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STUDIES OF TASMANIAN CETACEA.

PART IV.

*Delphinus delphis*

(The Common Dolphin.)

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Plates I.-V.

(Read 12th April, 1920.)

As with other members of the *Cetacea* the synonymy of this species is involved. Beddard <sup>(1)</sup> states that the following appear identical with *Delphinus delphis*: *D. major*, *D. fulvofasciatus*, *D. fosteri*, *D. janira*, *D. pomeegra*, *D. bairdii*, *D. moorei*, *D. walkeri*, *D. nova zelandiae*, *D. albinanus*, *D. marginatus*, *D. fuscus*, *D. souverbianus*, *D. variegatus*, *D. balteatus*, *D. algerienis*, *D. moschotus*. While agreeing in general terms with this combination of synonyms we wish to qualify it with certain remarks later in this paper.

The dolphin is common around the Tasmanian Coast and in the estuaries of the larger rivers, sometimes ascending them for many miles from the open sea. During the currency of the Easter Camp of the Tasmanian Field Naturalists' Club at Port Arthur we were fortunate in observ-

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(1) Beddard: A Book of Whales (1900), p. 254.

ing a large number of dolphins in Maingon Bay, Tasman's Peninsula. There were several hundred dolphins in the bay and their evolutions in the surf were watched with interest by many of the Naturalists for the greater part of Easter Monday. It appeared as if the animals were mating. The greater majority kept out in the waters of the bay beyond the line of breaking ocean combers that broke rank after rank upon the coast. Every now and then, however, a score or more would come dashing towards the shore, their outlines showing clearly in the incoming breaker. Just at the moment the wave broke and it appeared as though the dolphins would be cast against the rocks or flung far up on the sandy shore, they would turn suddenly, dive through the crest of the breaker, spring



several feet in the air, and once more swim seawards. Such a sight needs to be actually observed before one fully realises the immensity of the swimming power possessed by these aquatic mammals. The enormous force of the breaking waves, the various cross currents and undertows incidental to such a surf seemed to have no effect upon the evolutions of the dolphins. Although accustomed as we were to observe the swimming powers possessed by these animals from vessels and on other occasions from time to time, yet it needed such an observation as the foregoing to fully realise the power of these animals in their natural element. (See Plate I. and text fig. 1.)

## EXTERNAL CHARACTERS.

Although it is here assumed that the modern method of reducing all the smaller dolphins to a single species (that of the type) is a more or less wise one, it must still be claimed that such a proceeding leaves certain outstanding facts unaccounted for. In a word such a species as that of "*Delphinus fosteri*," having apparently well marked external characters, and some slight skeletal ones, does not agree in all respects with the large eight feet dolphins that frequent our coasts, and of which we hold a complete skeleton, and a set of notes made upon the animal prior to dissection. Perhaps the best that can be done at present is to regard the better defined species of former classifications as being sub-races, and to sink *in toto* all the ill-defined ones. The more one studies the *Cetacea* the more the conviction grows that we are dealing with a rapidly evolving order of marine mammals, and that within certain limits, taxonomy is tentative and certainly unworkable if pushed to extremes. We herewith detail the external appearances of two animals, one a mature male of eight feet in length, and the other an immature male of six and a half feet in length—exact measurements being included.

*Mature Male.*

Between the dorsal fin and the head the animal was jet black. From the constriction of the beak to the eye ran a curved black line—outlined and washed with white. From the eye to a line drawn vertically with the back of the dorsal fin was a curved line, above which the animal was black, and below which the colour shaded from dirty grey to white. In the tail regions a good deal of iron grey appeared, and it was assumed that, in young animals, the grey, white, and iron grey, would appear as yellow, thus giving rise to such a vernacular name as "yellow sided dolphin." The actual flukes of the tail were black.

*Immature Male.*

In the arrangement of the several colour areas this young male simulated the adult animal, but the white of the underparts was replaced by yellow, or more correctly, yellowish white. This animal came from the Derwent River and was as nearly adult, in point of measurement, as nine and a half is to twelve. Smaller animals, from the same river, in the collection of the Hobart Museum, show much deeper yellow tinting along the underparts—

thus pretty clearly showing that yellow sided dolphins are immature animals. Individually, the young male here under description manifested two, irregularly oval, white marks in the region of the tail, but otherwise conformed to the adult tinting, except in the matter of yellow replacing white upon the under parts—as already stated.

