

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

BULLETIN

OF THE

UNITED STATES NATIONAL MUSEUM.

No. 36.

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE CETACEANS,
A REVIEW OF THE FAMILY DELPHINIDÆ.

BY

FREDERICK W. TRUE.

WASHINGTON: .
GOVERNMENT PRINTING OFFICE.
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ADVERTISEMENT.

The present publication (Bulletin No. 36) is the forty-seventh of a series of papers intended to illustrate the collections belonging to the United States, and constituting the National Museum, of which the Smithsonian Institution was placed in charge by the act of Congress of August 10, 1846.

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S. P. LANGLEY,

Secretary of the Smithsonian Institution.

WASHINGTON, *February 25, 1889.*

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE CETACEANS.

A REVIEW

OF THE

FAMILY DELPHINIDÆ.

BY

FREDERICK W. TRUE,

Curator of the Department of Mammals, United States National Museum.

WITH FORTY-SEVEN PLATES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1889.

P R E F A C E .

More than four years ago the writer formed a determination to prepare a monograph of the species of Dolphins which occur on the coasts of North America. It immediately became apparent, however, that a proper comparison of the species described respectively by European and American naturalists could not be made without an examination of the types. A large proportion of the species of the family were established by Gray, whose descriptions are for the most part too brief and vague to serve as the basis of critical comparisons, while the descriptions of some other writers on the subject are almost equally insufficient.

Such being the condition of the literature, I resolved to visit the museums of Europe and to examine all the type specimens to which I could gain access. Professor Baird, the late Director of the Museum, very kindly consented to my being absent during the winter of 1883-'84, and I accordingly spent about four months in England and on the continent of Europe in the study of the specimens in question.

During this visit I became deeply indebted for courtesies shown me by the authorities of the different museums. I wish especially to acknowledge the kind attentions of Prof. William H. Flower, who not only gave me free access to the collections of the Royal College of Surgeons, which were at that time under his charge, but furnished me much valuable information, and, in addition, placed in my hands the proof-sheets of his then unpublished paper on the *Delphinidae*, to which I shall have frequent occasion to refer in the following pages. Acknowledgment is also especially due to Dr. Albert Günther and Oldfield Thomas, esq., of the British Museum; Prof. J. W. Clarke, of Cambridge, and Prof. H. N. Moseley, of Oxford; Dr. George E. Dobson, of Netley; Thomas J. Moore, esq., of the Liverpool Free Public Museum; Thomas Southwell, esq., of the Norwich Museum; Prof. H. Paul Gervais and Prof. Paul Fischer, of the Muséum d'Histoire Naturelle, Paris; Dr. F. A. Jentink, of the Leyden Museum; and Prof. P. J. Van Beneden, of Louvain.

In the course of my investigations I examined and measured the majority of the types of Gray, Cuvier, Gervais, Schlegel, and other English, French, and Dutch naturalists, together with numerous other specimens. Basing my opinions on the results of this study, I shall venture to pass in review the species of the different genera of the family, giving little attention to the genera themselves.

The genera *Orca* and *Orcella* are not touched upon in this paper. The species of the latter genus need no elucidation. In the case of *Orca*, the material which I gathered is scanty, and I abstain from discussing it for fear of adding to, rather than lessening, the confusion in which the genus is involved. Many additional facts must be obtained before even a tolerably satisfactory account of the killers can be written.

In conclusion it is necessary that I should say a few words regarding Professor Flower's paper "On the Characters and Divisions of the Family Delphinidæ" (Proc. Zool. Soc. London, 1883). As I have already stated, the proof-sheets of this valuable essay were very kindly placed in my hands by the author at the outset of my studies, and I have undoubtedly been influenced, to a great extent, by the opinions therein expressed. The grounds covered by this essay and my own, however, are somewhat different. Regarding his work, Professor Flower writes:

It is, however, not so much to specific distinctions that this research has been directed, as to discover the mutual relations of the different modifications of the Dolphin type to one another, and their association into groups which may be considered (following the custom adopted in the arrangement of other groups) of generic value.*

My own work, on the contrary, has been directed not at all toward the distinction of genera, but rather toward the determination of species.

I have accepted the generic divisions employed by Professor Flower for the most part without alteration, as the basis of my work.

* Flower: Proc. Zool. Soc. London, 1883, p. 469.

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INTRODUCTION.

§ 1. REMARKS UPON THE DISTINCTION OF SPECIES AND UPON SUB-FAMILY DIVISIONS.

The writer is fully aware that the time is not yet ripe for a final review of the family *Delphinidae*. The work now accomplished must be regarded as provisional and subject to revision in the future.

Some of the great hindrances to the study of the dolphins—the scarcity of material, the ignorance of the limits of specific variation, and the like—have already been pointed out by Professor Flower, and it is not necessary that I should dwell upon these points. One other difficulty which is encountered by every student of the Cetacea arises from the incompleteness of the descriptions of species. In numerous cases only the external appearance of the species is described (and this from a single individual), the description being accompanied by one or two measurements, such as the total length or the greatest girth. In other instances, equally numerous, species are described from a single skull. It is evident that if this condition of affairs affected the entire family there would be two series of species: First, those founded on external appearance alone; and, second, those founded on osteological characters alone. Such a condition of affairs does, indeed, to a large extent prevail and has proved the cause of much confusion.

A naturalist can, however, scarcely be regarded as deserving censure for having described the skeleton of a species the external appearance of which is unknown to him. If the description is full and accurate it must be accepted, and cetologists must be content to wait patiently until the acquisitions of new specimens make a complete description possible.

Some writers, however, seeking to avoid the difficulty arising from this multiplication of names, have produced confusion in another way. Having come into the possession of fresh specimens, or of skeletons, accompanied by collectors' notes on the external appearance, they have identified the former with species insufficiently described by previous writers from external characters alone, and, without giving figures or measurements of the exterior, have proceeded to describe the skeleton. It is evident that a student approaching the subject at a later date has

only the author's bare statement that the external characters of the individual whose skeleton is described were identical with those of a previously-described species.

In the case of species founded upon single skulls, absolute certainty as to their distinctness can be reached only when large series of individuals known to be alike in their external and skeletal characters shall have been acquired. When such series shall be at command, the limits of specific variation can be determined with accuracy, and it will be possible to judge whether the characters held out as distinguishing the species in question are really of specific value or only represent such variations as are common among individuals of the same species. In the mean time it is only possible in many cases to form opinions which may or may not coincide with the truth.

In this, as in all other families of animals, an arrangement of the genera in a single linear series does violence to their natural affinities, while the attempt to introduce subfamily distinctions, with a view of approximating the arrangement more closely to a natural sequence, is here attended with great difficulties. Dr. Gill* has recognized four subfamilies: *Pontoporiinae*, *Delphinapterinae*, *Delphininae*, and *Globiocephalinae*. The genus *Pontoporia* (= *Pontoporiinae*) I do not regard as belonging to the *Delphinidae*, and shall, therefore, omit all further reference to it. The *Globiocephalinae* (= *Globiocephalus* and *Grampus*) are characterized as having "digits (second and third) segmented into numerous phalanges," and to this are opposed the *Delphinapterinae* and *Delphininae*, which have "digits (second and third) not segmented into more than 5-6 phalanges each." The facts do not appear to warrant this distinction, since *Delphinus delphis* commonly has from seven to nine phalanges in the second digit, and *Tursiops tursio* and other species seven phalanges, which figures also represent the number of phalanges in the second digit of *Grampus*.

The character which Dr. Gill employs for the separation of the *Delphininae* from the *Delphinapterinae* seems to me to be of much greater importance. This relates to the condition of the cervical vertebrae. In *Monodon* and *Delphinapterus* (= *Delphinapterinae*) the cervicals are all distinct, while in the other genera of the family they are more or less consolidated. I should be inclined, therefore, to unite Dr. Gill's *Delphininae* and *Globiocephalinae* under the former name, and to oppose to them the *Delphinapterinae* as a second subfamily. I am the more inclined toward the adoption of this division on account of having discovered a character, which, in addition to that of the separate cervicals, is common to *Monodon* and *Delphinapterus*, but wanting in the other genera. This is that in the narwhal and white whale the pterygoid bones, instead of merely forming the walls of the posterior nares, extend backward in the form of broad plates across the optic canal and articulate with the squamosals.

* Gill. Arrangement of the Families of Mammals, 1872, p. 95.

This arrangement of parts is not to be found in other genera of the *Delphinidae*, but is characteristic of the fluviatile dolphins (*Platanista*, etc.), to which indeed the *Delphinapterineæ* show many marks of affinity. Their separate cervical vertebrae, prolonged pterygoids, broad pectorals, and rudimentary dorsal fin, taken together, entitle them, I believe, to be regarded as a distinct subfamily. Elsewhere in the group I do not perceive that broad divisions are called for. Professor Flower employs provisionally the characters furnished by the shape of the head as a means of dividing the family into two groups. These characters, as Professor Flower himself admits, though useful and seemingly in accordance with natural affinities, within certain limits, are not trenchant.

The characters of the two divisions as regards the form of the head are as follows:*

- a. With rounded head, without distinct rostrum or beak. (Among the genera included here are *Cephalorhynchus* and *Lagenorhynchus*.)
- b. Dolphins with distinctly elongated rostrum, or beak, generally marked off from the antenarial adipose elevation by a V-shaped groove. (Comprises *Delphinus*, *Tursiops*, *Prodelphinus*, *Steno*, and *Sotalia*.)

Leaving *Monodon* and *Delphinapterus* out of consideration, this distinction is valid for the majority of the genera, but is broken down by *Lagenorhynchus* and *Cephalorhynchus*. In the former genus (included in section a) the beak, though shorter than in *Tursiops* (included in section b), is quite distinct and well marked off from the forehead, while in some species of *Cephalorhynchus* the head is certainly not "rounded" in the sense of being globose, but is conical.

