines leave a considerable portion of the basisphenoid exposed when the skull is viewed from below; the malar bone is relatively larger (in somewhat the same proportion as the nasal); the articular part of the squamosal is, in lateral view, much deeper in proportion to its length; the coronoid process of the mandible is low and triangular instead of high and irregular in outline; and the groove marking the limit between the angular and articular portions of the mandible is better developed, particularly on the inner side.

When contrasted with skulls of the Pike Whale and the Common Finback of eastern North America, that of the Pollack Whale is distinguishable by (*a*) the greater relative length of the rostrum with regard to the rest of the skull as well as by the narrowness and shallowness of the rostrum as compared with its own length (the length of the rostrum, measured in photographs, from anterior border of posterior maxillary concavity to tip is equal to slightly more than twice distance in median line from level of maxillary concavity to back of occipital condyles, while in both the other species it equals decidedly less than twice this distance; the greatest width of the rostrum immediately in front of region where the maxillary border turns abruptly outward is equal to less than half the distance from this widest region to anterior extremity of maxillary, while in both the other species it is equal to more than half this distance; the depth of the rostrum at anterior margin of posterior maxillary concavity is contained a little more than five times instead of about four times in distance from anterior margin of maxillary concavity to tip); (*b*) the low, broadly triangular instead of irregularly short ligulate form of the coronoid process of the mandible (compare pl. 3, figs. 2 and 3, with True's pl. 3, fig. 3, and pl. 27, fig. 2.); (*c*) the extension of the palatine bones so far backward that the portion of the basicranial region exposed behind them (when skull is viewed from below) is squarish in outline instead of longer than broad; (*d*) the presence on the supraorbital portion of the frontal of a noticeable oblique ridge extending outward and backward from region of middle of posterior maxillary concavity to region of middle of orbit (this ridge is present in the two skulls of the Pollack whale examined, one from Florida, the other from Japan; it is absent in the four skulls of the Common Finback figured by True, and in a fifth skull, No. 237566, received from Newfoundland in 1904; it is also absent in the four skulls of the Pike Whale figured by True); (*e*) the conspicuously greater depth and robustness of the articular por-

tion of the squamosal and the less concave lower border and less evenly crescentic form of this bone when viewed from the side (posterior limb of crescent much wider (deeper) than anterior limb); (*f*) the unusually deep and narrow sulcus formed at the region of juncture between the squamous and articular portions of the squamosal (see pl. 4, *sq. sulc.;* also compare pl. 2 with True's pl. 2, *B. physalus*, pl. 24, *B. acutorostrata*, pl. 30, *Megaptera*, and pl. 47, *Rhachianectes*); and (*g*) the depth, particularly on the inner side, of the groove lying between the articular and angular portions of the mandible.

In addition to these characters which distinguish it from the skulls of both the Common Finback and the Pike Whale the skull of the Pollack Whale may be recognized as follows:

As compared with the Common Finback (see pls. 1, 2, and 3, also pls. 41 and 42 of Andrews's monograph; compare with pls. 1–4 of True's Whalebone Whales of the North Atlantic): Nasal bones (*a*) much larger, their anterior border extending forward about to level of anterior border of posterior maxillary concavity instead of falling conspicuously short of this level, (*b*) their anterior margin nearly straight instead of deeply concave, (*c*) the greatest combined width of the two bones much less than length of median suture instead of about equal to median suture; nasal process of maxillary conspicuously broader, its least width contained about two and one-half times instead of about five times in its length.

As compared with the Pike Whale (compare with pls. 22–27 of True's Whalebone Whales): Extreme of contrast between size of rostrum as compared with rest of skull; less relative width of intermaxillary gutter immediately in front of nasals; auditory bulla relatively smaller (its length about one-third width of basioccipital); jugal relatively shorter (its length contained about two and one-half times instead of about one and one-half times in length of outer portion of articular process of squamosal).

Vertebræ (pls. 5–15).—The vertebral formula is C. 7, D. 14, L. 13, Ca. 19 (+4?)=57. The boundary between lumbars and caudals is not certain. There appear to be four caudals lacking at the distal extremity of the series. Last vertebra with neural spine, No. 46; last with distinct tranverse process, No. 43 (vanishing traces on Nos. 44–46); first with perforated transverse process, No. 38.

In its general features the vertebral column is characterized by the height and erectness of the spinous processes, peculiarities that are most noticeable at the middle of the series. In the last dorsal and first seven lumbars the length of the spinous process equals about three times the depth of the centrum, while in the Common Finback from Maryland figured by True (pl. 5) the processes are barely twice as high as the centra. In the skeleton from Danzig, Germany, figured

by Menge,[7] they are even shorter, little more than one and one-half times the depth of the centra. In the Pike Whale, however (see True, pl. 27, fig. 2), the relative height of the spinous processes is essentially as in the Pollack Whale. With regard to the backward slant of the spinous processes the Pollack Whale differs from both the Common Finback and the Pike Whale. In the two better-known animals the processes rake backward to such a degree that in the median portion of the series the entire upper margin of the process is frequently carried back beyond the level of the posterior margin of the centrum. (See figures by True and Menge already referred to. This character is readily observed in a mounted skeleton of the Common Finback from Cape Cod, U.S.N.M. No. 16045. It is even more pronounced in a skeleton of the Blue Whale from Newfoundland, No. 49757.) The spinous processes in both the Florida skeleton and the Japanese specimen (Andrews, figs. 18–20) are, on the other hand, so little inclined backward that in no vertebra of either individual does the antero-upper angle of the process attain the level of the posterior articular surface of the centrum. A near approach to this condition may be seen in some of the Japanese vertebræ, notably lumbars 3 and 8, but all the vertebræ in this individual appear to lack the epiphyses, thus making the backward extension of the centra less than normal. The more detailed features of the vertebræ are shown by the photographs reproduced in the plates.

Ribs (pl. 16).—The bifid head of the first rib, a character nearly always present in the Pollack Whale, is clearly shown by the Florida specimen. In another peculiarity the ribs differ from those of the mounted skeletons of the Common Finback (No. 16045) and Blue Whale (No. 49757) in the National Museum: The combined neck and head form a large and conspicuous process in the second, third, and fourth ribs of the two better-known finbacks, projecting inward toward the centra beyond the tubercle; this projection is a mere irregular knob on the second and fourth[8] rib of the Pollack Whale, fairly well developed, though short, on the third only. This is probably a specific character, as the devolpment of the combined neck and head is essentially alike in both of the skeletons of the better known species, though the Blue Whale is fully adult, while the Common Finback is an immature individual with the epiphyses of the vertebræ not fused to the centra. In the skeleton of the Pike Whale (No. 20931). however, a third condition is represented: The collum is present and distinct but short on the second rib, very rudimentary on the third, and absent from the fourth. It is possible that the

[7] Schr. naturforsch. Gesellsch. Danzig, vol. 3, pt. 4. 1875.

[8] Too large as restored, judging by the structure of the left rib.

slight development of the collum in this specimen and in the Pollack Whale from Florida may in each case be an individual peculiarity; that immaturity does not account for it is shown by the fact that both skeletons came from aged individuals with the epiphyses of the vertebræ so completely fused that they are scarcely distinguishable. The separated ribs of the Common Finback shown by True (pl. 6, fig. 1) are from an animal too young to have developed the characters in question; the same is the case with those of the Pollack Whale figured by Andrews. In the mounted skeleton of a Common Finback from California, photographs of which are reproduced by True as text figures 95 and figure 4 of plate 6, the long collum of ribs 2, 3, and 4 may, however, be distinctly seen, especially in figure 95.

Chevron bones.—The chevron bones were all lost before the skeleton was received in Washington.

Sternum (pl. 18, fig. 1).—The outline of the sternum differs from that in all of the 25 sterna of the Common Finback figured by True on pages 140 and 141 and of the 10 of the Pike Whale on page 205. The portion of the cross which lies in front of the transverse arms is relatively larger than in any of those of the two better-known species; the length of the posterior median projection, in proportion to the width of the sternum, is about the same as the average for the Common Finback, but is less than in any of the sterna of the Pike Whale.

Scapula (pl. 17).—As compared with the scapula of the other American finbacks, so far as can be judged from very inadequate material, that of the Pollack Whale is distinguishable by greater width in proportion to the height and by the length, distinctness, and narrowness of the neck. The least width of the neck above the base of the coracoid process is contained a little more than four times in the greatest width of the blade, while in the other Atlantic finbacks it appears to be usually contained about three and one-half times. The acromion process is long and slender, with parallel sides, as in the Pike Whale, and without the tendency to broaden toward the tip, which is seen in the acromion of the Common Finback and the Blue Whale. The coracoid process is more slender than appears to be usually the case with that of the two larger finbacks; it thus agrees with the coracoid of the Pike Whale.

Bones of the arm and hand (pl. 19).—The bones of the arm are characterized by length and slenderness, features which are particularly noticeable in the humerus and radius. Apart from this general feature, which appears to distinguish the arm from that of all the other finbacks, I do not detect any peculiarities worthy of special note.

The metacarpals and such phalanges as are preserved agree in general form with those of the Common Finback and the Pike

Whale—that is, they are decidedly more constricted at middle in proportion to their length than in the Blue Whale.

Pelvic rudiments.—No pelvic rudiments were preserved.

Hyoid bones (pl. 18, figs. 2 and 3).—Though the material for comparison is not sufficient to give positive results, it indicates that the hyoid bones of the Pollack Whale differ noticeably from those of the other finbacks in the great depth of the concavity on the dorsal side of the combined basihyal and thyrohyals (fig. 3). In the Florida specimen the depth of this concavity is 225 mm. and the distance between the inner margins of the tips of the thyrohyals is 685 mm. The depth of the concavity is therefore 32.8 per cent of the width. In a hyoid of the Blue Whale from Newfoundland (No. 237567) the same measurements are, respectively, 275 and 1310. Here the depth of the concavity is only 20.9 per cent of the width. Yet the hyoids of this Blue Whale and of the mounted specimen (No. 49757) appear to be distinctly more concave than in the mounted specimens of the Common Finback (No. 16045) and Pike Whale (No. 20931). The thyrohyals in the Pollack Whale are much longer relatively to the central mass of the bone than in the Pike Whale, and they are not expanded at the middle as in the two specimens of the Blue Whale. The photograph does not give a proper idea of the size and length of the thyrohyals in the Florida specimen. It shows the bone from the ventral side with the thyrohyals curving away from the camera and consequently much reduced in apparent size as compared with the central portion of the bony mass. The same is true of the figure published by Andrews (fig. 13, p. 356). I can see no important features in the stylohyal (fig. 2).

Tympanic and periotic bones (pl. 22).—The smaller auditory bones have been lost. Probably they were jarred out of place during the period when the skeleton was being carried about the country on a truck. The tympanic and periotic of the left side are shown in several aspects on plate 22. Material for comparison with the ear bones of other finbacks is not very satisfactory, owing to the absence of fully authenticated specimens of *Sibbaldus*, but there appear to be rather well-marked characters by which the various Atlantic species of baleen whales can be identified on the basis of the periotic bone.