#### *Food.*

During the dissection of the adult animal the stomach was turned out, and found to contain a fair amount of semi-digested food, and an enormous number of the horny beaks of cuttlefish, also a few worms. The immature animal had apparently been feeding upon *Echinoderms*, as large quantities of *Spatangus* spines were found, and were the only undigested elements met with.

#### *Ribs and Scapula.*

As the scapulæ are frequently misplaced in articulated dolphins' skeletons, a measurement was made prior to the removal of the scapulæ of the immature animal to exactly fix its position. The numerical result was—from tip of beak to anterior rim of scapula =  $21\frac{1}{2}$  inches when the arm was at a right angle to the line of the body. As a guide to articulation, therefore, the hamular process should just overlap the edge of the first rib. In the matured dolphin the dorsal ribs (five) that reach the sternum, were retained in natural articulation, to set at rest the exact positions of the tubercula and capitula in each pair of ribs. It is an excellent plan to keep at least one such thorax in every comparative collection as it forms a court of appeal when cetacean skeletons are in process of mounting.

#### *External Measurements*

| Name of Measurement                            | Adult Male |                                   | Immature Male |                                   |
|--|------------|-----------------------------------|---------------|-----------------------------------|
|  | Feet       | Inches                            | Feet          | Inches                            |
| Total length between vertical rods .. .. .     | 8          | 1                                 | 6             | 5                                 |
| Girth at dorsal fin ... .. .                   | 3          | 8                                 | No            | data                              |
| Width of tail ... .. .                         | 1          | $9\frac{1}{2}$                    | 1             | 3                                 |
| Tip of beak to constriction ... .. .           | 0          | 6                                 | 0             | 6                                 |
| Size of the eye ... .. .                       | 0          | $1\frac{1}{4} \times \frac{3}{4}$ | 0             | $1\frac{1}{4} \times \frac{3}{4}$ |
| Length of pectoral fin along a middle line ... | 0          | $8\frac{1}{2}$                    | 0             | 8                                 |
| Height of dorsal fin ... .. .                  | 0          | $8\frac{1}{2}$                    | 0             | 8                                 |

During the dissection of these two animals various data were collected that are of greater individual than general utility, and they are therefore not detailed in the present text. By way of giving a comprehensive survey of the skull characters, available to us, a large comparative table has been drawn up and is hereunder appended. Two young dolphins in the collection of the Hobart Museum, which measure four feet two, and four feet four respectively, are available to us. They were captured in the Derwent, and prepared by Mr. Arnold of the Museum Staff. Mounted specimens are notoriously untrustworthy, as to outline, but a curious mobility of the snout from the constriction upwards suggests an outline that is actually approached in life when dolphins are racing at full speed through the water. It is, as far as our observations go, a prelude to a thoracic flexure, and a distinct shiver can be seen to run from stem to stern of this living ship—and then follows the enormous caudal effort that completes the action. The head and thorax of a dolphin are less immobile than is commonly supposed, and cephalic, thoracic, and caudal flexures can be distinctly observed, in clear sunlit seas, when dolphins in sportive mood are swimming around a ship. (Plate II.)

COMPARATIVE SKULLS OF DOLPHINS. (*Delphinus delphis*.)