The second character of the sections has to do with the length of the rostrum as compared with the total length of the skull. Here again *Lagenorhynchus* and *Cephalorhynchus* appear intermediate. *Cephalorhynchus eutropia* (section a) has the beak relatively as long as *Tursiops tursio* (section b); the same is also true for some species of *Lagenorhynchus*.

In spite of these considerations, however, I have employed these characters in the artificial keys to the genera, given on pages 152 and 153, believing them to be as useful, for that purpose at least, as any which can be formulated at present.

Among the supergeneric distinctions employed by Professor Flower is one which was brought into requisition for the first time and seems to be of value; this relates to the position of the two pterygoid bones. In a number of genera these bones meet in the median line of the palate, while in others they are widely separate. The value of this distinction is, however, diminished by the fact that in some species of *Lagenorhynchus* these bones are in contact, while in others they are widely divergent; also by the fact that the two positions appear to occur in some species, e. g., *Sotalia gadamu*, as an individual variation. Within certain limitation, however, the character is apparently of much value.

* Characters and Divisions, pp. 501 and 511.

§ 2. MEASUREMENTS.

At the beginning of my studies in the European museums I adopted a series of measurements which I applied uniformly to all specimens. It was not long before I perceived, however, that certain of them were of less value than others in the discrimination of species. I include them all in the tables in the hope that they may have value in some other connection.

The measurements are given uniformly in centimeters. The total length of the skull is measured from the center of a line joining the surfaces of the occipital condyles to the extremity of the rostrum. The length of the rostrum is obtained by measuring from the extremity of the same to the center of a line joining the bases of the maxillary notches. The orbital breadth is the distance between the centers (antero-posteriorly) of the margins of the orbits. The temporal fossæ being in most cases elliptical, the measurements of their length and breadth are made along their major and minor axes.

§ 3. ABBREVIATIONS.

There are a number of works upon the *Delphinidæ* to which I shall have need to refer so frequently in the succeeding pages that I have adopted for convenience certain abbreviations of their titles. These works are as follows:

Title.	Abbreviation.
J. E. GRAY. Catalogue of Seals and Whales in the British Museum. 2d ed., London, 8°, 1866.	Catalogue.
J. E. GRAY. Synopsis of the Species of Whales and Dolphins in the Collection of the British Museum. London, 4°, 1868.	Synopsis.
J. E. GRAY. Supplement to the Catalogue of Seals and Whales in the British Museum. London, 8°, 1871.	Supplement.
WM. H. FLOWER. On the Characters and Divisions of the Family <i>Delphinidæ</i> . Proceedings, Zoological Society of London, 1883, pp. 466-513.	Characters and Divisions.
WM. H. FLOWER. List of the Specimens of Cetacea in the Zoological Department of the British Museum. London, 8°, 1885.	List.
SCHLEGEL. Abhandlungen aus dem Gebiete der Zoologie und vergleichenden Anatomie. Leiden, 4°, 1841.	Abhandlungen.
VAN BENEDEN et GERVAIS. Ostéographie des Cétacés vivant et fossiles. Paris, 4°, 1880.	Ostéographie.
P. FISCHER. Cétacés du Sud-Ouest de la France. Actes de la Société Linnéenne de Bordeaux, xxxv, 1881, pp. 5-219, pl. i-viii.	Cétacés de France.

REVIEW OF THE SPECIES OF DOLPHINS.

SUBFAMILY I. DELPHININÆ.

1. SOTALIA Gray.

Sotalia, Gray, Cat. Seals and Whales, Brit. Mus., 2d ed., 1866, p. 401; Synopsis, 1868, p. 6; Supplement, 1871, p. 67.

The type of this genus is the *Delphinus guianensis* of Van Beneden.

Of the characters assigned to the genus by Gray (l. c.) and by Professor Flower (Characters and Divisions, p. 513) only three seem to me of real value as distinguishing it from *Tursiops* and *Steno*. These are (1) the separation of the pterygoids; (2) the more limited number of the caudal vertebræ; and (3) the greater number of teeth. The somewhat unusual breadth of the base of the pectoral fin is shared by *Steno*. The unusual length of the symphysis of the mandible which has also been cited as a generic character seems to me of little value, since it is not shared by all the species. Although in *S. plumbeus*, *lentiginosus*, and *sinensis* the symphysis occupies about one-third of the ramus of the mandible, in *S. tucuxi* and *gadamu* it occupies only about one-fifth.

The genus, as already intimated, is very closely related to *Steno* and *Tursiops*, both in its external form and its osteology. It shows some relationship, however, to *Platanista*, *Inia*, and *Pontoporia* in the comparatively small number of its vertebræ and the length of their centra.

It will be necessary for me to treat of the species with much reserve since I did not have the opportunity of examining carefully all the types and must therefore base my opinions partly upon the descriptions and drawings which have hitherto been published.

SOTALIA GADAMU (Owen).

Delphinus (Steno) gadamu, Owen, Trans. Zool. Soc. London, VI, 1866, p. 17, pl. III, figs. 1-2.

Sotalia gadamu Flower, Proc. Zool. Soc. London, 1883, pp. 489 and 513.

This species is the first treated of in Sir Richard Owen's memoir upon the Indian cetacea. His material consisted of drawings and a defective skull (1477b) which is now in the British Museum. The mandible which

bears the same number as this cranium (1477*b*) and was figured as belonging with the latter (Trans. Zool. Soc., VI, pl. 4), in reality belongs to a second and perfect cranium (1477*a*), which, although not mentioned by Sir Richard Owen, was apparently received with the type. This last-mentioned skull is wrongly labeled "No. 423. Type." A third skull (82: 1, 2, 3) is also in the collection. In the Cambridge Zoological Museum there is a fourth skull (573*a*) derived, according to the label, from Wollongong.

These four specimens agree well together; the Cambridge skull alone presents any important differences. The differences observable in this case relate to the comparative breadth of the skull and are very probably sexual. The pterygoids in specimens 1477*b* (type) and 1477*a* differ considerably in shape, but such variations are of frequent occurrence, and here at least, in my judgment, are not to be regarded as of specific value.

There are in the British Museum two stuffed skins of this species which though smaller than Sir Richard Owen's specimen agree well with it in proportions, except so far as regards the length of the pectoral fins. The following measurements taken from these skins are in right lines, except the distance from the extremity of the snout to the dorsal fin, in measuring which the curve of the back was followed:

Measurements of two mounted skins of Sotalia gadamu.

Measurement.	British Museum.	
	No. 82: 1, 2, 3.	No. 83: 11, 20, 3.
	<i>Inches.</i>	<i>Inches.</i>
Total length	63.0	62.75
Tip of beak to corner of mouth	8.15	9.75
Tip of beak to eye	9.6	10.5
Tip of beak to elevation of head	3.95	4.0
Tip of beak to blowhole	10.30	10.75
Tip of beak to anterior base of pectoral fin	15.0	16.25
Tip of beak to anterior base of dorsal fin	28.0	27.8
Length of base of dorsal fin	9.0	19.0
Height of dorsal fin (vertical)	5.5	5.7
Length of pectoral fin (from anterior base)	10.75	.....
Breadth of flukes (tip to tip)	16.75	12.4
Greatest breadth of pectoral fin	4.0	3.65
Teeth (about) .....	.....	28-28
		28-28

S. gadamu does not appear to be very closely related to the other species of the genus. The differences which separate it from *S. lentiginosus* will be considered in the section devoted to that species (p. 16). From *S. sinensis* and the South American species it differs widely as regards size of beak, number of teeth, etc., and the skeleton, when known, will probably show that similar differences extend to other parts of the body.

The skull shows decided affinities to *Tursiops*, from some species of which, were the pterygoids united, it would be very difficult to distinguish it.

Measurements of three skulls of Sotalia gadamu.

Catalogue number.	Collection.				Locality.				Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillae at middle of beak.	Greatest breadth between outer margins of intermaxillae proximally.
												At base of maxillary notches.	At its middle.		
1477a	Brit. Museum				India				♀	Cm. 147.7	Cm. 128.7	Cm. 10.6	Cm. 5.2	Cm. 2.0	Cm. 8.0
82. (1, 2, 3)	do				Kurrache Mus.					Cm. 43.2	Cm. 25.3	Cm. 9.3	Cm. 5.0	Cm. 2.7	Cm. 7.6
573a	Cambridge Museum				Wollongong					Cm. 43.0	Cm. 25.4	Cm. 10.5	Cm. 5.8	Cm. 3.2	Cm. 7.6

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossae.	Length.	Depth.						
1477a	Cm.	Cm. 6.7	Cm. 32.8	Cm. 33.8	Cm. 18.5	Cm. 13.7	Cm. 10.2	Cm. 7.0	Cm.	Cm.	Cm.	Cm.	Cm.	26+25+ 4-?
82. (1, 2, 3)	20.7	5.1	29.0	29.8	17.2	14.5	8.8	6.3	35.4	*5.8	20.3	7.1	6	25-? 25-25
573a	20.4	.....	28.4	29.8	19.0	15.6	9.0	7.2	36.2	*5.6	.....	.....	.....	20-25 25-25

* This is the length of the symphysis proper; the length of the rugose area is about 11.7 cm.

SOTALIA LENTIGINOSA (Owen).

Delphinus (Steno) lentiginosus, Owen, Trans. Zool. Soc. London, VI, 1866, p. 20, pl. v, figs. 2 and 3.

Sotalia lentiginosus, Flower, Proc. Zool. Soc. London, 1883, p. 489 and 513.

The only specimens of this species which I found in the European collections are the type skull (1476a) with its mandible (1477a) and a second broken mandible (1476a), all of which are in the British Museum.