The periotic of *Eubalæna* (family *Balænidæ*) is immediately distinguishable from that of the finbacks and humpback (family *Balænopteridæ*) by the relative positions of the anterior and posterior petrous processes. The anterior process in *Eubalæna* is drawn inward toward the posterior process, so that the axes of the two processes converge at an angle which is decidedly less than a right angle instead of somewhat greater than a right angle as in the finbacks and humpback. Apparently this difference is due almost entirely

to alterations in the position of the anterior process, since the relationship of the posterior process to the cochlear mass is essentially identical in the two types of periotic. The anterior process, however, is so placed in the right whale that its axis is about parallel to a prolongation of that of the internal acoustic meatus, while in the finbacks and humpback its axis forms at least a right angle with the prolonged axis of the meatus. Another peculiarity of the periotic in the right whale is the relatively small size of the cochlear mass, a character which is not readily described, but which is immediately apparent on comparison of the periotic of a right whale with that of the humpback or of any of the finbacks.

Among the *Balænopteridæ* the genus *Megaptera* appears to be distinguished by a conspicuous tendency toward heightening the cochlear portion of the periotic, so that the orifices appear to stand at the base or on the side of a nearly perpendicular wall, while in the finbacks they are situated on an oblique or nearly horizontal surface. In *Balænoptera physalus* the orifices of the internal acoustic meatus and the facial canal are separated from each other by a mass of bone whose diameter is fully as great as that of the canal, a peculiarity which appears to be diagnostic of the species. The opposite condition is seen in *Balænoptera acutorostrata*, in which the two orifices lie at the bottom of a common pit or tube with no definite septum between them. A well-developed but narrow septum is found in *Balænoptera borealis* and *Sibbaldus musculus*, but the periotic bones of these two animals are readily distinguished by the different development of the fossa for the stapedial muscle, this fossa having a very narrow, contracted area in *B. borealis*, while in *Sibbaldus* it is of the normal widely spread type.

The material examined (representing four individuals of *Eubalæna*, two of *Megaptera*, three of *Balænoptera physalus*, two of *B. acutorostrata*, one of *B. borealis*, and two supposedly *Sibbaldus*) is not sufficiently extensive to form the basis of any generalizations as to the true value of all the characters which I have mentioned, but it appears to be reasonably probable that most of these peculiarities represent features which are constant. Assuming that they have a definitely taxonomic value, the characters of the ear bones in the baleen whales of the North Atlantic may be arranged as follows:

Axis of anterior petrous process approximately parallel with axis of internal acoustic meatus; axes of anterior and posterior petrous processes converging at an angle much less than a right angle; auditory region proper relatively small; tympanic squarish or irregularly rhomboidal in outline____**Balænidæ.**

Axis of anterior petrous process approximately at right angles with axis of internal acoustic meatus; axes of anterior and posterior petrous processes converging at an angle obviously greater than a right angle; auditory region proper relatively large; tympanic ovate in outline_____**Balænopteridæ.**

Auditory region conspicuously elevated; orifices situated on the side or at the base of a nearly perpendicular wall----------**Megaptera nodosa.**
Auditory region not conspicuously elevated; orifices situated on an oblique or nearly horizontal area.
Internal acoustic meatus separated from cerebral orifice of facial canal by a bony septum about as wide as the orifice of the canal ----------**Balænoptera physalus.**
Internal acoustic meatus not separated from cerebral orifice of facial canal by a broad bony septum.
Cerebral orifice of facial canal and internal acoustic meatus opening together at bottom of deep common pit---------- ----------**Balænoptera acutorostrata.**
Cerebral orifice of facial canal and internal acoustic meatus separated by a narrow, high, bony septum.
Fossa for stapedial muscle small, its greatest width less than half that of cochlear region--**Balænoptera borealis.**
Fossa for stapedial muscle large, its greatest width more than half that of cochlear region--**Sibbaldus musculus.**

COMPARISON OF THE FLORIDA SPECIMEN WITH THE JAPANESE SKELETON IN THE AMERICAN MUSEUM OF NATURAL HISTORY.

Through the kindness of the authorities of the American Museum of Natural History I have been enabled to examine the Japanese skeleton of *Balænoptera borealis* collected by Mr. Andrews and to bring some of the smaller bones to Washington for direct comparison with our specimen. The two individuals shows numerous points of difference in structure. In our present state of ignorance on the subject of variation in the baleen whales I shall not, however, try to draw any conclusions as to the meaning of these differences.

Comparison of plates 1, 2, and 3 with Mr. Andrews's plates 41 and 42 will show the principal features of difference between the two skulls. In dorsal view these are to be found in the shape of the occipital shield, in the relative length and breadth of the nasal and of the nasal process of the intermaxillary, in the outline of the orbital wing of the frontal and the apparently greater area of the wing in the Japanese specimen as compared with that of the occipital shield, and in the conspicuous swelling outward in the Florida specimen of the upper part of the parietal and squamous portion of the squamosal beyond the edge of the dorsal shield. The less swollen condition of the squamous portion of the squamosal in the Japanese specimen is further indicated by the photographs reproduced in plate 4 showing an oblique view into the temporal fossa. In lateral view the rostrum appears to be deeper in proportion to its length and less curved in the Japanese specimen. The articular portion of the squamosal is also deeper in proportion to its length. How far these peculiarities may result from the slight difference of orientation in the two photographs I am unable to say, but I do not believe that they are all due to this cause. In ventral view the longer narrower

palatine and the more robust articular portion of the squamosal of the Japanese specimen are conspicuous features. A character which may be more important is seen in the different backward projection of the exoccipitals and the postero-external angle of the squamosal behind the level of the occipital condyles. This backward projection is slight in the photograph of the skull from Florida, conspicuous in the one from Japan. Apparently the orientation is nearly the same in the two photographs, but the difficulty of making an exact comparison of such a character between two skulls of such large size, one of which is in New York and the other in Washington, is so great that not much reliance can be placed on the peculiarities which appear to exist.

In the cervical vertebræ there are many features of difference between the two specimens. These can be best understood by comparing my plates 5 to 8 with Mr. Andrews's text figures 14 to 17. In general they consist principally in the greater width relatively to the height in the Japanese specimen and in differences in the angle of outward projection of the processes when viewed from the side. In reckoning the height the spinous process is not to be included, as this is uniformly low in the relatively immature Japanese skeleton. The differences, as will at once be seen, are conspicuous, extending even to the shape of the centra; but it is impossible to say how far they are due to the considerable disparity in the age of the two animals, or to possible specific features which may eventually be found to distinguish the representatives of *Balænoptera borealis* in the two oceans. In comparing the figures of the other vertebræ, my plates 12 to 15, Andrews's text figures 18 to 28, the fact must be kept in mind that the centra of the Japanese specimen lack the epiphyses.

Other peculiarities will be seen on comparing the figures of the scapula, the limb bones, and the jugal. The jugal of the Japanese specimen (pl. 19, fig. 2) is remarkable for its robustness as compared with that of the much older individual from Florida (pl. 19, fig. 1).

MEASUREMENTS.

Length of skull (straight), 3 m. 480 mm.
Greatest breadth (squamosal), 1 m. 600 mm.
Breadth of orbital wing of frontal at distal end, 390 mm.
Length of maxillary along upper surface, 2 m. 550 mm.
Length of intermaxillary along upper surface, 2 m. 690 mm.
Breadth of beak at middle (curved) 670 mm.
Length of nasal, 260 mm.
Breadth of exposed portion of two nasals at distal end, 135 mm.
Breadth of exposed portion of two nasals at proximal end, 90 mm.
Length of mandible (straight), 3 m. 290 mm.
Length of mandible (curved), 3 m. 415 mm.
Depth of mandible at middle, 275 mm.
Depth of mandible through coronoid process, 370 mm.

Greatest breadth of axis, 680 mm.
Depth of body of axis, 155 mm.
Greatest breadth of fourth cervical, 668 mm.
Height of fourth cervical from lower border of centrum, 320 mm.
Greatest breadth of fifth cervical, 608 mm.
Height of fifth cervical from lower border of centrum, 295 mm.
Greatest breadth of sixth cervical, 570 mm.
Height of sixth cervical from lower border of centrum, 365 mm.
Greatest breadth of seventh cervical, 572 mm.
Height of seventh cervical from lower border of centrum, 420 mm.
Greatest breadth of first dorsal, 630 mm.
Height of first dorsal from lower border of centrum, 430 mm.
Centrum of first dorsal: Width, 215 mm.; depth, 160 mm.; length, 75 mm.
Greatest breadth of seventh dorsal, 770 mm.
Centrum of seventh dorsal: Width, 215 mm.; depth, 155 mm.; length, 175 mm.
Greatest breadth of first lumbar, 915 mm.±
Centrum of first lumbar: Width, 325 mm.; depth, 175 mm.; length, 210 mm.
Greatest breadth of first caudal, 640 mm.
Centrum of first caudal: Width, 265 mm.; depth, 220 mm.; length. 260 mm.
Greatest length of sternum, 320 mm.
Greatest breadth of sternum, 285 mm.
Greatest breadth of scapula, 1 m. 50 mm.
Greatest depth of scapula, 590 mm.
Length of humerus, 350 mm.
Greatest width of humerus (proximal), 215 mm.
Greatest width of humerus (distal), 190 mm.
Greatest width of humerus (median), 145 mm.
Length of radius, 710 mm.
Length of ulna (outer side), 700 mm.
Length of ulna (inner side), 635 mm.
Combined width of radius and ulna (proximal), 310 mm.
Combined width of radius and ulna (distal), 240 mm.
Combined width of radius and ulna (median), 180 mm.
Length (median) of first right metacarpal, 115 mm.
Length (median) of second left metacarpal, 140 mm.
Length (median) of third left metacarpal, 133 mm.
Length (median) of fourth left metacarpal, 107 mm.
Length (median) of first phalanx, first right digit, 115 mm.
Length (median) of first phalanx, second right digit, 132 mm.
Length (median) of second phalanx, second right digit, 122 mm.
Length of first rib (greatest in straight line), 925 mm.
Greatest diameter of first rib, 270 mm.
Section of first rib at middle, 124 by 36 mm.
Length of seventh rib (greatest in straight line), 1 m. 640 mm.
Length of seventh rib (following curve), 2 m. 45 mm.
Length of stylohyal (greatest in straight line), 445 mm.
Length of basihyal, 265 mm.
Width of basihyal (greatest in straight line), 750 mm.
Width of basihyal (following curve), 910 mm.
Length of lacrimal, 265 mm.
Greatest width of lacrimal, 113 mm.
Length of jugal (greatest in straight line), 325 mm.
Largest baleen plates, 640 mm.

Greatest diameter of auditory bulla, 223 mm.
Distance from stapes to tip of anterior petrous process, 173 mm.
Distance from stapes to tip of posterior petrous process, 360 mm.

EXPLANATION OF PLATES.

Skeleton of *Balænoptera borealis.*

PLATE 1.

Skull from above.

PLATE 2.

Skull from below.

PLATE 3.

Skull from the side.

FIG. 1. Skull from right side.
2. Left mandible from outer side.
3. Left mandible from inner side.
4. Left mandible from above.

PLATE 4.

Oblique view of braincase.

FIG. 1. No. 236680 U. S. Nat. Mus. (Florida).
2. No. 34871 Amer. Mus. Nat. Hist. (Japan).

fr. frontal.
i. intermaxillary.
ip. interparietal.
mx. maxillary.
n. nasal.
occ. occipital.
p. parietal.
sq. squamosal.
sq. sulc. squamosal sulcus.

PLATE 5.

Cervical vertebræ Nos. 1, 2, and 3.

FIG. 1. Viewed from the side.
2. Viewed from in front.

PLATE 6.