| Specimen Number                                | No. 1<br>HOBERT<br>MUSEUM.                      | No. 2<br>LAUNCESTON<br>MUSEUM.  | No. 3<br>LAUNCESTON<br>MUSEUM.   | No. 4<br>HOBERT<br>MUSEUM.           | No. 5<br>LAUNCESTON<br>MUSEUM.    | No. 6<br>LAUNCESTON<br>MUSEUM.       | No. 7<br>LAUNCESTON<br>MUSEUM.      | No. 8<br>HOBERT<br>MUSEUM.           | No. 9<br>LAUNCESTON<br>MUSEUM.        |
|--|---|---------------------------------|----------------------------------|--------------------------------------|-----------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|---------------------------------------|
| Parts of skeleton available ...                | Complete skeleton called " <i>D. fosteri</i> ." | Skull only. Imperfect.          | Skull only. Imperfect.           | Skull only. Reg. 4680.               | Skeleton Adult. Mature.           | Skull only. Mature.                  | Skeleton Immature. ♂                | Skull only. Mature ♀<br>Reg. 4425.   | Skull only. Mature ♀                  |
| Name of the bone and measurement made ...      | Skull. 464 mm. (18½ in.)                        | Skull. 462 mm. (18 3/16 in.)    | Skull. 440 to 445 mm. (17½ in.)* | Skull. 483 mm. (19 in.)              | Skull. 457 mm. (17 7/16 in.)      | Skull. 443 mm. (15 5/16 in.)         | Skull. 449 mm. (17½ in.)            | Skull. 437 mm. (17 3/16 in.)         | Skull. 448 mm. (17½ in.)              |
| Total length without mandible ...              | No 470 mm. (18½ in.)                            | No                              | 450 mm. (17 11/16 in.)           | 515 mm. (19½ in.)                    | No                                | No                                   | No                                  | 441 mm. (17½ in.)                    | No                                    |
| Total with mandible ...                        | 395 mm. (15½ in.)                               | Mandible. No                    | 382 mm. (15 in.)                 | 427 mm. (16 13/16 in.)               | Mandible. No                      | Mandible. No                         | 378 mm. (14½ in.)                   | 376 mm. (14½ in.)                    | Mandible. No                          |
| Greatest skull width at the zygomatic arch ... | 188 mm. (7½ in.)                                | Mandible. 190 mm. (7 7/16 in.)  | 189 mm. (7½ in.)                 | 202 mm. (7 15/16 in.)                | Mandible. 186 mm. (7 5/16 in.)    | Mandible. 183 mm. (7 3/16 in.)       | 193 mm. (7 9/16 in.)                | 192 mm. (7 7/16 in.)                 | Mandible. 192 mm. (7 7/16 in.)        |
| Notch to end of beak ...                       | 290 mm. (11½ in.)                               | 287 mm.* (11 3/16 in.)          | 274 mm.* (10¾ in.)               | 288 mm.* (11 5/16 in.)               | 286 mm.* (11 3/16 in.)            | 278 mm. (11 7/16 in.)                | 274 mm. (10¾ in.)                   | 274 mm. (10¾ in.)                    | No data.                              |
| Beak width at the notch                        | 90 mm. (3 1/16 in.)                             | 95 mm. (3 11/16 in.)            | 90 mm. (3 1/2 in.)               | 100 mm. (3 7/8 in.)                  | 90 mm. (3 1/2 in.)                | 90 mm. (3 1/2 in.)                   | 100 mm. (3 7/16 in.)                | 100 mm. (3 7/16 in.)                 | 98 mm. (3 13/16 in.)                  |
| Width in the middle of the beak ...            | 54 mm. (2 1/8 in.)                              | 56 mm.* (2 3/16 in.)            | 55 mm. (2 1/8 in.)               | 70 mm. (2 7/8 in.)                   | 55 mm. (2 1/8 in.)                | 55 mm. (2 1/8 in.)                   | 52 mm. (2 1/8 in.)                  | 57 mm. (2 1/8 in.)                   | 56 mm. (2 3/16 in.)                   |
| Height at vertex with mandible, if available   | 152 mm. (5 31/32 in.)                           | 148 mm. (5 13/16 in.)           | Mutilated. (5 13/16 in.)         | 168 mm. (6 9/16 in.)                 | 152 mm. (5 31/32 in.)             | 152 mm. (5 31/32 in.)                | 150 mm. (5 3/8 in.)                 | 152 mm. (5 31/32 in.)                | 149 mm.* (5 7/8 in.)                  |
| Greatest width of pre-narial basin ...         | 69 mm. (2 11/16 in.)                            | 68 mm. (2 3/4 in.)              | 69 mm. (2 11/16 in.)             | 74 mm. (2 7/8 in.)                   | 70 mm. (2 3/4 in.)                | 70 mm. (2 3/4 in.)                   | 69 mm. (2 11/16 in.)                | 75 mm. (2 15/16 in.)                 | 76 mm. (3 in.)                        |
| Locality and Donor ...                         | N.W. Coast of Tasmania (per Mr. M. T. Cheek).   | Tamar Heads (Mr. Adye Douglas). | Tamar Heads (Mr. Adye Douglas).  | Scamander (per Mr. J. G. Walker).    | Scamander (per Mr. J. G. Walker). | King Island (per Mr. J. M. Bowling). | River Derwent (per Mr. J. V. Cook). | King Island (per Mr. J. M. Bowling). | Kelso—Tamar Heads (per Rev. W. White) |
| Footnotes. ...                                 | * Mutilated. (Plate III.)                       | * Mutilated.                    | * Mutilated. (Plate IV.)         | * Mutilated during life by a Killer. | * Mutilated.                      | * Mutilated.                         | Good order. (Plate V.)              | Good order. (Plate V.)               | * Mutilated.                          |