Sir Richard Owen showed his recognition of the true affinities of the species by placing it in Gray's genus *Steno*, which, at the time he wrote, included both species with united pterygoids and those with separate pterygoids. He very properly separated the present species from *S. gadamu*, in consideration of the difference in the relative length of the beak, the number of teeth, and some other characters of the skull, apparently of less moment. Professor Flower, however, seems to doubt the distinctness of the two species. He writes:

D. lentiginosus, Owen, from the same locality [as *S. gadamu*], described in the same memoir, is a closely allied species, if distinct. (*List*, p. 489.)

The doubt expressed in the last clause of this sentence I do not share. In addition to the differences pointed out by Sir Richard Owen, viz., the

existence in *S. lentiginosa* of (1) a relatively longer beak, (2) flatter intermaxillæ (3) a longer tooth-row, and (4) more numerous teeth, I find (5) that the symphysis of the mandible is longer than in *S. gadamu*, (6) the temporal fossæ are larger, (7) the pterygoids are longer, and (8) the interorbital breadth less (see table of measurements below). The whole relative arrangement of the bones of the inferior surface of the skull differs in the two species.

In regard to external appearance, if the figures published by Sir Richard Owen are to be relied upon, the two species, *S. lentiginosa* and *S. gadamu*, are very different (T. Z. S., VI, 1866, pl. 3 (*S. gadamu*), pl. 5, figs. 2, 3 (*S. lentiginosa*)). In addition to the difference in color and style of marking, the proportions of the pectoral fin, as presented both by the measurements and in the plates, are such as would alone suffice for the separation of the two species. The length of this member in *S. gadamu* is fully 22 per cent. of the entire length of the animal, while in *S. lentiginosa* the former length is less than 13 per cent. of the latter. Differences of almost equal magnitude exist in the proportions and relative positions of other members of the body. The value of these distinctions, however, would be greatly enhanced if we could be sure that the measurements were derived from the specimens themselves and not from the drawings. Unfortunately the intimation derived from the first paragraph of Sir Richard Owen's paper is that they were derived from the drawings. Even should such prove to be the case, the differences in the skulls remain, and these alone, in my estimation, are sufficient to warrant the separation of the species.

Measurements of the type skull of Sotalia lentiginosa.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.	
							At base of maxillary notches.	At its middle.			
1476a	Brit. Museum.	<i>D. lentiginosus</i> ..	Vizagapatam.	?	Cm. 47.0	Cm. 28.2	Cm. 10.2	Cm. 4.7	Cm. 3.2	Cm. 7.6	
Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to— Anterior margin of superior nares. End of crest of pterygoid.	Breadth between— Orbits. Inner margins of temporal fossæ.	Temporal fossæ. Length. Depth.	Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
1476a	Cm. 25.3	Cm. 3.8	Cm. 31.7 Cm. 34.9	Cm. 17.4 Cm. 14.7	Cm. 10.2 Cm. 8.0	Cm. 39.9	Cm. 12.1	Cm. 23.9	Cm. 7.9	Cm. 0.43	Cm. 34-34 33-34

*This is the extent of the rugose area; the real symphysis is about 5.3 cm.

SOTALIA GUIANENSIS (Van Beneden).

Delphinus guianensis, Van Ben., Mém. Couron. Acad. Royale Belg., coll. in 8°, XVI, 1864, art. 2, 1 pl.

Sotalia guianensis, Gray, Cat. Seals and Whales, Brit. Mus., 1866, p. 401.

SOTALIA BRASILIENSIS E. Van Beneden.

Sotalia brasiliensis, E. Van Ben., Mém. Acad. Royale Belg., XLI, 1875, art. 1, pls. 1 and 2.

SOTALIA PALLIDA (Gervais).

Delphinus pallidus, Gervais, Castelnau Expéd. dans l'Amér. Sud, pt. VII, Zoologie, 1855, p. 94, pl. XIX, figs. 1-2.

Sotalia pallida, Van Ben. and Gervais, Ostéog. des Cétacés, 1880, p. 595.

SOTALIA TUCUXI (Gray).

Steno tucuxi, Gray, Ann. and Mag. Nat. Hist., 2d ser., XVIII, 1856, p. 158.

Sotalia tucuxi, Flower, Proc. Zool. Soc. London, 1883, p. 513.

SOTALIA FLUVIATILIS (Gervais).

Delphinus fluvialtilis, Gervais, Bull. Soc. d'Agric. Héroult, XL, 1853, p. 148 (*sine descr.*).

Sotalia fluvialtilis, Van Ben. and Gervais, Ostéog. des Cétacés, 1880, p. 596.

Of these five nominal species, one, *S. guianensis*, is from Cayenne; three from the Amazon River, *S. pallida*, *tucuxi*, and *fluvialtilis*; and one, *S. brasiliensis*, from the bay of Rio de Janeiro. At least two skeletons of *S. guianensis* are to be found in the European collections and one of *S. brasiliensis*. The latter, however, is that of so young an animal as to make comparisons of little value. The description of *S. tucuxi* was drawn from two skulls in the British Museum. A skull of *S. fluvialtilis* is said to be in the Paris Museum,* but is not figured by Van Beneden and Gervais in the Ostéographie.† These authors, however, figure and describe portions of a skeleton of *S. pallida*, also said to be in the Paris Museum.

Professor Flower justly remarks that the materials are not at present sufficient for the proper determination of these species. Nevertheless, several opinions have been advanced regarding them. M. Ed. Van Beneden has brought forward characters which he views as distinguishing *S. brasiliensis* from *S. guianensis*. The authors of the Ostéographie apparently held the same view, and at the same time united *S. fluvialtilis* to *S. pallida*. Gray believed that *S. tucuxi* might also be identical with *S. pallida*, while Professor Flower finds it difficult to distinguish between these two species and *S. brasiliensis*.

It is only between *S. guianensis* and *S. brasiliensis* that comparisons of any moment have been made, and the value of these is unfortunately

* Mém. Acad. Belg., XLI, 1875, art. 1, p. 4.

† The references to the figures of *Sotalia* in this work are very confusing. The legend of plate XLI is as follows: "1-5, *S. guyanensis*. 6-17, *S. pallida*." In the "explication des planches," however, all the figures on this plate are placed under the heading of *S. guyanensis*, while in the text (p. 593) fig. 7 is referred to as *S. fluvialtilis*.

diminished by the fact that the specimen of *S. brasiliensis* is very young. The characters drawn out by M. Ed. Van Beneden are as follows:

Characters.	<i>S. guianensis</i> .	<i>S. brasiliensis</i> .
1. Size.....	greater.	smaller.
2. Number of vertebrae.....	55	54
3. Number of ribs (pairs).....	12	11
4. Number of sternal ribs (pairs).....	7	6
5. Number of pieces in sternum.....	3	{1 (of bone); 1 (of cartilage).
6. Number of teeth.....	{ 32 — 29	{ 34 — 33
7. Ear-bones.....	smaller.	{larger and peculiar.

On account of the immature condition of the specimen of *S. brasiliensis*, characters 1 and 5 are manifestly of little importance. The differences represented in characters 2, 3, and 6 are within the range of individual variation, as has been abundantly proved by the examination of various species. Characters 4 and 7, therefore—the number of sternal ribs and the size and form of the ear-bones—alone constitute recognizable distinctions between the two species. Of these two characters, the first is quite likely to be merely an individual difference; but the second can not of course be so considered.

Between *S. fluviatilis* and *S. pallida* the following distinctions are made:

Color—

S. fluviatilis: Body black above, rose-pink below; pectorals colored like the back.

S. pallida: Body fulvous above, white below; pectorals not colored like the back.

Pectoral fins—

S. fluviatilis: Quite large and pointed.

S. pallida: Smaller, less pointed, and narrower at the base.

Dorsal fin—

S. fluviatilis: Two-thirds as high as long.

S. pallida: Less high.

These distinctions are unsatisfactory, but can not be set aside without reason.

Between the five species we have but two points of comparison, the color of the body and the number of teeth. The data given by the different original describers are as follows:

S. brasiliensis—

Color: Back blackish, sides fulvous, belly white; pectoral like the back.

Teeth: $\frac{33}{34}$. (E. Van Beneden.)

S. guianensis—

Teeth: $\frac{29}{30}$. (E. Van Beneden.)

S. tucuxi—

Color: Darkish black or fuscous. Teeth: $\frac{30}{30}$. (Gray.)

S. fluviatilis—

Color: Above black, beneath rose-color; pectorals like the back. (Gervais.)

S. pallida—

Color: Above fulvous, beneath white; pectorals like the belly. Teeth: $\frac{33}{34}$. (Gervais.)

Besides the original descriptions of the different species, we have Natterer's account of a specimen of river-dolphin harpooned at the mouth of the Rio Negro.* The specimen, which was a male, is represented as having been ashy-gray above and violet-gray below, with fins colored like the back. In coloration, therefore, it agreed tolerably well with *S. fluviatilis*. Natterer gives a number of measurements, but we have only the measurements of *S. brasiliensis* with which to compare them. From these it appears that the latter species has shorter pectoral fins, higher dorsal fin, and narrower flukes than had Natterer's specimen.

These differences give some strength to the opinion that the marine species, *S. brasiliensis* and *S. guianensis*, are distinct from the fresh-water species.

Von Pelzeln is inclined to support Gray's opinion that all the nominal river species are identical. He states, however, that Bates mentions *S. pallida* as occurring in the lower Amazon, which does not appear to be a fact. Bates's words are as follows:

In the upper Amazons a third pale, flesh-colored species is also abundant (the *Delphinus pallidus* of Gervais).†

The species which he found at the mouth of the Tocantins River is the "*Steno tucuxi* of Gray."