Cervical vertebræ Nos. 4 (fig. 1), 5 (fig. 2) and 6 (fig. 3) viewed from in front.

PLATE 7.

Cervical vertebra No. 7 (fig. 1) and dorsal vertebra No. 1 (fig. 2) viewed from in front. Fig. 2 is slightly more reduced than fig. 1.

PLATE 8.

Cervical vertebræ Nos. 4 (fig. 1), 5 (fig. 2), 6 (fig. 3), and 7 (fig. 4); dorsal vertebra No. 1 (fig. 5) viewed from the side.

PLATE 9.

Cervical vertebra No. 6 viewed from in front.

FIG. 1. No. 236680 U. S. Nat. Mus. (Florida).
2. No. 34871 Amer. Mus. Nat. Hist. (Japan).

PLATE 10.

Dorsal vertebra No. 1. viewed from in front.

FIG. 1. No. 236680 U. S. Nat. Mus. (Florida).
2. No. 34871 Amer. Mus. Nat. Hist. (Japan).

PLATE 11.

Cervical vertebra No. 6 (figs. 1 and 2) and dorsal vertebra No. 1 (figs. 3 and 4) viewed from the side.

FIG. 1 and 3. No. 236680 U. S. Nat. Mus. (Florida).
2 and 4. No. 34871 Amer. Mus. Nat. Hist. (Japan).

PLATE 12.

Dorsal vertebræ Nos. 2–14 and lumbar vertebræ Nos. 1–5 viewed from the side.

PLATE 13.

Lumbar vertebræ Nos. 6–13 and caudal vertebræ Nos. 1–19 viewed from the side.

PLATE 14.

Lumbar vertebra No. 1 (fig. 1) and caudal vertebra No. 1 (fig. 2), viewed from in front.

PLATE 15.

Lumbar vertebra No. 1 (fig. 1) and caudal vertebra No. 1 (fig. 2), viewed from the side.

PLATE 16.

Right ribs viewed from behind.

PLATE 17.

Right scapula.

FIG. 1. Outer aspect.
2. Inner aspect.

PLATE 18.

Sternum (fig. 1).

Stylohyal (fig. 2).

Basihyal (fig. 3).

PLATE 19.

Jugal (figs. 1 and 2).

FIG. 1. No. 236680 U. S. Nat. Mus. (Florida).
2. No. 34871 Amer. Mus. Nat. Hist. (Japan).

Forearm (fig. 3).

PLATE 20.

Bones of the hand.

FIG. 1. Fourth lett metacarpal.
2. Second phalanx, second right digit.
3. First phalanx, second right digit.
4. First phalanx, first right digit.
5. Third left metacarpal.
6. Second left metacarpal.
7. First right metacarpal.

PLATE 21.

Lacrimals (figs. 1 and 2).
Baleen plate from near middle of series (fig. 3).

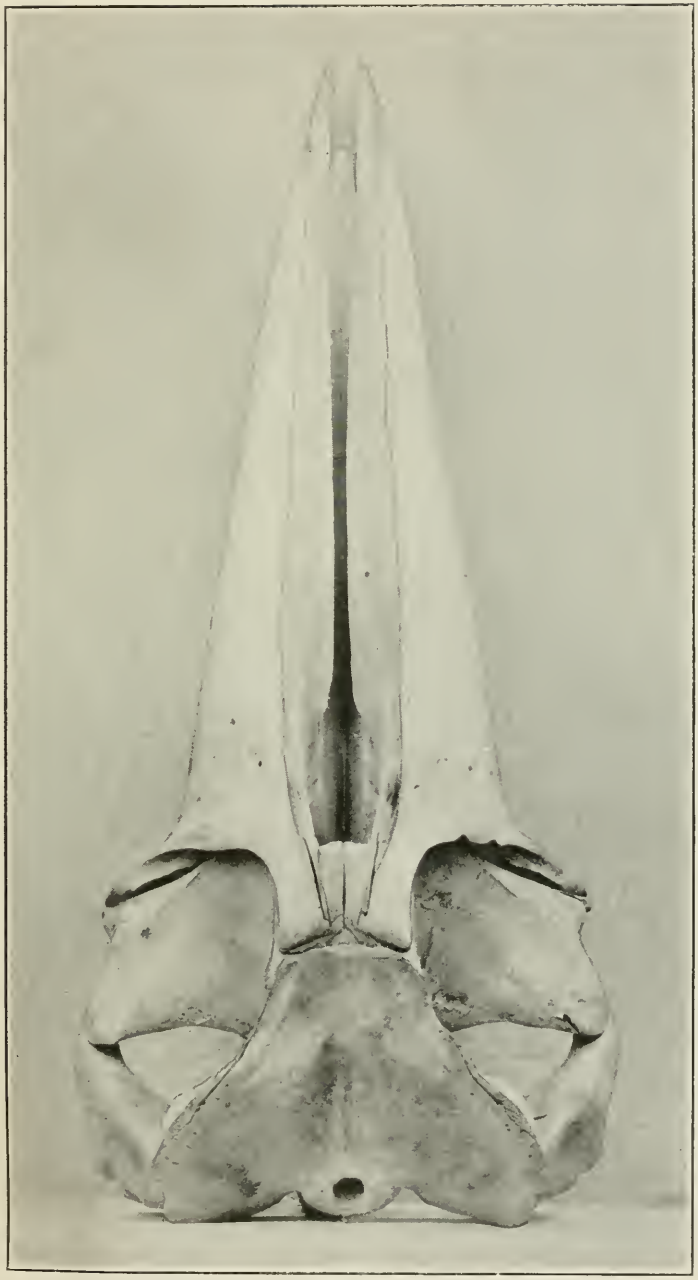
PLATE 22.

Tympanic and periotic bones.

FIG. 1. Outer aspect, tympanic in place.
2. Superior aspect, tympanic in place.
3. Outer aspect, tympanic removed.
4. Inner aspect, tympanic removed.

a. c. Aqueduct of cochlea.
a. p. Anterior petrous process.
a. v. Aqueduct of vestibule.
c. f. n. Channel for facial nerve.
f. c. Cerebral orifice of facial canal.
f. m. Fossa for head of malleus.
f. st. Fossa for stapedial muscle.
i.a.m. Internal acoustic meatus.
m. Malleus.
p. ap. Posterior apophysis of Beauregard.
p. p. Posterior petrous process.
s. p. Sigmoid process.
st. Stapes.

○



POLLACK WHALE: SKULL FROM ABOVE

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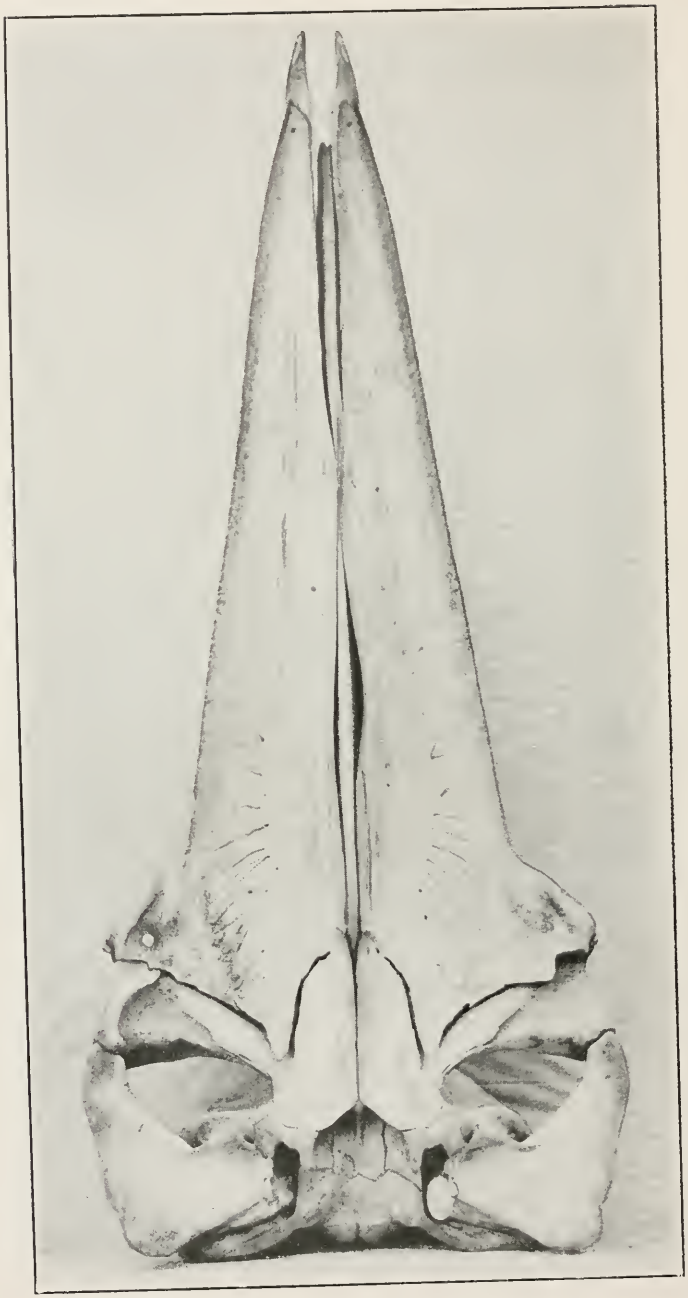

POLLACK WHALE: SKULL FROM BELOW

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POLLACK WHALE: SKULL FROM THE SIDE

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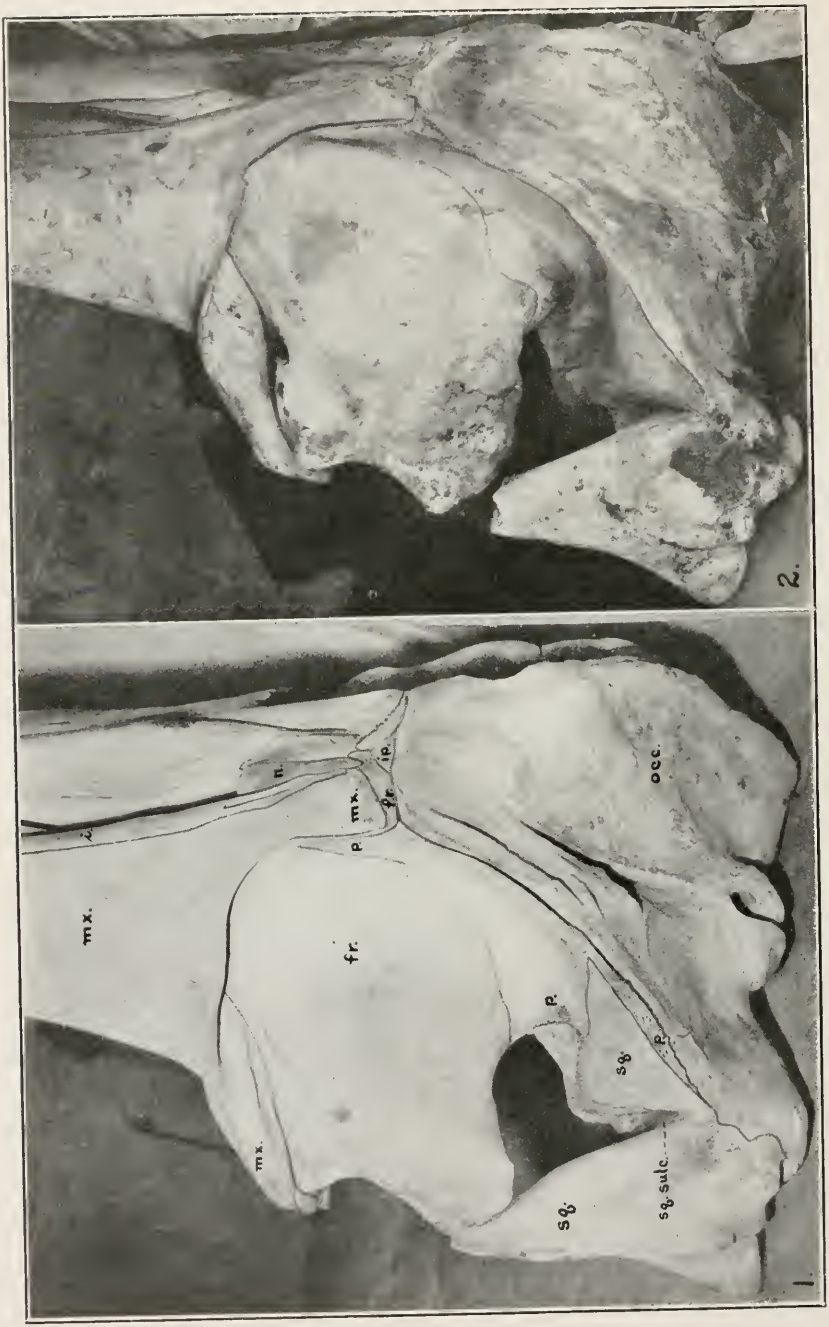