## DESCRIPTIVE AND GENERAL.

No. 1.—This skull is practically adult, but shows no super ossification. The supra-occipital hood overlungs the frontals. The vomer is extremely thin (as it appears in the plate, for 60 mm.). Rostral cartilage not ossified. Left nasal sends down a short process. Sutures not ankylosed to extent in in temporal fossa, at the vertex, or the otocranium. Interparietal coalesced with the frontal and the supra-occipital. General build of skull might suggest a sub-race, if external characters supported the idea. T. M. No. D 590. (Plate II.)

No. 2.—This is a beach-worn specimen, more adult than No. 1. Sutures opened by exposure to the weather, much mutilated at the end of the beak. Left nasal fused to the pre-frontal, supra-occipital hood rubbed but apparently similar to No. 1. Beak of notch wider than No. 1 but less than the female skulls manifest.

No. 3.—Typically an adult male. This is also a beach-worn specimen. All characters conform to the type.

No. 4.—Adult, but showing no super ossification, owing to method of cleaning no minute osteological details are available. (Plate IV.)

No. 5.—Fully adult, with all the super ossification ever shown by the *Dolphins* of this genus. The mandibular excess (in length) is due to the upper jaw being

mutilated during a fight in early life. The effect was that of upturning the tip of the beak, the bones being cross penetrated by a beaked wound. This animal was eight feet one inch long.

No. 6.—Skull found at Surprise Bay, King Island. It to all intents and purposes duplicates specimen No. 1, and is therefore of the sub-race called "*Dolphinus fosteri*."

No. 7.—A fine specimen of an immature male, all the characters of the normal type are present. The various stages of skeletal growth and development may be studied in this specimen. Total length of the animal, prior to dissection, six feet five inches.

No. 8.—Fully adult female, a typical sex specimen. Preaurial basin shallow and wide. Intermaxillary subsides upon the maxillary less steeply than in the male. Mandible shorter than that of the male. (Plate V.)

No. 9.—Typical female skull, sawn through for study of the falx. No mandible. All female characters splendidly shown as *vide supra*, in contrast with No. 8, a female, and No. 1, a male.

*The Skeleton.*

The axis and atlas vertebræ are always ankylosed in these whales, the rest of the cervicals being quite free. The vertebral formula is fairly constant, and may be given as follows:—

Cervicals = 7.

Dorsals = 14 (some cetologists say 15).

Lumbar = 22.

Caudals = 32 = 75—with a maximum of 76.

Accidental mutilations of the vertebræ are common, even among young animals, owing to the custom of diving under ships in rapid motion. Such effects usually manifest themselves in the shape of exostosis, which may either simply cover the elements involved, or by partial absorption and subsequent accretion, materially alter the contour of the bones. We hold various instances, in our respective collections, of these naturally healed wounds. The true lumbar vertebræ are devoid of zygapophyses, but they appear in a functionally reduced state on the chevron-bearing portion of the caudal series, having doubtless reference to muscular attachment areas rather than anything else. The neural spines slope gradually backwards through half of the dorsal series, assume a recovery in the second half, and become vertical in the middle of the lumbar series—approximately the twenty-eighth vertebra from the skull. The chevron-bearing series (or as we might call them sacro-lumbar, although usually simply included in the caudal series) begin by being approximately vertical, as regards their neural spines, and end by having them pitched at a slope that closely simulates that which obtains in the middle dorsals. In the two animals dissected by me, the following express the sizes of the neural spines, and neurapophyses of the last dorsal that reaches the sternum, and the largest lumbar of the series; in other words—the twelfth and twenty-eighth vertebræ, from the skull.