In this unsatisfactory condition our knowledge is, unfortunately, likely to remain, until more material has been collected. The skeletons of a number of adult individuals, and observations upon the variation of the color and of the proportions of the pectoral and dorsal fins among members of the same school, are requisite to solve the problems which these five nominal species present.

Skulls Nos. 1189*a*, ♂, and 1189*b*, ♀ in the British Museum, the types of *S. tucuxi* are those of young animals, as is indicated by the exposure of a considerable portion of the frontal behind the maxilla and the distinctness of the occipito-parietal suture. The intermaxillæ are short proximally, and the maxillæ are visible on the anterior and lateral margins of the anterior nares. The ridge of the mesethmoid is higher than the triangular prenarial area in its middle part, and is thickened, forming a transverse ridge. The intermaxillæ are broadest and quite flat near the middle of the rostrum. The prenarial triangle is concave. The nasals are small in the male, and present only a thick upper edge.

The inner margins of the pterygoids in this specimen are separated at the extremity by an interval of about 23^{mm} and at the base are about 5^{mm} apart. The outline of these bones in the two sexes is somewhat different. The intermaxillæ and vomer appear in the median of the palate anteriorly in No. 1189 *a* for a distance of about 116^{mm}. The crowns of the teeth are tinged with brown, the roots are open. The ramus of the mandible is flat internally.

A skull recently purchased by the National Museum agrees very

* Brasilische Säugethiere. Resultate von Johann Natterer's Reisen in den Jahren 1817 bis 1835. Dargestellt von August von Pelzeln. Wien, 1833. Pp. 95-96.

† Bates, Naturalist on the Amazons, 1864, p. 83.

closely with these, but is larger, and evidently belonged to an older individual. The beak is relatively longer. I regard it identical with *S. tucuxi*, and have included it in the table of measurements under that name. It is said to have come from Florida, but the evidence is not entirely satisfactory. This skull also agrees well in proportions and details of structure with that figured by Van Beneden and Gervais under the name of *S. pallida* (Ostéographie, pl. XLI, fig. 6).

Van Beneden's measurements of the exterior and skull of his *S. brasiliensis* are appended for convenience of reference:

Measurements of Sotalia brasiliensis.

Exterior:	Metres.
Total length	1. 21
Extremity of beak to eye	0. 18
Eye to base of pectoral	0. 14
Length of the base of the pectoral at its insertion	0. 06
Pectoral to extremity of spinal column	0. 82
Extremity of beak to base of pectoral	0. 30
Vertical height of body in front of the dorsal	0. 23
Greatest height of the tail	0. 12
Length of the pectoral	0. 155
Height of the dorsal	0. 11
Total breadth of the flukes	0. 32
Skull:	
Total length	0. 305
Length of beak	0. 165
Antero-posterior diameter of cranial cavity	0. 100
Breadth of skull between temporal fossæ	0. 130
Breadth at the zygomatic apophyses of temporal	0. 136
Height of skull between the crest and the basion	0. 110
Breadth of beak at last tooth	0. 052
Height at same point	0. 022
Height of foramen magnum	0. 042
Greatest breadth of same	0. 035
Breadth of one of the occipital condyles	0. 022
Greatest diameter of condyle	0. 038

For *S. fluviatilis*, Gervais gives only the following measurements:

	Metres.
Total length of body*	1. 108
Greatest girth	0. 70
Skull:	
Length of beak	0. 20
Breadth of enlarged part preceding the beak	0. 14
Length of mandible	0. 270
Length of tooth row of same	0. 165
Length of the symphysis	0. 050

For *S. pallida* his measurements are as follows:

	M.
Length of body	1. 65
Greatest girth	0. 98
Skull:	
Total length	0. 34
Enlarged part preceding the base of the beak	0. 12

* Weight, 37.5 kilograms.

Measurements of three skulls of *Sotalia tucuxi*.

Catalogue number.	Collection.	Type of—	Locality.	Sex.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillary at middle of beak.	Greatest breadth between outer margins of intermaxillary proximally.
							At base of maxillary notches.	At its middle.		
1189 ^a	Brit. Mus. *.....	<i>Steno tucuxi</i> ..	Amazon River.	♂	Cm. 30.9	Cm. 17.1	Cm. 6.3	Cm. 4.5	Cm. 12.0	Cm. 5.3
1189 ^b	do. *.....	do	do	♂	Cm. 29.2	Cm. 16.5	Cm. 5.8	Cm. 3.0	Cm. 12.0	Cm. 4.3
21499	U. S. Nat. Mus.	do	Florida (?)	♂	Cm. 35.3	Cm. 20.2	Cm. 7.1	Cm. 4.1	Cm. 12.4	Cm. 5.5

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extent of beak to—		Breadth between—		Temporal fossae—		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Inner margins at temporal fossae.	Length.	Depth.						
1189 ^a	Cm. 14.5	Cm. 3.5	Cm. 20.3	Cm. 21.1	Cm. 11.6	Cm. 10.6	Cm. 7.1	Cm. 5.2	Cm. 23.6	Cm. 4.7	Cm. 13.9	Cm. 5.1	0.38	{ 28—29 30—30
1188 ^b	Cm. 14.2	Cm. 3.2	Cm. 19.3	Cm. 20.1	Cm. 10.6	Cm. 10.2	Cm. 6.3	Cm. 5.3	.....	.....	.....	.....	.....	{ 31—33 32—30
21499	Cm. 18.3	Cm. 3.5	Cm. 24.4	Cm. 25.2	Cm. 12.9	Cm. 11.1	Cm. 7.4	Cm. 6.1	Cm. 29.7	Cm. 6.3	.....	Cm. 6.3	.....	{ 31—33 32—30

* Collected by Bates.

† The maxillæ have sprung apart.

SOTALIA PLUMBEA (Cuvier).

Delphinus plumbeus, Cuvier, Règne Animal, 2d ed., 1, 1829, p. 283; Pucheran, Rev. et Mag. de Zool., 2d ser., VIII, 1856, pp. 145, 315, 362, 449.

Sotalia plumbeus, Flower, Proc. Zool. Soc. London, 1883, p. 513.

Steno plumbeus auct.

In the elaborate critique upon the relationships of this species published by Pucheran in 1856, the evidence upon which it was united to *D. malayanus*, Lesson, *D. dubius*, Cuvier, and other species, was very carefully sifted and the conclusion arrived at that it must be considered distinct and valid.

In its proportions and general appearance the type skull (a3053) resembles that of *S. lentiginosa*, but the differences are such that it can not be united with that form, at least upon the basis of the present scanty material. "*Delphinus plumbeus*, Dussumier," writes Professor Flower, "represents the longest and narrowest form of this type, with the most numerous teeth." (Characters and Divisions, p. 489). The beak is longer and more compressed than in *S. lentiginosa*, and the braincase is decidedly narrower.

So far as external appearances are concerned there are apparently few points of resemblance between the two species. The depression and great extent of the dorsal fin, so strongly insisted upon by Pucheran as a character of *S. plumbea*, is not shared by *S. lentiginosa*, and the measurements do not agree. The color of the body of *S. plumbea* is described by F. Cuvier as being of "une teinte uniforme d'un gris plombé, excepté l'extrémité et le dessous de la mâchoire inférieure, qui sont blanchâtres."* The color of *S. lentiginosa*, according to Professor Owen, is "pretty uniformly bluish cinereous, or slaty, freckled with irregular small spots or streaks of brown or plumbeous pigment, the streaks longitudinal and flecked with white; the under surface is a shade lighter than the rest of the body."†

I think we may look upon the two species as distinct, and do not fear that future evidence will invalidate this conclusion.

Table of measurements of the type-skull of *Sotalia plumbea*.

Catalogue number.	Collection.	Type of—	Locality.	Age.	Total length.	Length of beak.		Breadth of beak—		Breadth of intermaxilla at middle of beak.	Greatest breadth between outer margins of intermaxillae proximally.			
						At base of maxillary notches.	At its middle.							
a3053	Mus. d'Hist. nat.‡	<i>S. plumbea</i> . . .	Malabar . . .	Ad.	Cm. 55.9	Cm. 34.9	Cm. 11.2	Cm. 4.3	Cm. 2.8	Cm. 8.4				
Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.	Length of mandible.	Length of symphysis mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Breadth of anterior nares.	Number of teeth.
a3053	Cm. 31.0	Cm. 5.1	Cm. 40.0	Cm. 41.9	Cm. 19.2	Cm. 13.5	Cm. 11.2	Cm. 8.6	Cm. 47.0	Cm. 15.0	.....	Cm. 8.7	Cm. 5.3	{ 37-37 34-33

* Mammifères de la Ménagerie du Muséum, 60° livraison. (Fide Pucheran.)

† Trans. Zool. Soc., London, vi, 1866, p. 20.

‡ Collected by Dussumier, 1837.

SOTALIA SINENSIS Flower.

Delphinus chinensis, Osbeck, Voyage to China in 1751, p. 12 (without description): Desmarest, Encycl. méthod. ("Mammalogie"), 1822, p. 514. (From Osbeck without description.)

Delphinus sinensis, F. Cuvier, Hist. nat. des Cétacés, 1836, p. 213. (From Osbeck without description.)

Delphinus sinensis, Flower, Trans. Zool. Soc. London, VII, 1870, p. 151.

Sotalia sinensis, Flower, Proc. Zool. Soc. London, 1883, p. 513.