POLLACK WHALE: OBLIQUE VIEW OF BRAINCASE

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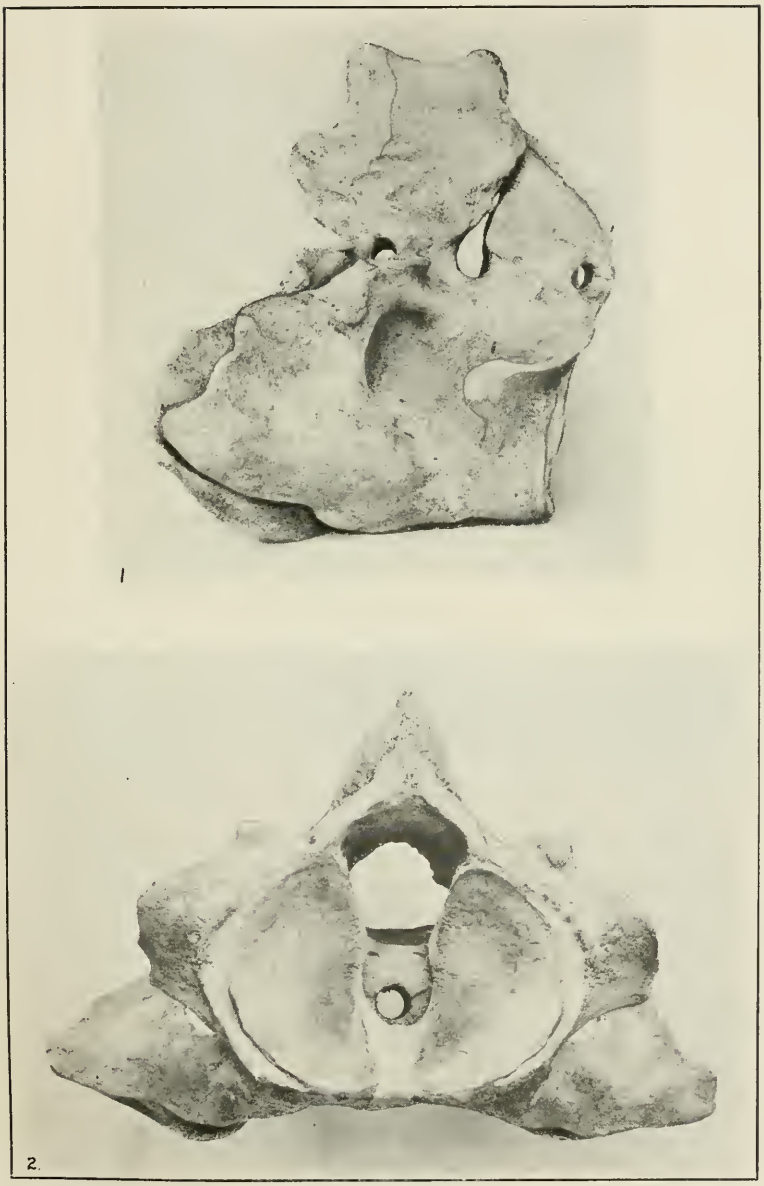

POLLACK WHALE: CERVICAL VERTEBRÆ NOS. 1, 2, AND 3

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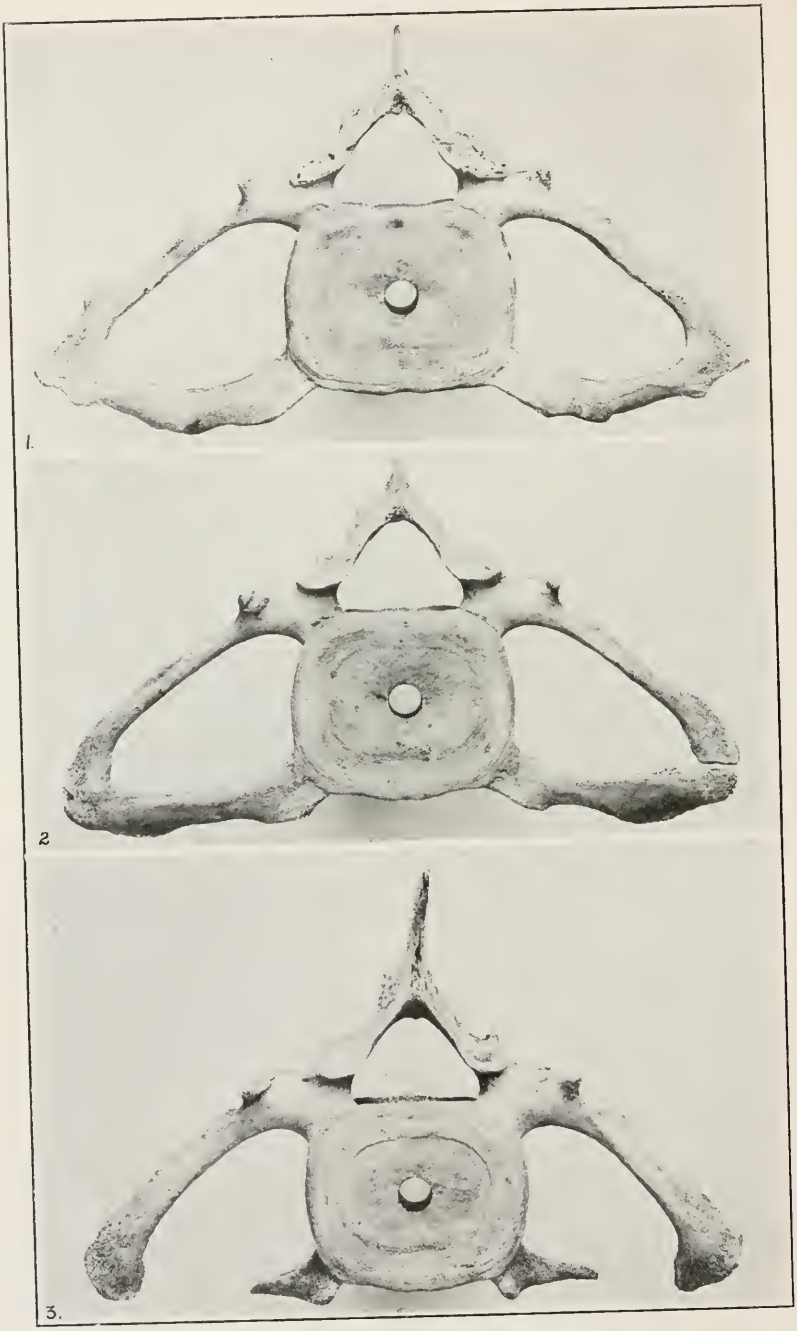

POLLACK WHALE: CERVICAL VERTEBRÆ NOS. 4, 5, AND 6

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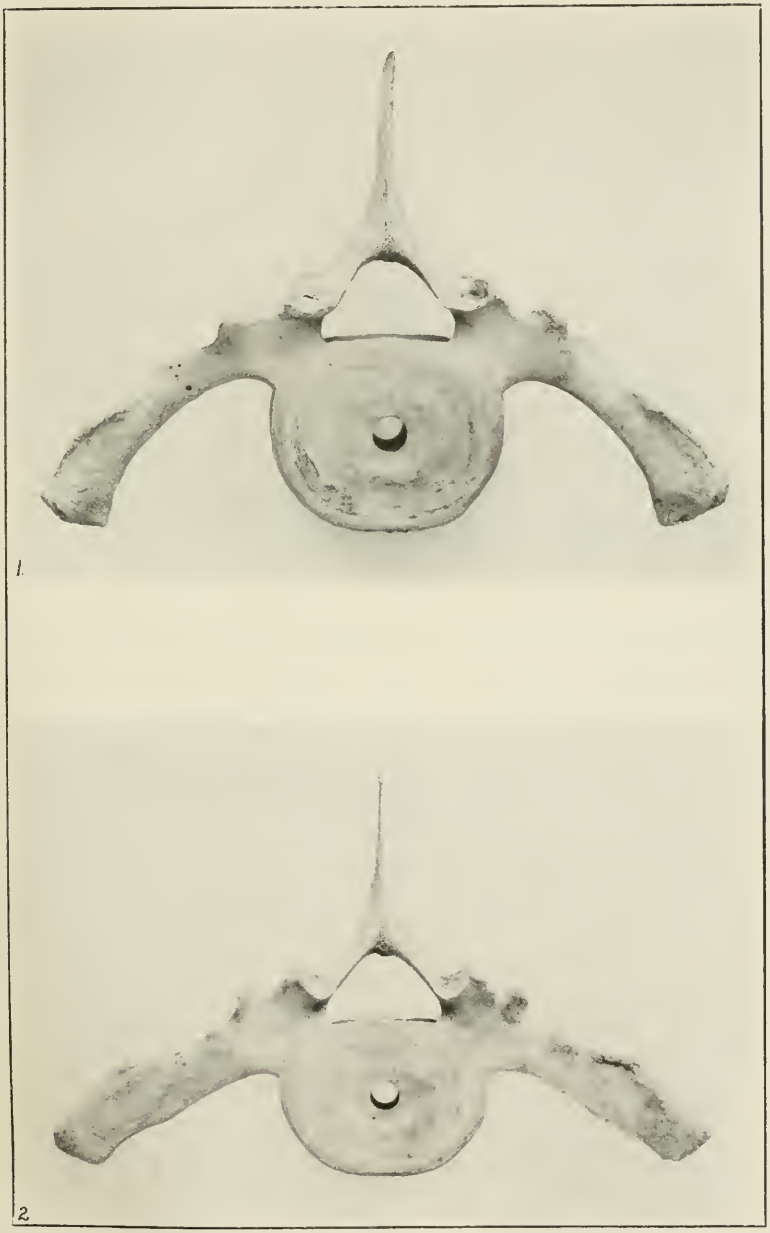