*Comparative Vertebræ.*

| Adult Male | Name of Vertebra      | Measurement made                         | Size in mm. | Immature Male | Size in mm. | Remarks                               |
|------------|-----------------------|--|-------------|---------------|-------------|---------------------------------------|
| "          | No. 12 from the skull | Upper surface of centrum to tip of spine | 70 mm.      | "             | 65 mm.      | Epiphyses of immature animal all open |
| "          | No. 28 from the skull | Upper surface of centrum to tip of spine | 117 mm.     | "             | 100 mm.     | Epiphyses of immature animal all open |



*Comparative Arm Bones.*

| Adult Male | Measurement made                                    | Size in mm. | Immature Male | Size in mm. | Remarks   |
|------------|---|-------------|---------------|-------------|---|
| "          | Humerus, alone                                      | 60 mm.      | "             | 55 mm.      | In the immature animal the epiphyses are all open |
| "          | Total length of humerus, radius, wrist, and fingers | 330 mm.     | "             | 250 mm.     |   |

Measurement applied comparatively to two animals in different stages of growth does not, always, convey to the mind the real differences existing between their skeletons—and in this connection weight is often a most useful aid. The outline of a bone may be very close to the size attained at maturity, and yet the amount of ossific matter deposited in that bone may be far below the quantity found in a similar bone taken from a fully matured animal. The humerus of the adult male dolphin, above cited, turns the scale at 55 grammes, while the same bone from the arm of the immature animal only weighs 28 grammes! This expresses more fully the real skeletal departure, than the minus of five mm. docs. upon total (comparative) length. Comparative weights often reveal startling differences in skulls that upon measurement alone would be relegated to the common standard of "at, or about the same age." Naturally the general condition of the skull has to be carefully considered, and the weight standard is only absolutely a test when both specimens weighed have been treated exactly the same throughout, as in the present instance, with the humeri, where both were cleaned and dried under a common series of conditions.

*Ear Bones.*

The ear bones of immature dolphins of over two thirds the adult, minimum age of maturity, are practically as highly developed as those of their seniors—which means, that these atrophied sense capsules grow little, or not at all, after the period named. Ear bones of males, and females, manifest individual, and it may yet be shown sex variations, that would be called into determinative requisition if found fossil. An extensive range of specimens all correctly sexed, and aged, would yield some interesting data here. Ear bones of the genus *Delphinus*, can be separated from those of *Globicephalus*, by the less production of the tympanic, at its anterior articular end. Again, they can be separated from the Beaked whales, of

the genus *Mesoplodon*, as can those of *Tursiops*, and *Globicephalus*, by the less production of the posterior articular end of the perotic. In this connection *Tursiops* is intermediate, showing a more or less style-like extension that cuts it off from ear bones of either *Delphinus*, or *Globicephalus*. *Mesoplodon*, however, of all the whales named, is, at the point indicated, both extended and truncated. Minor variations of the foramina, etc., are not easily detailed in anything but an illustrated monograph, although interesting enough to the student.

## DESCRIPTION OF PLATES.

### PLATE I.

This shows a photograph of Maingon Bay, Tasman's Peninsula, with Cape Raoul in the distance. In the foreground can be seen the dolphins springing out of the wave as it broke upon the shore. While this gives some idea of the scene, it does not convey any idea of the number of dolphins in the bay, or the number that could often be seen in the surf at one time. Owing to the very dull light, and the great rapidity with which the animals performed their aquatic evolutions, it was exceedingly difficult to obtain a photograph of the event. Of the many photographs, those taken by Mr. F. B. Cane give the best effect, and we have to thank him for allowing us to use them to illustrate these notes.

### PLATE II.

Two young dolphins captured in the River Derwent. The irregularity of outline is due to the mounting. (Tasmanian Museum, Reg. Nos. D591 and 592.)