This species, which from the time it was originally observed by Osbeck in 1751, stood among the forms *incertæ sedis*, was formally described by Professor Flower, in 1870, on the basis of two skeletons collected by Mr. Swinhoe in the harbor of Amoy. Although, through the kindness of Professor Flower, I was enabled to examine the types of the species, I can add nothing to his concise and sufficient account, and will simply quote the paragraphs in which the distinctive characters are set forth:

The principal differences between this skeleton and that of all other Dolphins lie in the vertebral column. The total number of vertebrae is less [viz: C. 7 D. 12, L. 10; Ca. 22=51], the individual vertebrae are proportionally longer, and their transverse processes are shorter and broader than in any other species. Next to it in these characters stands *D. guianensis* (genus *Sotalia*, Gray), which has the following vertebral formula: C. 7, D. 12, L. 14, C. 22=55; then *D. tursio*, which has C. 7, D. 13, L. 17, C. 25=62.* 'The live animal is of a milky white, with pinkish fins and black eyes.† The numbers of the teeth of the adult specimen of *D. sinensis*, as indicated by the alveoli, are $\frac{33-32}{32-31}$, total 128.‡

The localities in which the species is known or believed to occur are the harbor of Amoy, Canton River, and Foochow River.

A good figure of the exterior and measurements are still desiderata. Measurements of the skull are given in the synopsis.

2. STENO Gray.

< *Steno*, Gray, Zoology Erebus and Terror, 1846, p. 43; Cat. Cetacea Brit. Mus., 1850, p. 127; P. Z. S. London, 1864, p. 236; Cat. Seals and Whales Brit. Mus., 1866, p. 232; Supplement, 1871, p. 65; Van Beneden & Gervais, Ostéographie des Cétacés, 1880, p. 592.

> *Glyphidelphis*, Gervais, Zool. et Paleont. Franç., 1859, p. 301.

= *Steno*, Flower, Proc. Zool. Soc. London, 1883, p. 513.

Only three characters of importance have been brought forward as distinguishing this genus from its nearest ally, *Tursiops*. These relate to the (1) compression of the beak, (2) the elongation of the symphysis of the mandible, and (3) the rugosity of the teeth. The first two of these characters impress upon the mandible a peculiar form, which is widely different from that existing in *Tursiops*. The rami are concave

* Trans. Zool. Soc., London, VII, 1870, p. 159. The number of vertebrae in the genera *Monodon* and *Delphinapterus*, which is only 50, is not taken into consideration by Professor Flower in this connection. † Loc. cit., p. 152. ‡ Loc. cit., 155.

onward, and as the symphysis is not keeled the terminal portion of the mandible has the least depth, which is not the case in *Tursiops*. In the last-named genus the beak is depressed, while in *Steno* it is compressed. The teeth are equally numerous in the two genera, but in *Steno* the crown is rugose. As regards the vertebræ, the number in four regions of the body is practically alike in both genera, but, according to the measurements given by Dr. Peters for *S. perspicillatus*, the combined length of cervical vertebræ would appear to be considerably greater in *Steno* than in *Tursiops*.

From *Sotalia* the present genus is distinguished by its conjoined pterygoids and its less numerous and rugose teeth.

STENO ROSTRATUS (Desmarest).

Delphinus rostratus, Cuvier, Desmarest, Nouv. Dict. d'Hist. nat., IX, 1817, p. 160; Mammalogie, 1822, p. 515.

Delphinus rostratus, Shaw (?), Cuvier, Ann. du Muséum, XIX, 1812, p. 10.

Delphinus frontatus (pars), Cuvier, Oss. foss., 2d ed., v, 1823, p. 278. (Fide Flower.)

Delphinus rostratus, G. Cuvier, Règne Animal, 2 ed., I, 1829, p. 289; F. Cuv., in Oss. foss., 4th ed., 1836, p. 86, 121; Hist. nat. des Cétacés, 1836, p. 156.

Delphinus bredanensis, Cuv., Lesson, Hist. Nat. des Mammif. et Oiseaux découverts depuis 1788, 1828, p. 206; Van Breda, Nieuwe Verhandl. Nederl. Inst., II, 1829, pp. 235-237, pls. 1, 2.

Delphinorhynchus bredanensis, Lesson, Hist. Nat. des Mammif. et Oiseaux découverts depuis 1788, 1828, p. 441 (table méthod.).

Steno rostratus and *S. frontatus*, Gray, Zool. Erebus and Terror, 1846, p. 43.

Steno frontatus, Gray, Synop. Whales and Dolphins, 1868, p. 5.

Glyphidelphis rostratus, Gervais, Zool. and Paleon. Franç., 1859, p. 301; Ostéog. des Cétacés, 1880, p. 594, pl. xxxvii, figs. 8-11.

Delphinus planiceps, Schlegel, Abhandl. aus d. Geb. Zoologie, heft I, 1841, p. 27 (not Van Breda).

Steno compressus, Gray, Zool. Erebus and Terror, 1846, p. 43, pl. 27.

Delphinus Reinwardtii, Schlegel, Abhandl. Geb. Zool., heft I, 1841, p. 27, pl. 3, figs. 2, 3.

Delphinus Pernettyi, Desmarest, Mammalogie, 1822, p. 513.

The peculiar synonymy of this species has received thorough treatment at the hands of Professor Flower (Charac. and Div., p. 482 *et seq.*), to whose account I can add but little. He has, however, fallen into the same error as Schlegel in accrediting the name *D. planiceps* to Van Breda. The latter writer used the name of *D. bredanensis* for the species, which name, according to his own account, he took from Lesson's *Histoire naturelle des Mammifères découverts depuis 1788*.

Desmarest credits the name *D. rostratus* to G. Cuvier, but incorrectly it appears, for Cuvier simply states that his specimens belong possibly to Shaw's *Delphinus rostratus*. It appears to me, therefore, that Desmarest's name should be appended to the name of the species instead of Cuvier's.

Van Breda appears to have published his account of the species, under the name of *D. bredanensis*, before Cuvier had recognized that

the stuffed skins which had been associated with the skulls in the Paris Museum did not belong to the same species. When Cuvier recognized the latter fact he at the same time arrived at the conclusion that Van Breda's specimen was specifically identical with the skulls in the Paris Museum. He also received from Brest a figure of a specimen which seemed to him identical with Van Breda's (*Oss. foss.*, 4th ed., VIII, pt. 2, p. 122, note). Van Breda's figure and the figure of the Brest specimen (copied by F. Cuvier), therefore, represent the exterior of the species under discussion according to Cuvier's best knowledge and belief.

In accepting his opinion, however, we meet at once with a serious difficulty. The figures referred to represent a dolphin having the beak confluent with the forehead, a point strongly insisted upon by G. Cuvier and again by F. Cuvier. But in 1876 Peters described a specimen of *Steno* the skull of which is, generically at least, identical with the skulls in the Paris Museum, but which has the beak distinctly marked off from the forehead as in the species of *Tursiops* and *Delphinus*. We have, therefore, either to consider the figures known to Cuvier incorrect, or to regard Peters' specimen as belonging to a distinct subgenus. From this dilemma nothing thus far known can save us. The figures in question are crude, but it seems scarcely probable that both would have the same defect as regards the beak. Regarding the *Steno perspicillatus* of Peters, Professor Flower says:

If it is not specifically identical with, it is certainly very closely allied to *Steno rostratus*. (*Characters and Divisions*, p. 486.)

I examined the type-skull in 1887, through the kindness of Dr. Hilgendorf, and was unable to see wherein it differed from the ordinary *S. rostratus*. The rostrum, as indicated in Peters' figure, is rather abruptly and unsymmetrically terminated, as though the tip had been cut off. Such, however, does not appear to have been the case, and it is possible that the individual was injured by accident during life. This condition of the rostrum makes it appear that its proportional width at the middle is unusually great; according to my measurements it is 19.8 per cent. of the length. But with the explanation given I do not think that this is to be regarded as of importance. The teeth are rugose, as in ordinary specimens of *S. rostratus*; they number $\frac{24-23}{22-21}$. The premaxilla are high, thick, and rounded.

In external form and coloration there is a close resemblance to *Tursiops tursio*, except that a dark eye-ring and forehead-line are present, as in *D. delphis*. The cervical region is longer than in *Tursiops*, but the number of vertebrae is nearly the same in both.

The facts being such as they are, it has seemed to me best to hold Peters' specimen apart, under the name of *Steno perspicillatus*, and I have, therefore, entered that species separately in the synopsis. For further remarks on the figures known to Cuvier, see p. 27.

In Cuvier's original description (*Ann. du Muséum*, XIX, 1812, p. 9) no single skull is mentioned, and the species, therefore, has no type. The description, however, and the figure afterwards published in the *Osséments fossiles*, would suffice for the recognition of the species were it not that others were subsequently erected on skulls closely resembling that figured by Cuvier.

The characters which have been insisted upon as separating the different species relate to the width of the beak and the number of teeth. In the first of these characters, as Professor Flower has already intimated, there is a complete gradation. The following table shows the gradation in twenty-six specimens in European museums, including the type of *S. compressus* and probably also of *S. reinwardtii*:

Comparison of the length of the beak in S. compressus, etc., taken at 100 per cent., with its width at the middle.