POLLACK WHALE: CERVICAL VERTEBRA NO. 7 AND DORSAL VERTEBRA NO. 1

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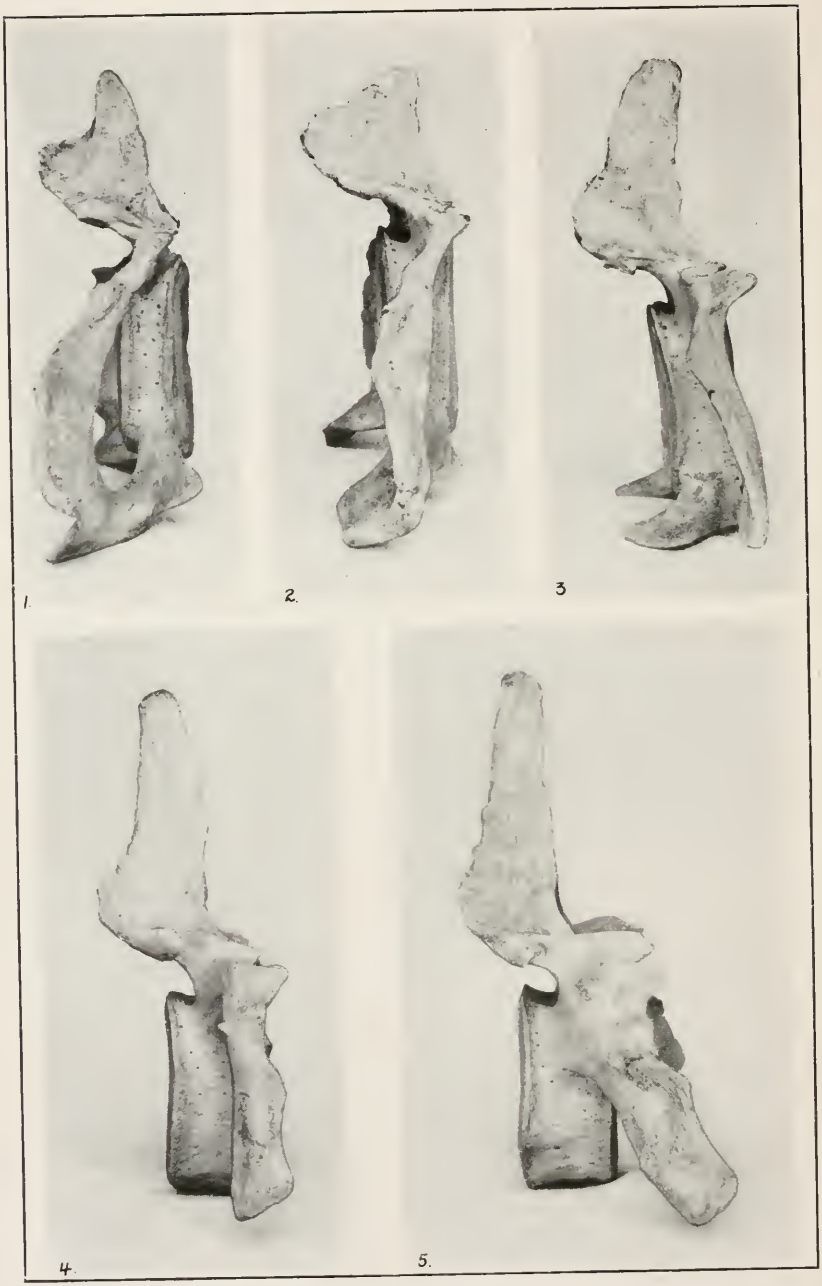

POLLACK WHALE: CERVICAL VERTEBRÆ NOS. 4, 5, 6, AND 7: DORSAL VERTEBRA NO. 1

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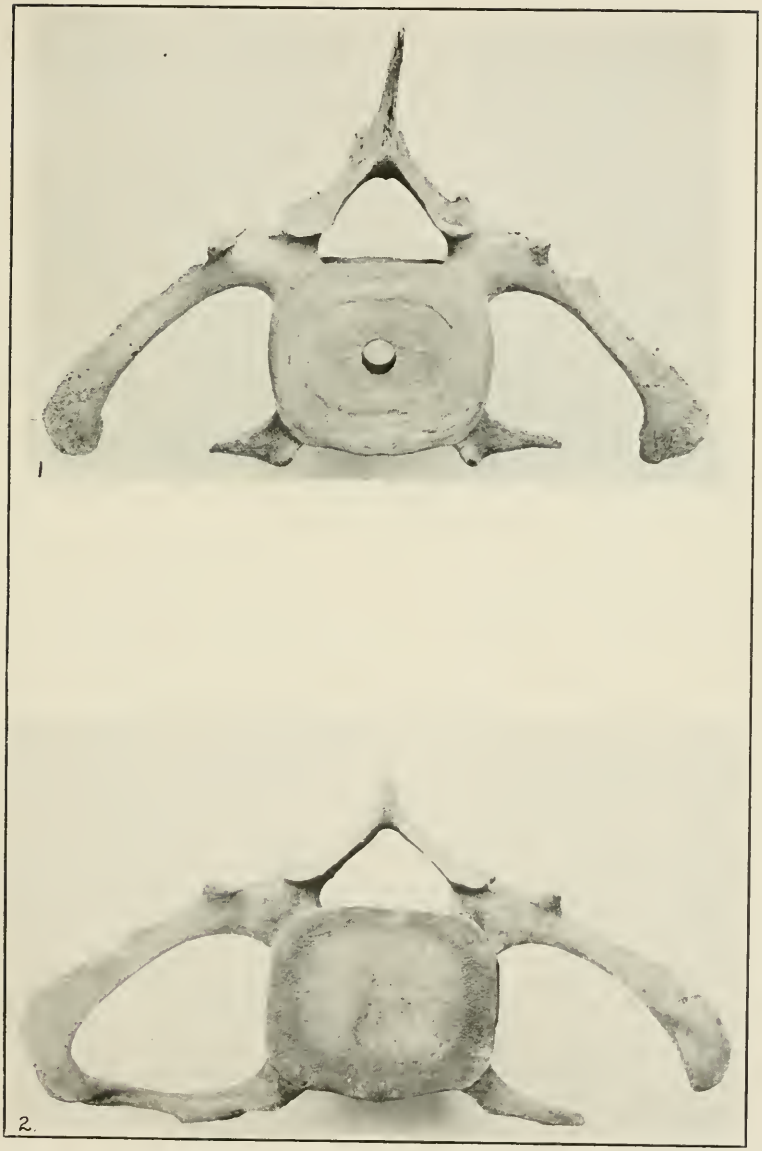

POLLACK WHALE: CERVICAL VERTEBRA NO. 6

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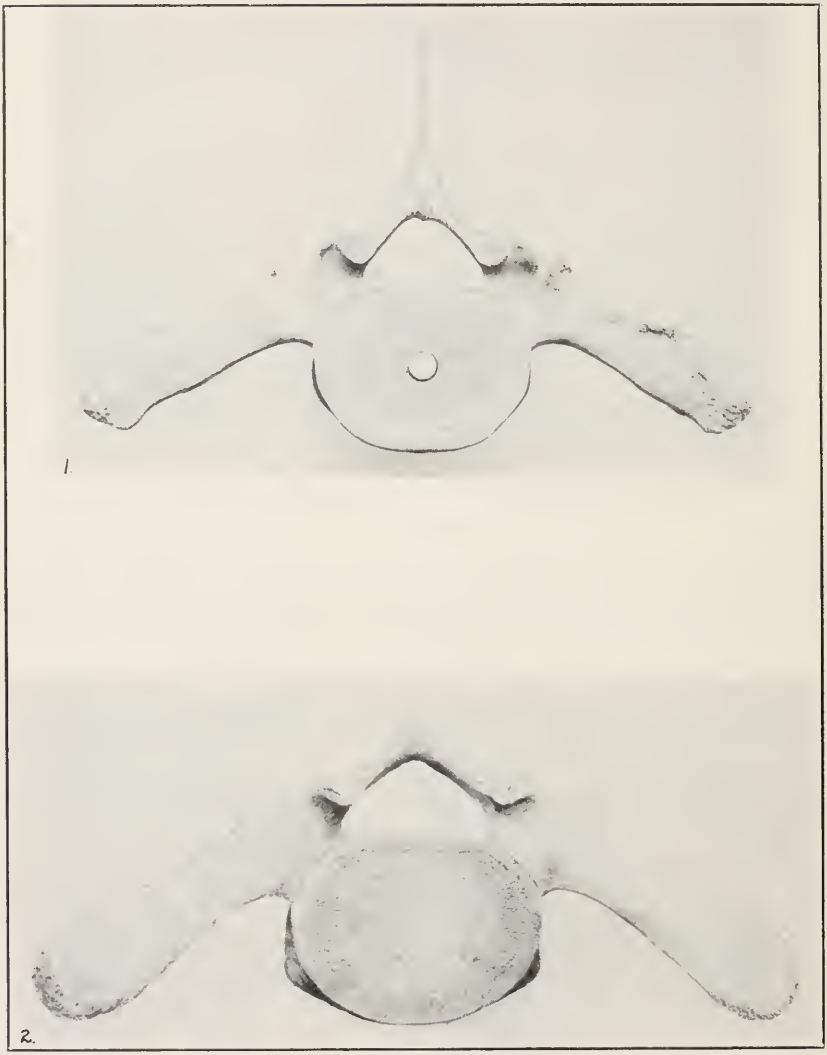

POLLACK WHALE: DORSAL VERTEBRA NO. 1

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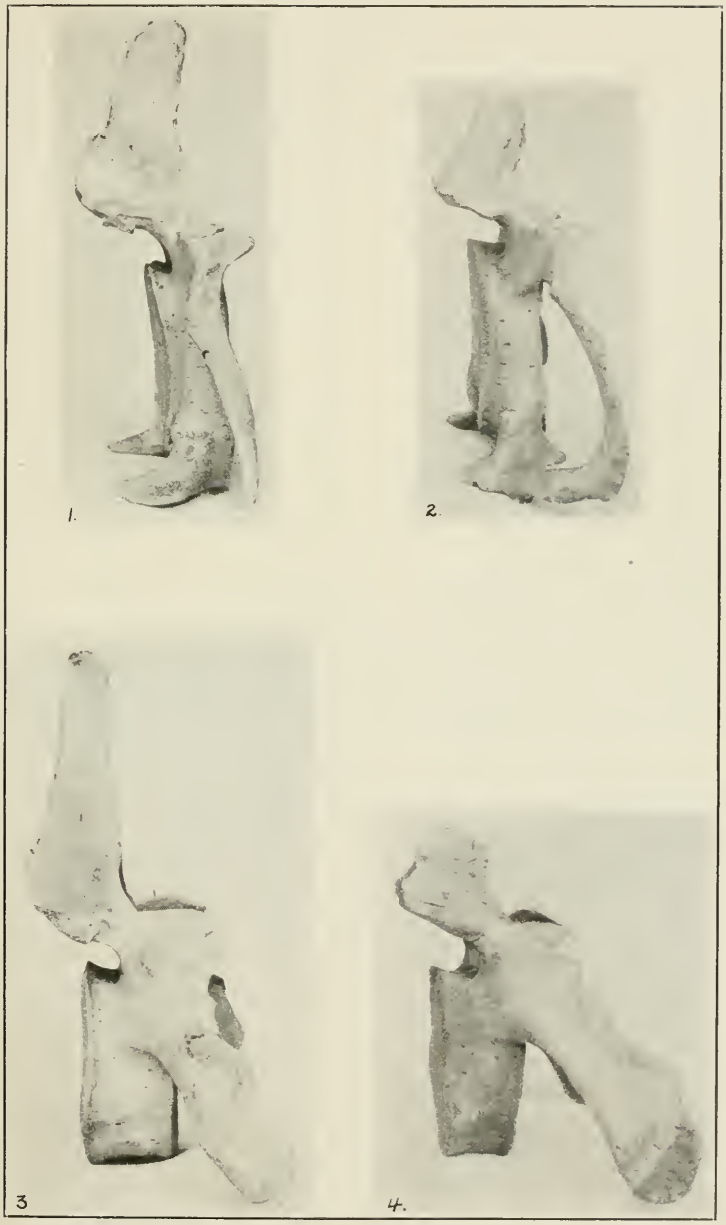