### PLATE III.

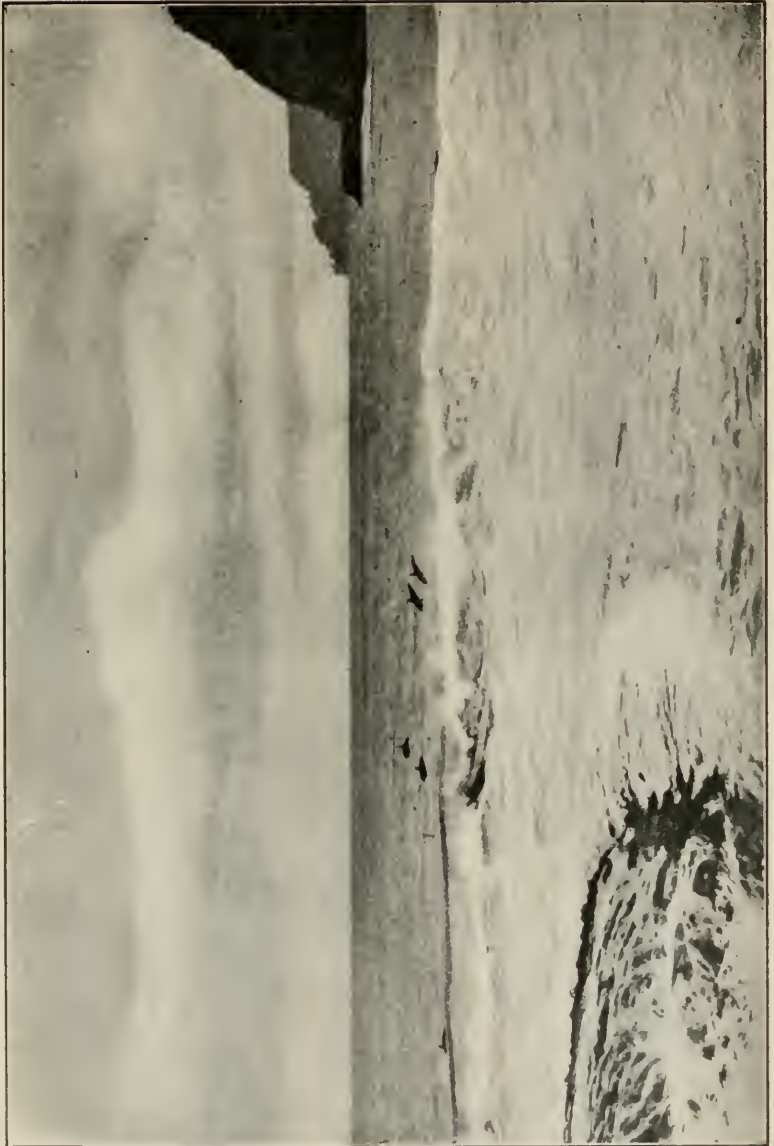
Articulated Skeleton of *Delphinus delphis* (*fosteri*?)  
(Tasmanian Museum, Reg. No. D590.).

### PLATE IV.

Skull of *Delphinus delphis*.  
(Tasmanian Museum, Reg. No. 4680.).

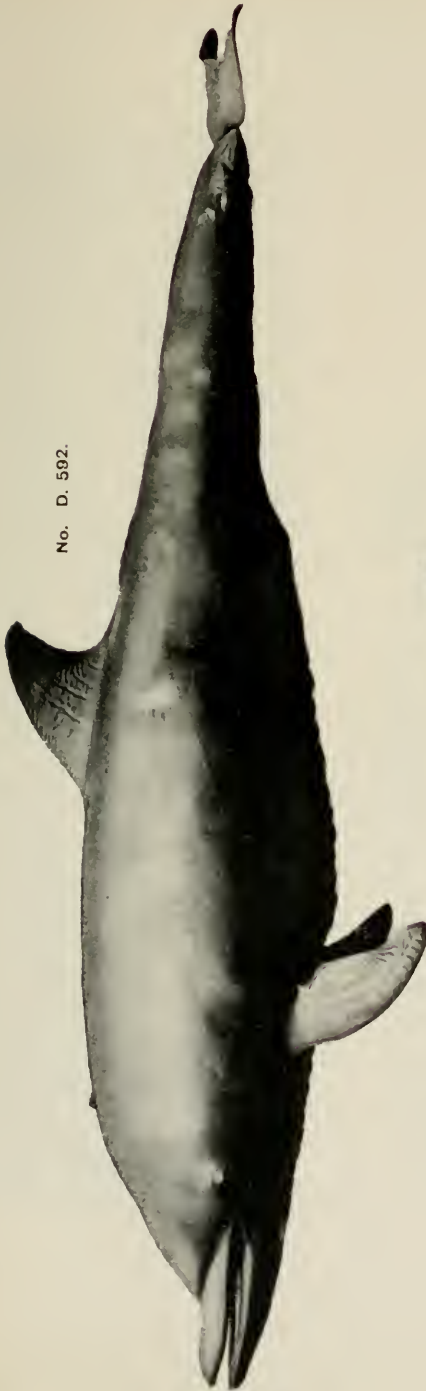
### PLATE V.