Collection.	Number.	Identification.	Proportional width of beak at middle.	Length of skull.	Greatest number of teeth—	
					Upper jaw.	Lower jaw.
			<i>Per cent.</i>	<i>Inches.</i>		
1. Leiden	24	Reinwardtii (?Type).	11.5	20.47	25	25
2. Liverpool	7, 7, 66, 31 .....	.....	12.0	21.0	24	24
3. Paris	a 3047	Rostratus	12.2	19.5	22	22
4. London (B. M.)	346 b	Compressus	12.6	20.5	22	24
5. London (B. M.)	346 a	Compressus (Type).	12.9	20.125	25	27
6. Liverpool	24, 2, 63 .....	.....	13.2	21.25	25	24
7. Leiden	26	Planiceps	13.3	19.92	24	25
8. Oxford	X ⁹ (juv.)	Rostratus	13.5	19.4	23	24
9. Oxford	1668	Rostratus	14.3	20.2	24	25
10. Liverpool	19, 11, 62 .....	.....	14.3	21.4	22	23
11. Liverpool	13, 11, 68, 1 .....	.....	14.5	20.25	23	24
12. Liverpool	a .....	.....	14.7	21.4	23	23
13. London (B. M.)	346 d	Compressus	15.5	20.125	22	20
14. Leiden	None (1)	?Planiceps	15.6	19.68	21	23
15. Leiden	None (2)	?Planiceps	15.8	20.79	21	24
16. Oxford	1676	Rostratus	15.8	20.0	22	22
17. Liverpool	23, 1, 64, 2 .....	.....	15.8	20.25	22	21
18. Leiden	27	?Planiceps	16.2	19.2	21	22
19. Liverpool	21, 5, 62, 1 .....	.....	16.4	21.75	20	21
20. London (B. M.)	245 d	Frontatus	16.5	20.375	22	22
21. Liverpool	12, 7, 69, 1 .....	.....	16.9	20.6	21	21
22. London (B. M.)	245 c	Frontatus	17.4	20.125	23	22
23. Liverpool	24, 3, 59, 2 .....	.....	18.1	20.85	23	23
24. Liverpool	7, 2, 70, 63 .....	.....	18.7	20.0	23	23
25. Leiden	30	Planiceps	18.8	21.06	21	24
26. Norwich .....	.....	Frontatus	?21.0	19.2	.....	.....

A gradation so complete as this evidently renders any character drawn from the proportions of the rostrum useless as an index of specific distinctness, and, unless others can be brought forward, the separation of the skulls into different species is, of course, unwarranted.

The slight variation in the number of teeth has no significance, as the table plainly shows. In all species of dolphins, as a general rule, the individuals having the longest rostrums have the greatest number of teeth.

In Cuvier's figure of the skull of *D. rostratus* (*Oss. foss.*, 4th ed., 1836, pl. 222, fig. 7) the breadth of the rostrum at the middle is 19.1 per cent.

of its length, which makes this a very broad-beaked specimen. Measurements from figures, however, are not always to be relied upon. In the description Cuvier gives the number of teeth as $\frac{26-26}{25-26}$, while the figure shows 21 in the left side of the upper jaw and 24 in the lower jaw. No. *a*3047 in the Paris Museum, labeled *S. rostratus*, and also *bredanensis*, belongs to the opposite end of the series. The breadth of the rostrum at the middle is but 12.2 per cent. of its length. This was probably one of the specimens already in the museum in Cuvier's time.

Steno compressus Gray.

The type of this species, No. 246*a* of the British Museum, is a skull with tolerably narrow rostrum and rather numerous teeth, but apparently without other characters serving to distinguish it from the skulls in the Paris Museum and in other collections. It is improbable, therefore, that it represents a distinct species.

Delphinus reinwardtii Schlegel.

The type of this species is apparently the No. 24 of the Leiden Museum. This is a large skull with a long, narrow rostrum and a rather large number of teeth ($\frac{24-25}{25-25}$). It does not differ from the skulls which Gray called *S. compressus*, or, in other words, is a narrow-beaked individual of *S. rostratus*.

Delphinus bredanensis Van Breda.

As already stated Van Breda described this species before Cuvier had discovered that the skins originally accredited to *S. rostratus* were of quite another species. Van Breda perceived that these skins were different from that of his specimen but concluded that the case was one in which two species very different externally were alike as regards cranial characters. Van Breda's figure, however, convinced Cuvier that he was in error, and caused him to accept the same as representing the true external characters of his *D. frontatus* or *rostratus*.

Steno fuscus Gray.

Steno fuscus, Gray, Zool. Erebus & Terror, 1846, p. 44, pl. 26, fig. 1.

What the relationships of this species are, and whether it is a *Steno* at all, must probably always remain in doubt. Gray makes the following statement in regard to it:

Inhab. Cuba, W. S. MacLeay, Esq.

This species is only known by a fetal specimen in spirit, not in a very good state. Presented to the British Museum by W. S. MacLeay, Esq.

The figure represents an animal resembling *Prodelphinus obseurus*, or indeed not unlike Van Breda's *Steno bredanensis*. The forehead is not separated from the beak by a transverse groove.

I did not see the specimen when in London, and if my memory serves me, was informed that it could not be found. Even if it still exists, however, I think the same ruling should be applied in this case as in that of *Tursiops cymodice*, regarding which Professor Flower says:

T. cymodice may be at once expunged from the list. It is founded upon a single skull of a very young animal; the basilar suture is not closed, and all its distinguishing characters are those of immaturity. It is impossible to say even of which variety it is the young. (*Characters and Divisions*, p. 480.)

Such, too, is the case with this *Steno fuscus*, and it should be dropped forever from the catalogue of species.

Since the foregoing paragraphs were written, Dr. Lütken has published an important account of the genera *Steno*, *Delphinus* and *Prodelphinus*, based on the material in the Copenhagen Museum.*

He gives in plate 1 a colored figure of *S. rostratus*, constructed from data furnished by Captain Andréa. This figure does not agree closely with those of Cuvier, Van Breda or Peters, but is unquestionably much more accurate than those of the first two authors mentioned. That it represents the species called *Delphinus rostratus* by Cuvier and Desmarest is highly probable, and I have, therefore, substituted it for Cuvier's figure as an illustration in the Synopsis.

There are no grounds for considering Peters' figure of *S. perspicillatus* less accurate than the newly-published figure of *S. rostratus*. There is, however, a decided want of agreement between the two figures and the descriptions in regard to the coloration of the species. Until, therefore, it can be proven that *S. perspicillatus* is the young of *S. rostratus*, or that the coloration of the latter is exceedingly variable, it seems to me that the Peters' species must be considered distinct. The two species are quite similar in osteological characters. Their vertebral formulæ are as follows:

S. rostratus, C. 7; D. 13; L. 15; Ca. 30 = 65.

S. perspicillatus, C. 7; D. 12; L. 15; Ca. 32 = 66.

The specimen of *S. rostratus* captured by Captain Andréa and described by Dr. Lütken, was taken in 1° 14' S. lat., 17° 20' W. long., or about midway between Ascension Island and the coast of Africa.

The following measurements of the exterior were taken:

	Centimeters.
Total length	257.4
Height immediately in front of the dorsal fin	67.6
From the snout to the dorsal fin	111.8
From the snout to the eye	41.6
From the same to the blow-hole	36.4
From the same to the pectoral fin	65.0

The skeleton was about 240^{em} long; the head alone 53^{em}. The first two cervical vertebræ were anchylosed together, but the neural arch

* Chr. Fr. Lütken, K. Danske Vidensk. Selsk. Skr., 6te Raekke, naturviden. og math. Afd., V, 1889, pt. 1, pp. 1-61, 1 pl. and 2 charts.

and rudimentary transverse process of the axis were visible behind those of the atlas. The third cervical had on each side a perpendicular flat triangular process, pierced by a large foramen. In the following three vertebræ the bony ring surrounding the foramen was incomplete. In the seventh cervical there was a tolerably long diapophysis, but no parapophysis. Thirteen pairs of ribs were present, the first of which was much the largest. The first six were attached to the vertebræ by both neck and head.

The first neural spine of the dorsal region was on the second dorsal vertebra, and, with the next following, was directed much backward. The last ten caudal vertebræ, which were located in the flukes, were without neural arches. Twenty-three chevron bones were present, the three posterior ones being rudimentary.

The longest transverse process was on the second lumbar vertebra. The last trace of a transverse process was found on the fourteenth caudal vertebra. The first perforations of the transverse processes for the passage of the caudal artery were in the sixth and seventh caudal vertebræ.

Five metacarpal bones were present. The formula of the phalanges was as follows: I, 4; II, 8; III, 6; IV, 3; V, 3.

Dr. Lütken gives, in addition, the following measurements of eight skulls in the Copenhagen Museum. Two of these, Nos. 2 and 5, he regards as possibly belonging to a separate but closely allied species.

Measurements of eight skulls of Steno rostratus. (From Lütken.)

Number.	Length of skull.	Length of brain-case.	Breadth of brain-case.	Length of symphysis of mandible.
	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>
2	54.0	21.3	21.3	15.5
6	53.5	22.4	22.5	15.8
1	53.0	22.0	22.6	15.0
10	53.0	21.7	23.1	15.3
9	52.0	20.9	21.0	16.3
5	51.2	19.8	19.8	16.0
3	51.0	21.8	21.8	14.5
4	50.5	21.7	22.1	13.5

One of the two skulls (Nos. 2 and 5) regarded as belonging to a separate species is from the Pacific Ocean. It was obtained by Professor Reinhardt at Honolulu, while on the *Galathea* expedition.

Measurements of twenty-five skulls of *Steno rostratus* and the type-skull of *S. perspicillatus*.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—	
							At base of maxillary notches.	At its middle.
					Cm.	Cm.	Cm.	Cm.
a	346a	Brit. Mus	<i>S. compressus</i>		51.1	32.5	9.3	4.2
b	346b	...do . . . . .	...do		52.1	31.8	9.9	4.1
c	345c	...do	<i>S. frontatus</i>	India	51.1	30.0	10.7	5.2
d	345d	...do			51.8	30.7	10.5	5.1
e	21, 2, 63	{ Liverpool Pub. } Mus.			54.0	33.6	9.8	4.5
f	12, 7, 69, 1	...do			52.3	31.1	10.5	5.2
g	23, 1, 64, 2	...do			51.5	30.5	9.7	4.8
h	a	...do			54.4	32.0	10.2	4.8
i	19, 11, 62	...do			54.4	31.9	10.2	4.8
j	7, 7, 66, 31	...do			53.4	31.7	9.5	3.8
k	21, 5, 62, 1	...do			55.3	33.2	10.8	5.5
l	70, 2, 70, 63	...do			50.8	29.2	10.2	5.5
m	24, 3, 59, 2	...do			53.0	30.1	9.8	5.5
n	13, 11, 68, 1	...do		Indian Ocean(?)	51.5	30.7	10.2	4.4
o		Norwich Mus.		Ad.	48.7	29.0	10.8	6.1
p	1676	Oxford Mus.		Ad.	50.8	30.5	10.4	4.8
q	x5	...do		Jr.	49.3	30.2	9.2	4.1
r	1668	...do		Ad.	51.3	32.0	9.8	4.6
s	24	Mus. Pays-Bas.	<i>D. reinwardtii</i>	Java	52.0	34.0	9.0	3.9
t	25	...do		Jr.	49.8	31.2	8.7	...
u	26	...do		Indian Ocean	50.6	32.4	9.5	4.3
v	30	...do		(?) Java	53.5	32.0	(?)11.0	6.0
w		...do		Atlantic Ocean	50.0	30.2	9.5	4.7
x		...do		Indian Ocean	52.8	31.8	10.4	5.0
y	27	...do			48.8	29.0	10.5	4.7
	5037	{ Berlin Univ. Zool. } Museum.	<i>S. perspicilla-</i> <i>tus.</i> }	South Atlantic.	♀ Ad. 49.9	29.3	11.1	5.8

Measurements of twenty-five skulls of *Steno rostratus* and the type-skull of *S. perspicillatus*.