POLLACK WHALE: CERVICAL VERTEBRA NO. 6 AND DORSAL VERTEBRA NO. 1

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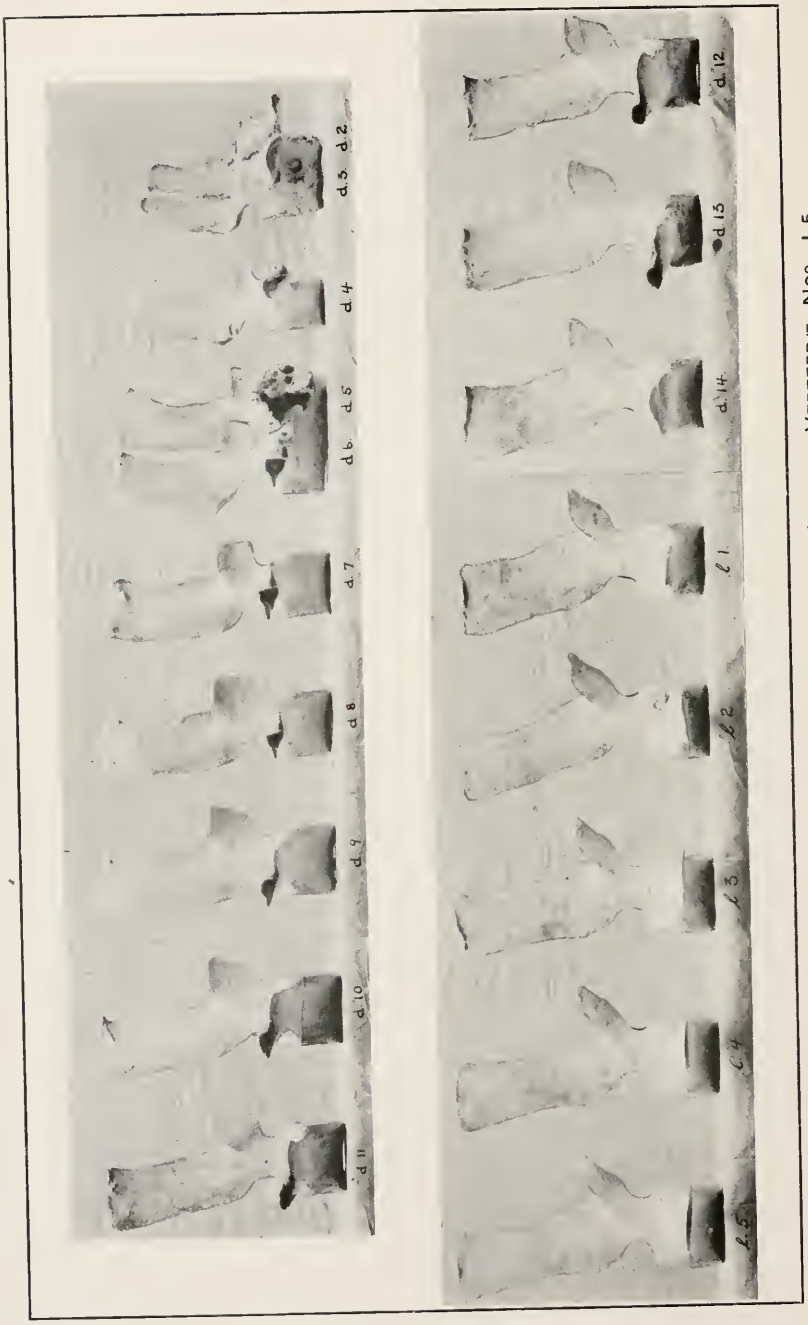

POLLACK WHALE: DORSAL VERTEBRÆ NOS. 2-14 AND LUMBAR VERTEBRÆ NOS. 1-5

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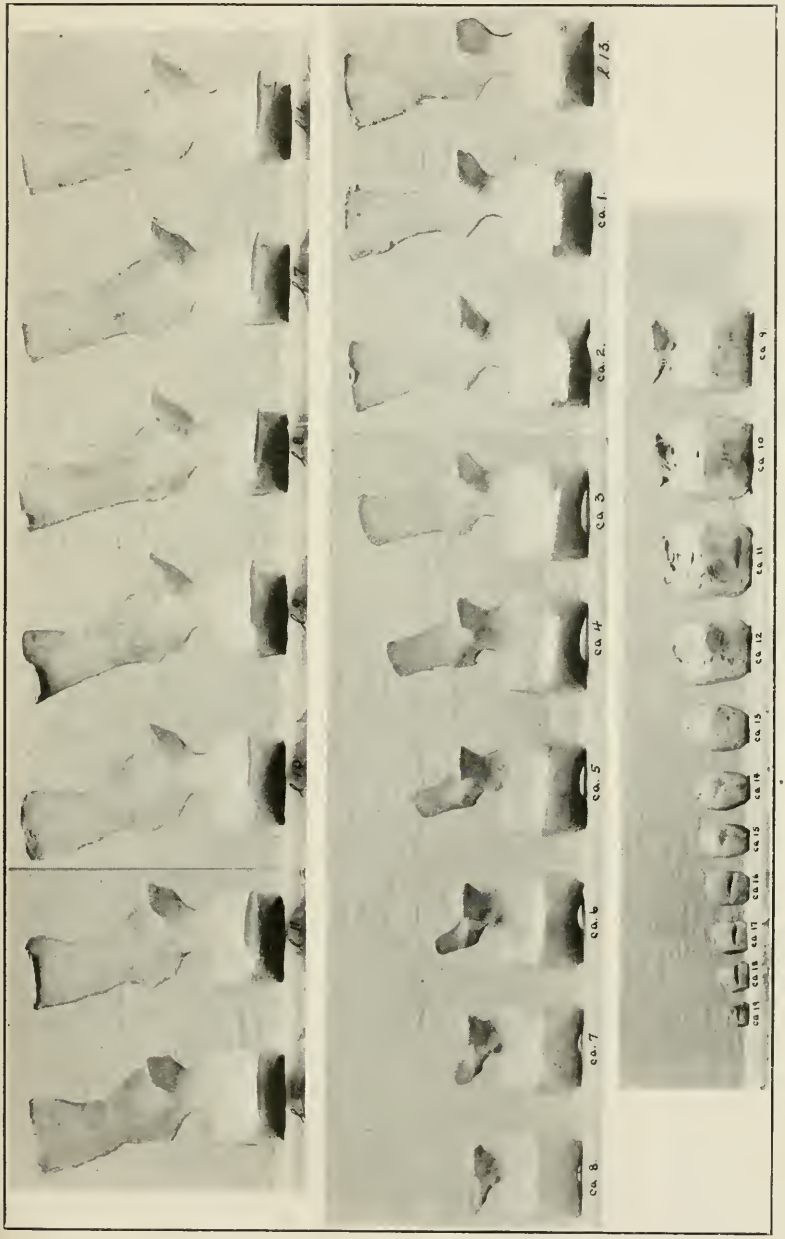

POLLACK WHALE: LUMBAR VERTEBRÆ NOS. 6-13 AND CAUDAL VERTEBRÆ NOS. 1-19

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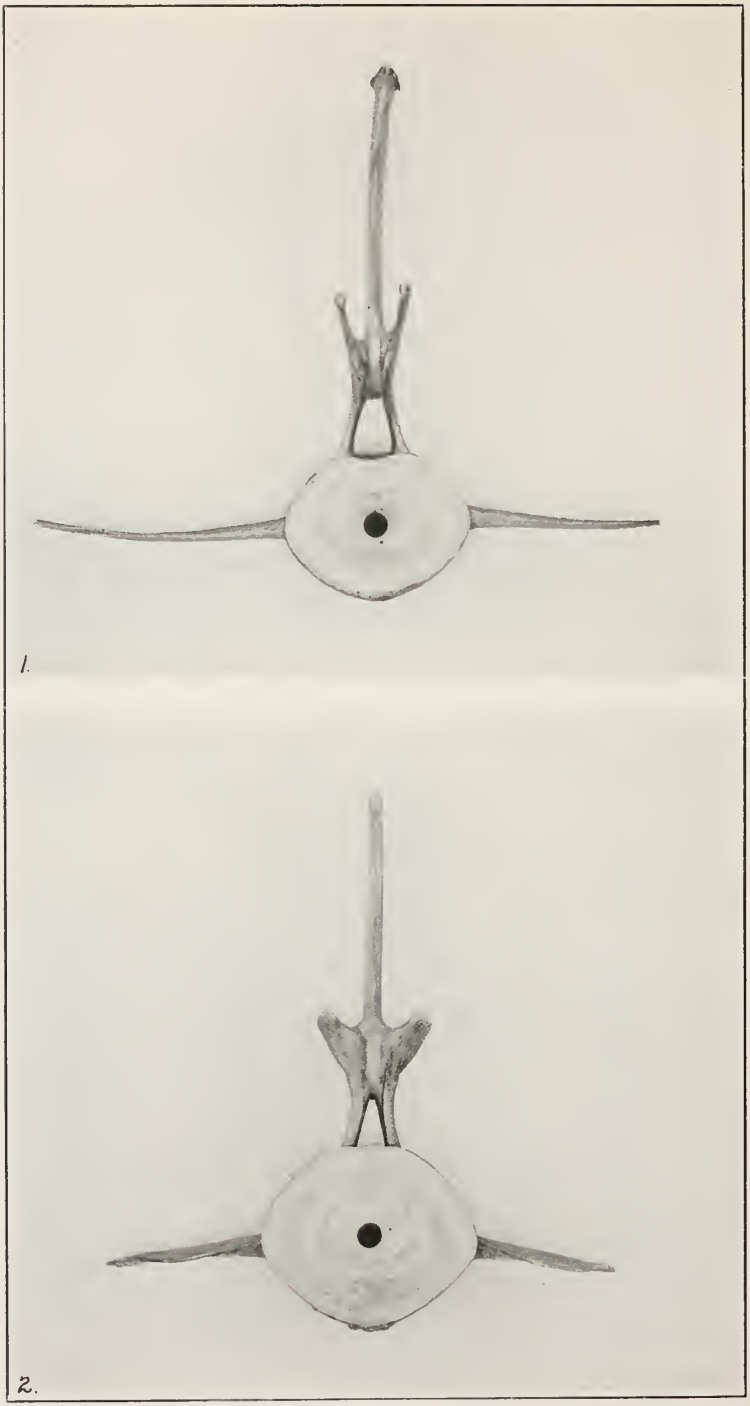