Skull of *Delphinus delphis*.  
(Tasmanian Museum, Reg. No. 4425.).

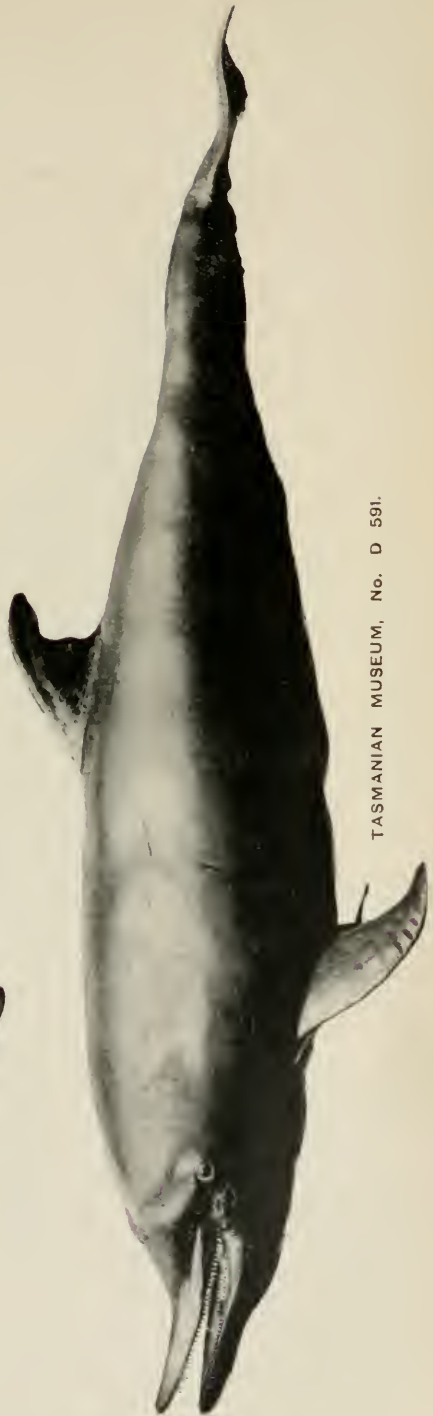


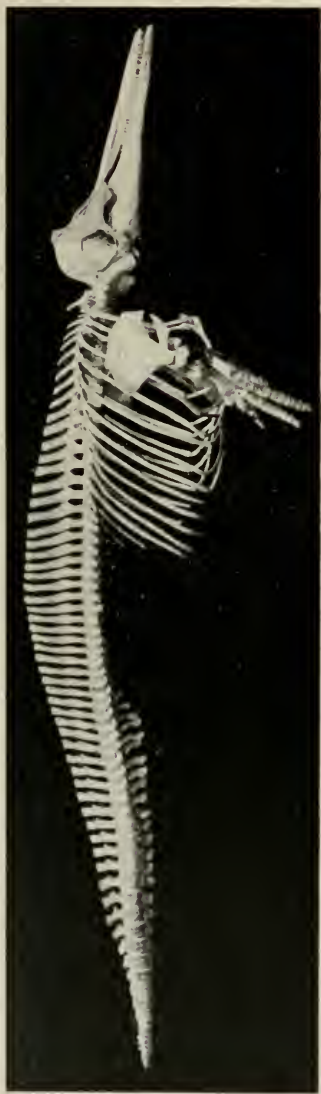
DOLPHINS IN SURF.

No. D. 592.