	Breadth of intermaxillæ at middle of beak.		Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
	Greatest breadth between outer margin of intermaxillæ proximally.	Anterior margin of superior nares.			End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.						
a	2.9	8.0	26.0	6.6	35.5	38.1	16.4	14.5	8.6	8.0	43.2	16.8	27.4	7.4	{ 25—24 27—25
b	2.8	.....	.....	.....	.....	.....	.....	15.5	.....	.....	43.8	15.6	.....	.....	{ 22—22 24—24
c	3.6	8.0	24.2	6.3	34.3	36.5	19.3	15.0	10.7	9.1	43.2	14.2	25.4	8.6	{ 22—23 22—22 21—22
d	3.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	43.8	15.6	.....	.....	{ 22—22
e	3.2	.....	27.5	.....	37.6	.....	18.8	15.3	10.2	8.3	46.1	15.3	.....	.....	{ 25 24
f	3.8	.....	26.4	.....	36.2	.....	20.3	16.0	11.2	9.5	43.8	13.3	.....	.....	{ 21 21
g	3.2	.....	25.4	.....	34.5	.....	18.2	15.3	10.8	8.9	42.5	14.0	.....	.....	{ 23 21
h	3.7	.....	.....	.....	.....	.....	20.0	.....	.....	.....	.....	.....	.....	.....	{ 23—22 23—22
i	3.2	.....	.....	.....	.....	.....	19.7	.....	.....	.....	.....	.....	.....	.....	{ 23 22
j	2.9	.....	.....	.....	.....	.....	17.8	.....	.....	.....	.....	.....	.....	.....	{ 24 24
k	3.8	.....	.....	.....	.....	.....	19.7	.....	.....	.....	.....	.....	.....	.....	{ 20 21
l	4.0	.....	.....	.....	.....	.....	19.7	.....	.....	.....	.....	.....	.....	.....	{ 23 23
m	3.8	.....	.....	.....	.....	.....	20.0	.....	.....	.....	.....	.....	.....	.....	{ 23 23
n	2.9	.....	.....	.....	.....	.....	18.8	.....	.....	.....	.....	.....	.....	.....	{ 23 24
o	.....	.....	.....	.....	.....	.....	17.5	16.9	.....	.....	41.0	14.0	.....	.....	{ 21—21 22—20
p	3.3	.....	.....	.....	.....	.....	18.8	15.0	10.3	8.9	.....	13.4	.....	.....	{ 22—21 22—22
q	3.2	.....	.....	.....	.....	.....	16.5	13.2	9.5	8.5	.....	13.2	.....	.....	{ 23—23 24—21
r	3.6	.....	.....	.....	.....	.....	17.8	14.6	9.5	8.8	.....	(?)14.0	.....	.....	{ 23—24 25—25
s	.....	.....	.....	.....	.....	.....	18.2	13.5	.....	.....	.....	.....	.....	.....	{ 24—25 25—25
t	.....	.....	.....	.....	.....	.....	16.5	15.0	.....	.....	.....	.....	.....	.....	{ 24—25 25—25
u	.....	.....	.....	.....	.....	.....	17.5	14.2	.....	.....	.....	.....	.....	.....	{ 23—24 25—24
v	3.8	.....	27.0	.....	.....	.....	20.0	16.0	.....	15.0	.....	.....	.....	.....	{ 20—21 22—24
w	.....	.....	.....	.....	.....	.....	18.0	15.5	.....	.....	.....	.....	.....	.....	{ 21—20 23—23
x	.....	.....	.....	.....	.....	.....	19.0	15.7	.....	.....	.....	.....	.....	.....	{ 21—21 24—24
y	.....	.....	.....	.....	.....	.....	19.6	15.5	.....	.....	.....	.....	.....	.....	{ 20—21 22—20
z	3.7	8.7	24.7	5.6	33.3	35.5	20.4	13.6	11.0	9.3	.....	.....	.....	.....	{ 24—23 22—21

STENO PERSPICILLATUS Peters.

Delphinus (Steno) perspicillatus, Peters, Monatsber. der K. Akad. Berlin, 1876, pp. 360-366, pls. 2, 3.

The reasons for regarding this species as distinct from *S. rostratus* have been given on p. 25. It differs apparently only in external characters. Peters' specimen was a female, and was taken in the Atlantic Ocean, in 32° 29' 7" S. lat., 2° 1' W. long. The measurements of the skull of this individual are, for purposes of comparison, included in the foregoing table of measurements of *S. rostratus* (p. 30).

3. TURSIOPS Gervais.

Tursiops, Gervais, Hist. nat. des Mamm., II, 1855, p. 323. (*Fide* Flower.)

This genus is distinguishable from *Prodelphinus* principally by its less numerous and larger teeth. From *Steno* it differs by reason of its short mandibular symphysis and more numerous vertebrae.

The numerous species described by Gray were founded chiefly upon single skulls, and their true relationships are, therefore, not readily to be made out. From such evidence as we possess, however, there appear to be four species, as follows: *Tursiops tursio* (Fabricius); *Tursiops catalania* (Gray); *Tursiops abusalam* (Rüppell); *Tursiops gillii* Dall.

Tursiops aduncus, Hemp. and Ehrenberg, may or may not prove to be distinct, but as we have not had access to the original description of that species, we venture no opinion regarding it.

TURSIOPS TURSIO (Fabricius).

Delphinus tursio, Fabricius, Fauna Groenland., 1780, p. 49.

Delphinus tursio, Bonnaterre, Cétologie, 1789, p. 21.

Delphinus truncatus, Montagu, Mem. Wern. Soc., III, 1821, p. 75.

Tursiops tursio, Gervais, Comp. Rend., 1864, p. 876.

Delphinus melis, Gray, Zool. Erebus and Terror, 1846, p. 38, pl. 18.

Delphinus cymodice, Gray, Zool. Erebus and Terror, 1846, p. 33, pl. 19.

Delphinus eurynome, Gray, Zool. Erebus and Terror, 1846, p. 38, pl. 17.

Phocæna compressicauda, Lesson, Cétologie, p. 199.

At the beginning of my cetological studies, and before I had examined any European specimens, I was inclined to regard the "Porpoise" of the Atlantic coast of America as specifically distinct from the "Bottlenose" of European waters. I have since come to regard them as identical. I have examined side by side the skeletons of two old individuals of almost exactly equal size, one from off Hatteras, North Carolina (22304 ♀), and the other from the coast of England (21,151), and find only such differences as appear to me to be due to individual variation.

Before considering the types of the different species which have been thus far described, I shall discuss the series of skulls in the national

collection. This series comprises about forty-five specimens, of which ten are fragmentary, and three foetal or very young. Of four only is the sex known.

The greater part of these skulls were collected by Dr. H. C. Yarrow at Fort Macon, North Carolina; others are from the fishing grounds at Hatteras, North Carolina; and the remainder are from different points on the Atlantic coast between New Jersey and Florida. The species is perfectly well known to our fishermen. Large numbers have been taken for many years at Hatteras, where I have myself witnessed the capture of between eighty and ninety in a single day. These individuals were about equally divided between the two sexes, and were of all ages.

From the skulls above mentioned I have selected twenty-one perfect specimens of nearly equal size for comparison. Their sex is unknown, but from the fact that they were picked up at random on the beach, and that males and females frequent this coast in about equal numbers, it is highly improbable that all are males or all females. If there are differences between the sexes as regards the proportions of the length and width of the beak they should appear on comparison of the measurements.

In his valuable paper on the cetaceans of Southwestern France, Dr. Fischer calls attention to sexual differences in the skulls of *Tursiops tursio*. His words (translated) are as follows:*

Upon examining together the heads of males and females, one perceives that they present characteristic differences. The beak is longer and relatively narrow in the males. * * * The heads of the females are remarkable on account of the breadth of the beak at its base and at the middle; the beak has consequently a more triangular form.

The measurements given by Dr. Fischer do not entirely bear out these statements. From these the following results are obtained:

Comparison.	♂ 1 compared with ♀ 6 (adulte).	♂ 3 compared with ♀ 4 (épiphysée).	♂ 3 compared with ♀ 11 (épiphysée).	♂ 7 compared with ♀ 5 (jeune).
Relative length of beak of male compared with that of female.....	Longer.	Shorter.	Shorter.	Longer.
Width of beak at base in male compared with ditto in female.....	Narrower.	Narrower.	Narrower.	Wider.
Width of beak at middle in male compared with ditto in female.....	Narrower.	Narrower.	Narrower.	Wider.