POLLACK WHALE: LUMBAR VERTEBRA NO. 1 AND CAUDAL VERTEBRA NO. 1

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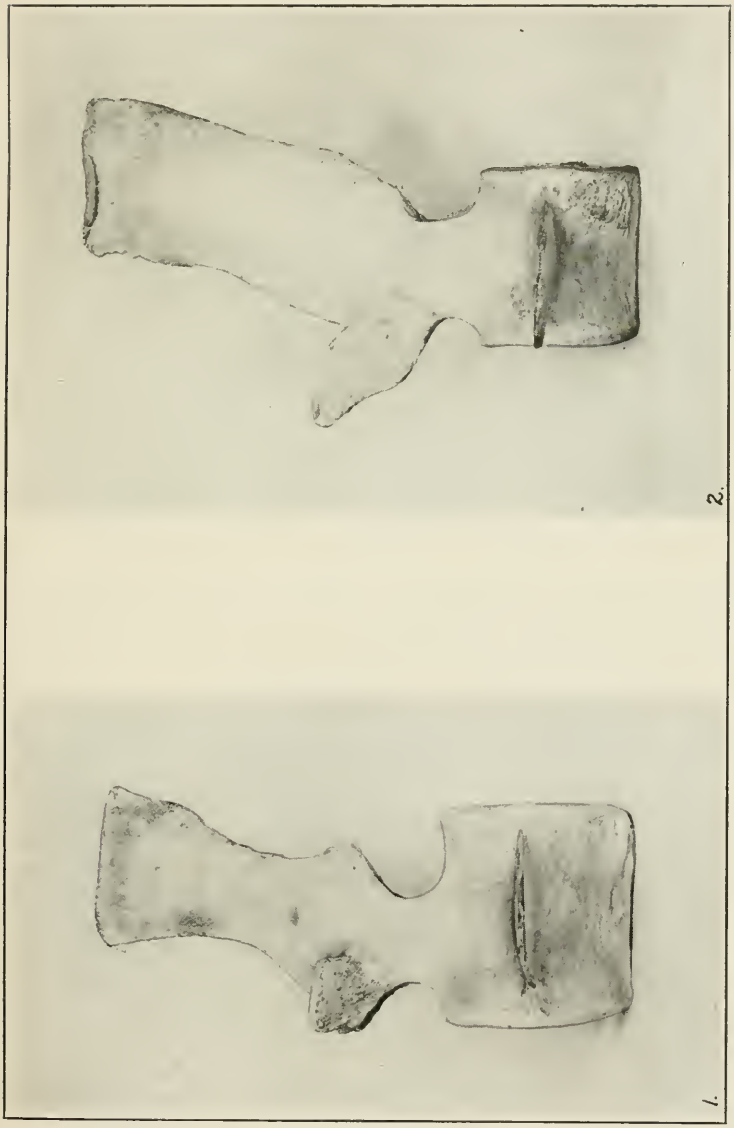

POLLACK WHALE: LUMBAR VERTEBRA NO. 1 AND CAUDAL VERTEBRA NO. 1

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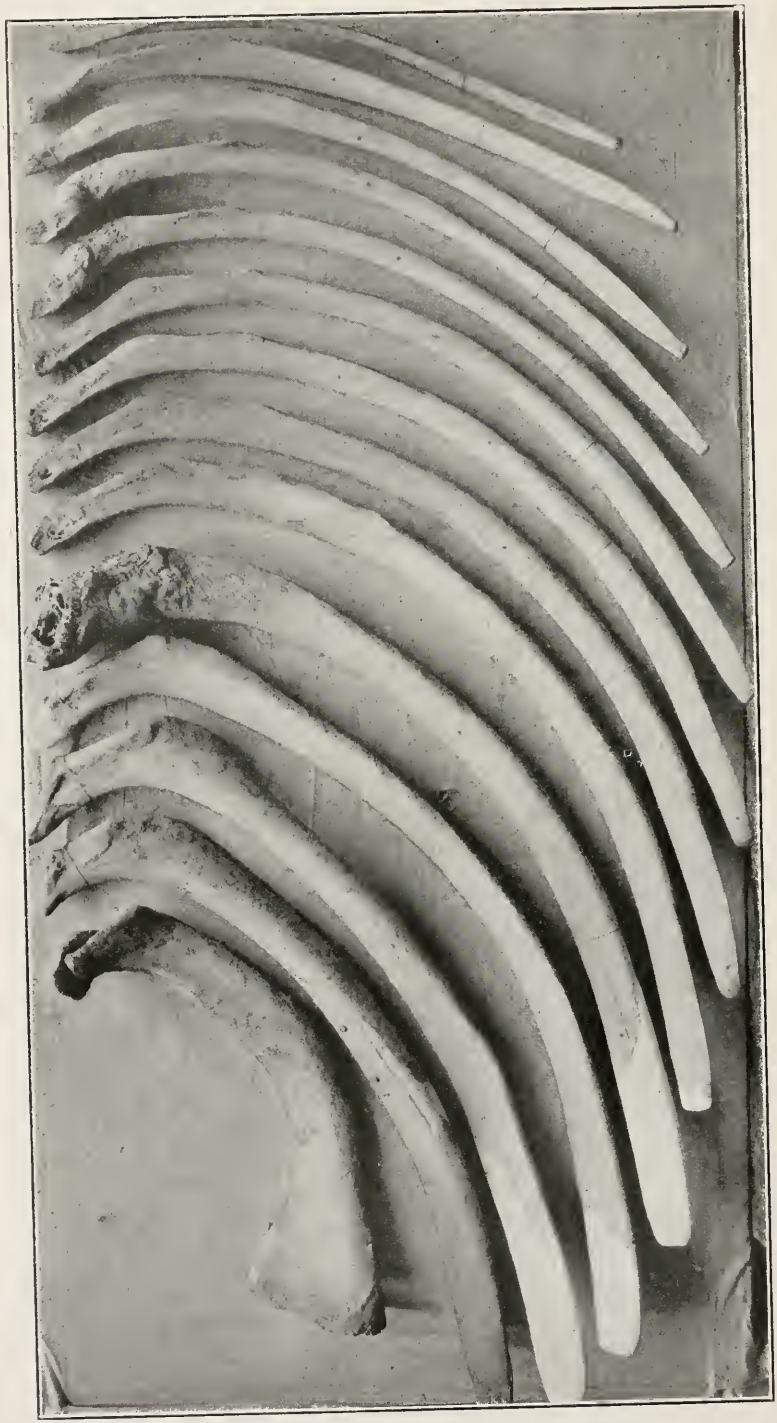

POLLACK WHALE: RIGHT RIBS

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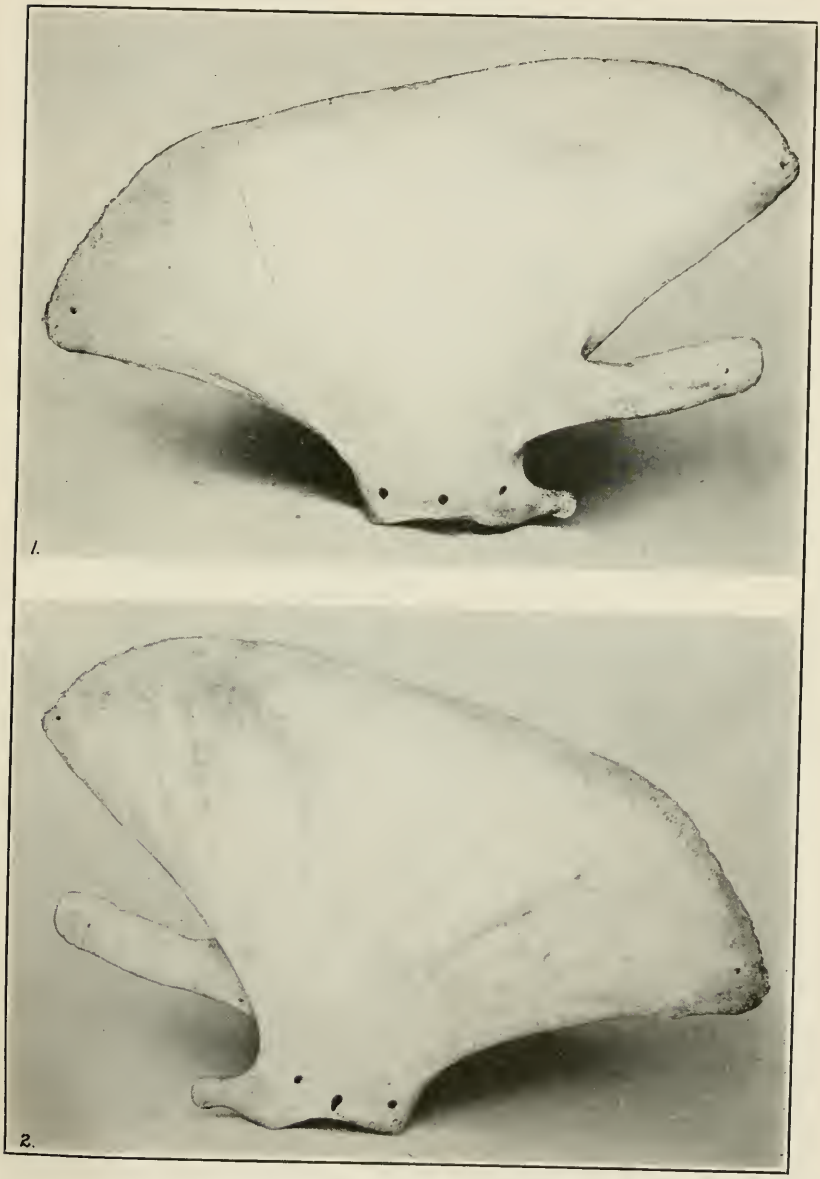