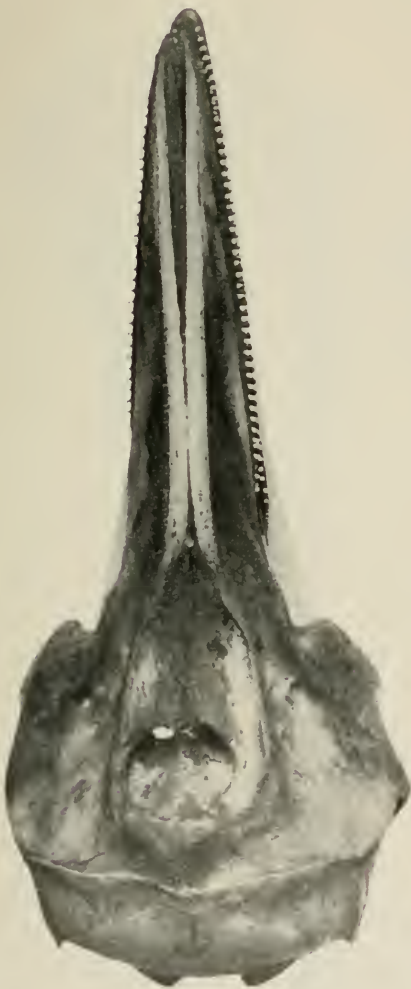


TASMANIAN MUSEUM, No. D 591.

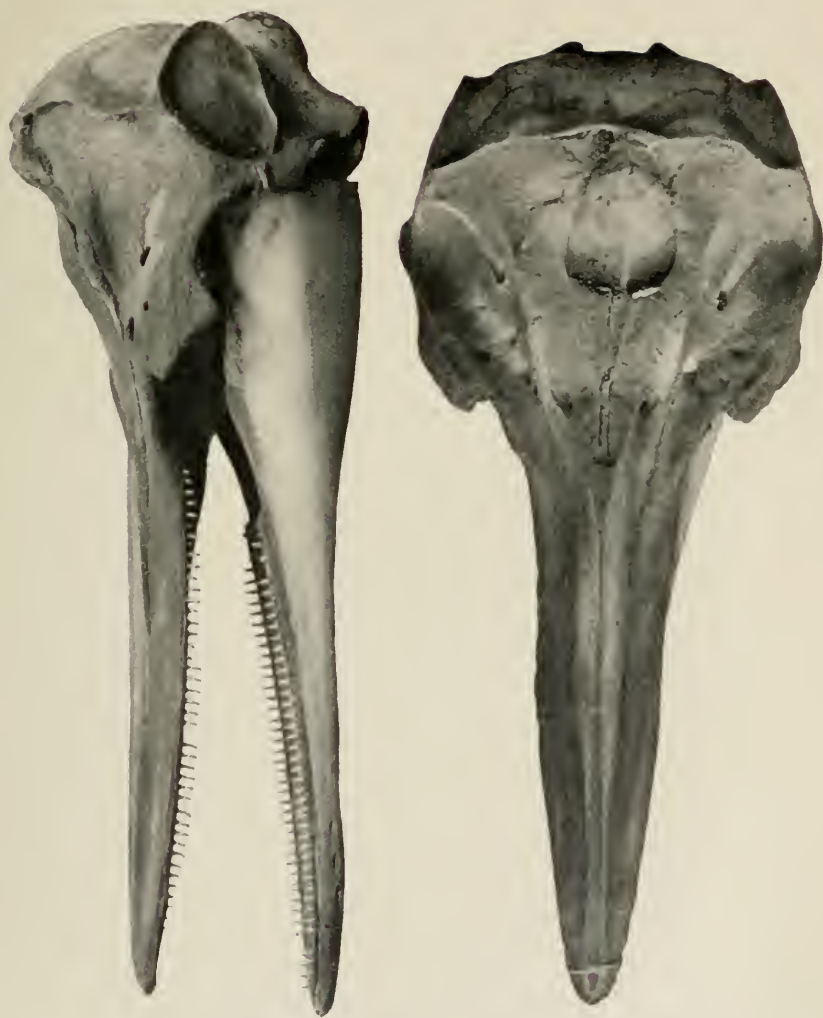




TASMANIAN MUSEUM, No. D. 590.



TASMANIAN MUSEUM, No. 4680.



TASMANIAN MUSEUM, No 4425.