POLLACK WHALE: RIGHT SCAPULA

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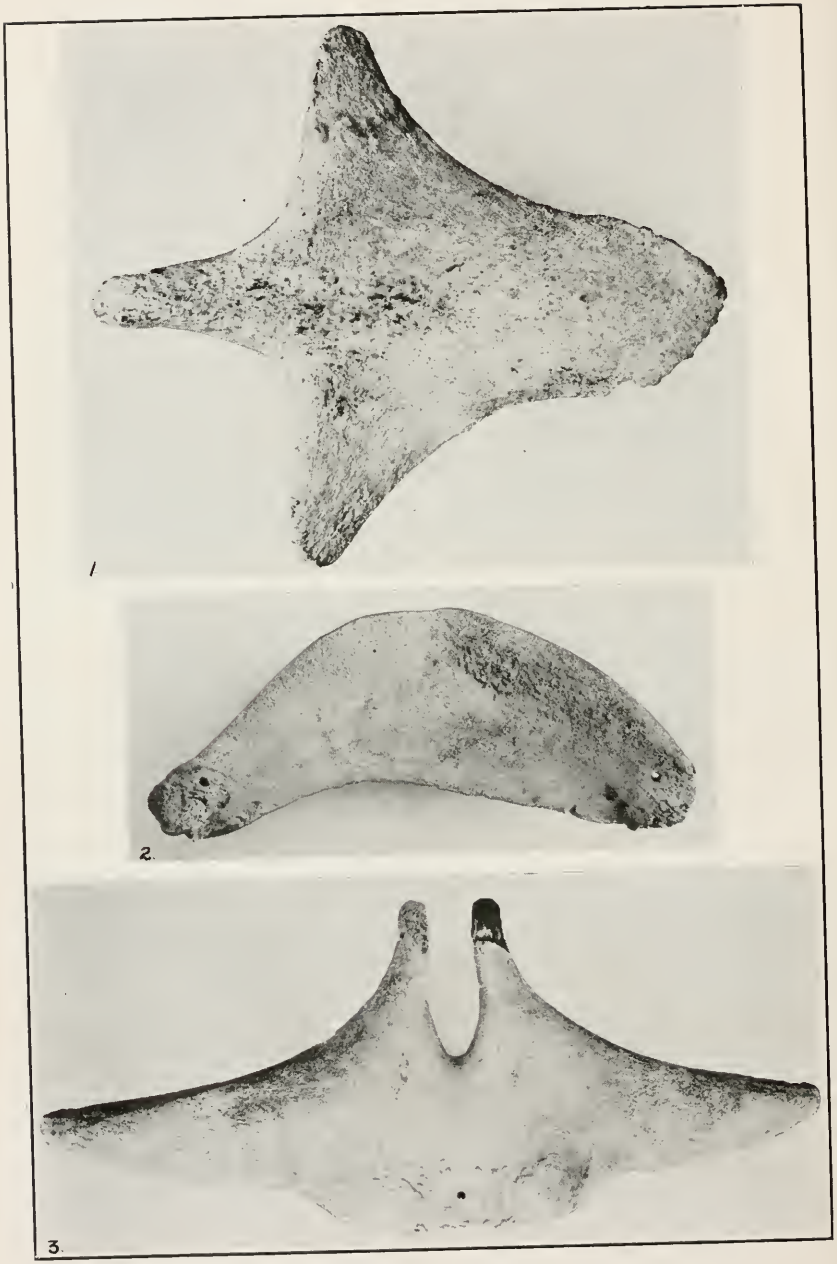

POLLACK WHALE: STERNUM, STYLOHYAL, AND BASIHYAL

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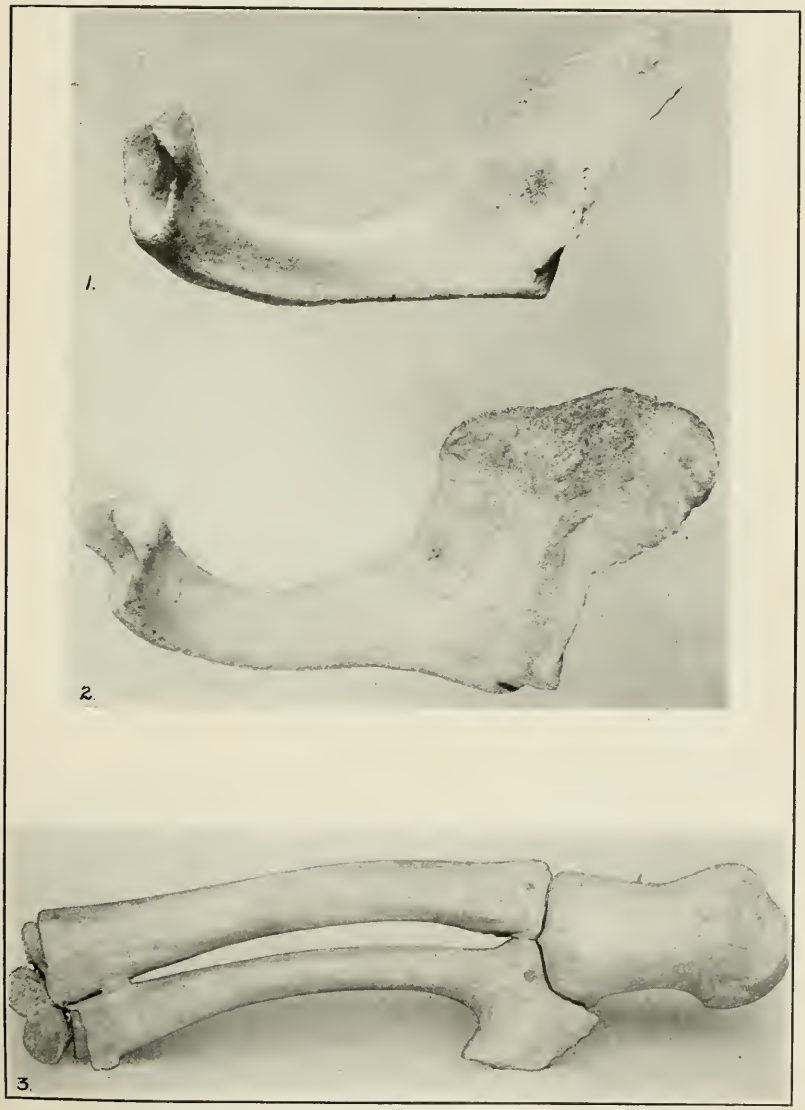

POLLACK WHALE: JUGAL AND FOREARM

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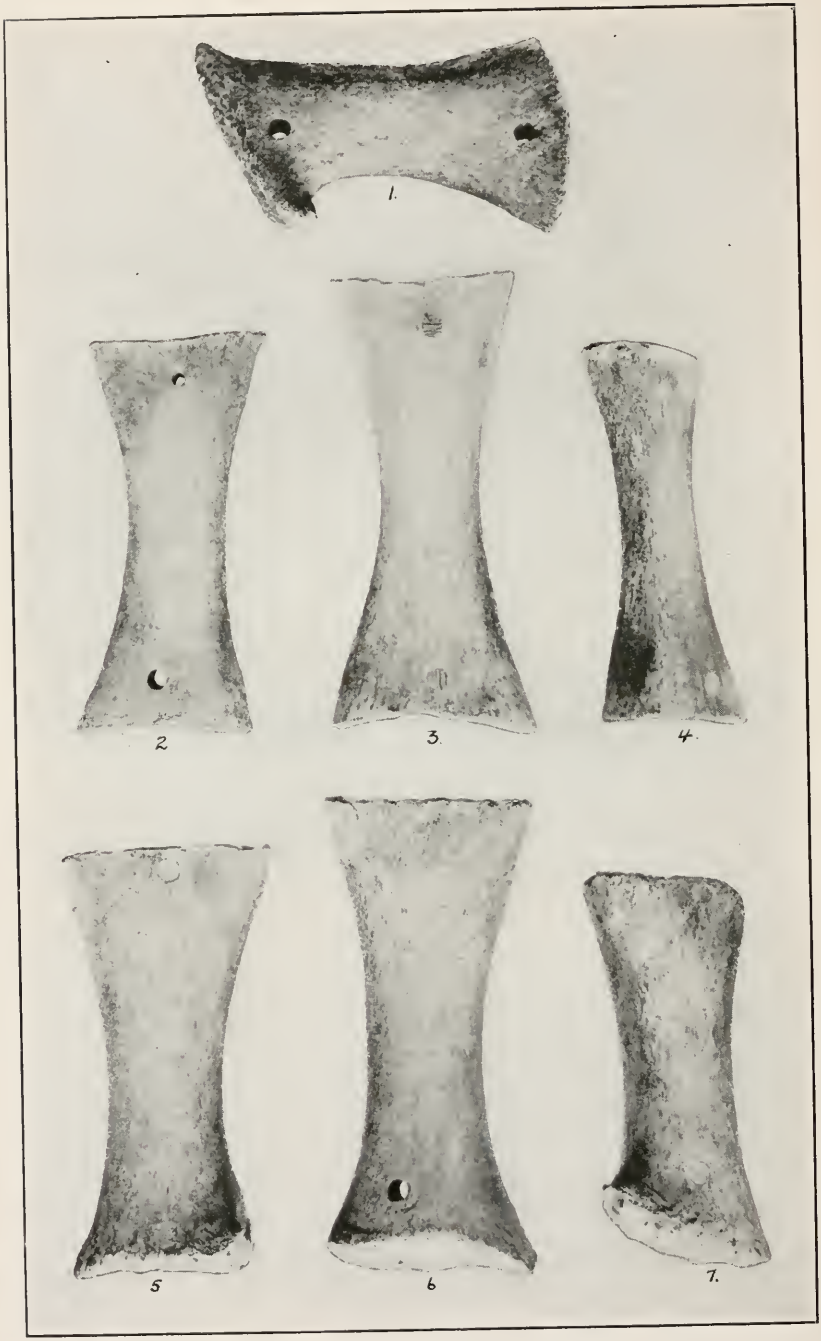

POLLACK WHALE: BONES OF THE HAND

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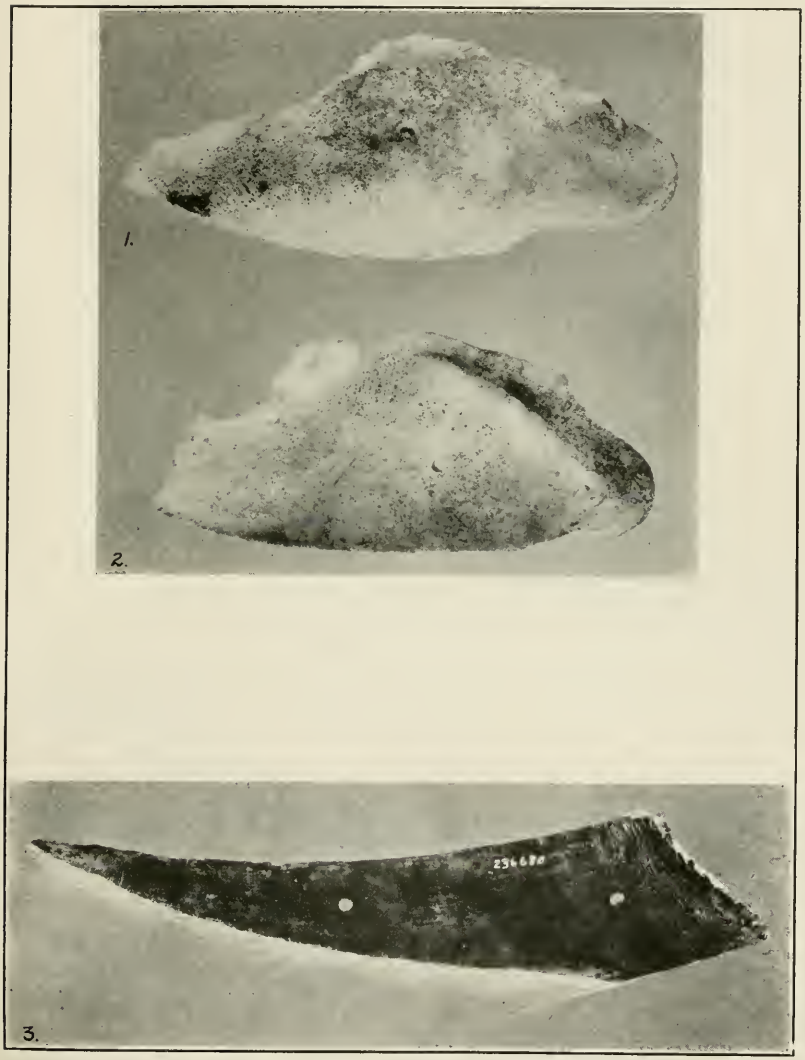

POLLACK WHALE: LACRIMALS AND BALEEN PLATE FROM NEAR MIDDLE OF SERIES

FOR EXPLANATION OF PLATE SEE PAGE 15

POLLACK WHALE: TYMPANIC AND PERIOTIC BONES

FOR EXPLANATION OF PLATE SEE PAGE 15