It appears from these comparisons that ♂ 1 has a longer and narrower beak than ♀ 6; ♂ 3 has a *shorter* and narrower beak than ♀ 4 ♀ 11; and ♂ 7 has a longer and *wider* beak than ♀ 5. Thus we have three of the four possible combinations—long and narrow, long and wide, short and narrow—in the same sex.

*Actes de la Soc. Linn. de Bordeaux, 4^me sér., v, 1881, p. 159.

The four skulls of known sex in the national collection have the following absolute proportions :

Measurements of four skulls of T. tursio.

Measurements.	20901 (Fire Island, N. Y.).	16504 (Cherry-stone Point, Va.).	20962 (Turkey Gut, N. Y.).	22304 (off Hatteras, N. C.).
Total length.....	43.3	43.9	44.0	52.9
Length of beak.....	22.4	24.1	24.4	28.0
Breadth of beak at notches.....	11.2	10.1	10.3	12.6
Breadth of beak at middle.....	7.0	6.9	6.4	8.0
Breadth of intermaxilla at middle.....	3.7	3.2	3.3	4.4
Depth of beak at middle.....		2.7		3.8
Length of tooth-line.....	19.4	20.4	21.1	24.8
Breadth across orbital processes of frontal.....	20.0	20.4	19.3	24.7
Length of mandible.....	36.2	37.5	37.6	45.0
Depth at coronoid.....	8.1	8.4	7.9	9.4
Teeth.....	24-25	24-24	23-23	26-25
Age.....	24-24	23-23	23-25	24-24
Sex.....	Young.	Young.	Young.	Old.
Condition.....	♂ Fresh.	♂ Fresh.	♀ Fresh.	♀ Fresh.

From these measurements we select the following for comparison :

Measurements.	20901, ♂ a, Fire Island, N. Y. (young).	16504, ♂ b, Cherry-stone Point, Va. (young).	20962, ♀ c, Turkey Gut, N. Y. (young).	22304, ♀ d, Hatteras, N. C. (old).
	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>
Total length.....	43.3	43.9	44.0	52.9
Length of beak.....	22.4	24.1	24.4	28.9
Breadth of beak at maxillary notches.....	11.2	10.1	10.3	12.6
Breadth of beak at middle.....	7.0	6.9	6.4	8.0

A comparison of the length of the beak, relative to the total length, and of the width of the beak at its base and at its middle relative to its total length, gives the following results :

Comparison.	♂ a compared with ♀ c.	♂ b compared with ♀ c.	♂ a compared with ♀ d.	♂ b compared with ♀ d.
Relative length of beak in male compared with ditto in female.....	Longer.	Shorter.	Shorter.	Longer.
Relative width of beak at base in male compared with ditto in female.....	Wider.	Narrower.	Wider.	Narrower.
Relative width of beak at middle in male compared with ditto in female.....	Wider.	Wider.	Wider.	Wider.

The same diversity appears here as in the previous case. The old female, which would be supposed to have the sexual characters strongly marked, has a relatively shorter and wider beak at the base than one of the young males, but a longer and narrower beak than the other.

Coming now to the series of twenty-one skulls, before mentioned, we find the same variation. In some the beak is long and narrow, and *vice*

versa; in others short and narrow, and the opposite. The table of measurements is as follows, the skulls being arranged in order of their absolute length :

Measurements of twenty-one skulls of Tursiops tursio.

[Measurements in centimeters.]

Number.	Total length.	Length of beak.	Breadth of beak at notches.	Breadth of beak at middle.	Breadth of intermaxillary same point.	Depth of beak at middle (including intermaxillæ).	Length of tooth-line.	Breadth between orbital processes of frontal.	Total length of mandible.	Depth between angle and coronoid process.	Teeth.	Remarks.
12277 (N. C.).	43.2	23.2	10.8	7.0	3.8	2.7	19.5	19.1	36.5	8.2	23-23 24-23	Sutures distinct; teeth sharp; fresh.
11997 (N. C.).	43.3	22.9	10.8	6.8	3.4	2.6	19.5	20.3	.....	.....	.....	Sutures open; beach-worn.
12005 (N. C.).	44.2	23.6	12.0	7.9	4.7	3.2	20.0	21.8	.....	.....	23-23	Sutures distinct; beach-worn.
12007 (N. C.).	41.3	24.1	10.8	6.1	3.6	.....	20.5	.....	.....	.....	.....	Young; beach-worn.
12275 (N. C.).	44.8	24.6	10.3	6.3	3.4	2.6	20.9	20.9	38.0	8.0	24-24 23-24	Sutures distinct; teeth sharp; fresh.
20767 (Point Lookout, Md.).	45.2	24.8	11.4	6.9	3.8	.....	21.3	20.9	38.4	8.5	24-23 24-24	Sutures distinct; teeth sharp; fresh.
11998 (N. C.).	45.6	21.2	12.4	7.9	4.2	3.1	20.8	22.6	.....	.....	22-23	Sutures open; beach-worn.
12011 (N. C.).	45.6	24.7	11.4	7.4	4.7	2.9	20.7	20.6	.....	.....	23-22	Sutures distinct; unknown; beach-worn.
12009 (N. C.).	45.6	24.6	12.1	7.9	4.0	2.9	21.5	21.9	.....	.....	26-25	Do.
12013 (N. C.).	46.2	25.1	11.2	7.6	3.9	3.0	21.6	20.3	.....	.....	24-24	Sutures open; beach-worn.
12006 (N. C.).	46.3	24.7	11.8	7.6	4.1	3.1	21.2	22.1	.....	.....	25-24	Do.
11994 (N. C.).	46.3	24.7	12.1	7.5	4.2	3.0	21.2	21.9	.....	.....	.....	Do.
12002 (N. C.).	46.4	24.7	11.7	8.0	4.2	2.9	20.3	21.8	.....	.....	22-22	Do.
11995 (N. C.).	46.4	24.7	11.5	7.2	4.2	3.0	21.2	22.8	.....	.....	24-24	Do.
12004 (N. C.).	46.6	25.4	11.8	7.5	4.0	2.9	21.4	21.3	.....	.....	24-23	Do.
11993 (N. C.).	46.7	25.7	11.1	7.1	3.8	2.8	21.9	20.4	.....	.....	22-24	Do.
12001 (N. C.).	46.8	24.8	12.2	7.5	4.1	3.1	21.7	22.1	.....	.....	23-23	Do.
12274 (N. C.).	47.0	25.5	11.6	7.3	4.2	2.9	21.2	22.3	39.7	8.6	24-24 24-24	Sutures distinct; teeth sharp; fresh.
12276 (N. C.).	47.1	25.5	11.1	7.0	3.9	2.7	21.8	20.7	39.0	8.3	25-25 24-24	Do.
12014 (N. C.).	47.3	25.8	11.9	7.3	4.2	3.2	21.9	21.5	.....	.....	26-26	Sutures open; beach-worn.
22080 (Hatteras).	47.8	27.0	11.2	6.7	3.5	2.9	23.2	20.9	.....	.....	23-25	Sutures open; fresh.

The skulls, it will be observed, vary but little in length; they rise by gradations of 6^{mm} and less from 43.2 to 47.8^{cm}.

We shall first examine the table for indications of sexual differences in the relative length of the beak as compared with the total length of

the skull. The proportional length of the beak in the different specimens, arranged in an ascending scale, is as follows :

52.9 per cent.	53.4 per cent.	51.4 per cent.
53.0	53.7	51.5
53.1	53.9	51.5
53.2	54.1	51.9
53.2	54.2	55.0
53.4	54.3	55.4
53.4	54.3	56.5

It appears that, excepting in the skull with relatively longest beak, the proportion of the length of the beak rises by gradations of four-tenths of 1 per cent. and less.

The proportion of the width of the beak at its base to its length is as follows :

41.5 per cent.	46.0 per cent.	47.4 per cent.
41.9	46.1	47.8
43.1	46.1	49.0
43.5	46.4	49.2
44.6	46.6	49.2
44.8	46.6	50.9
45.5	47.1	51.2

The gradations here are 1.7 per cent., 1.1 per cent., and less.

The proportions of the width of the beak at its middle compared with its length rise by gradations of 1 per cent. and less, as follows :

24.8 per cent.	28.6 per cent.	30.3 per cent.
25.6	29.1	30.4
26.5	29.5	30.8
27.5	29.7	32.1
27.6	30.0	32.4
27.8	30.2	32.6
28.3	30.2	33.5

In all three cases the greatest variation is at the extremes of the series.

What do these proportions show? Apparently that the relative length and width of the beak give no indication of the sex. Unless these twenty-one specimens are all of the same sex, which is very improbable, for the reasons stated, the gradation of proportions is such that it would be impossible to divide the females from the males.

The skulls of greatest absolute length have not relatively longest beaks. The beaks which are relatively longest, as compared with the absolute total length of the skull, are, generally speaking, narrowest at the base and middle in proportion to their absolute length.

The length of the mandible as compared with the length of the skull, minus the beak, is greater in all of Dr. Fischer's males than in his females. In both of my young males (20901 and 16504), on the contrary, it is shorter than in the young female, 20962; and in one of the former (20901) it is shorter than in the old female, 22304.

Dr. Fischer's Nos. 8 and 9, of unknown sex, but which from a consideration of the proportions he believes to be females, should, I think, be regarded as males if the length of the mandible alone is considered, but, on the contrary, as females if the breadth of the beak is considered.

From the facts presented, and numerous others, I am inclined to regard the variation in cranial proportions as of little value in determining the sex. From Dr. Fischer's material and that to which I have had access, however, we are able to get some idea of the limits of variation in cranial proportions. The greatest and least proportions, as regards the length of the beak in thirty-five specimens, are as follows:

Proportion of length of beak to total length of skull:

Greatest.....58.2 per cent. (Dr. Fischer, No. 1, ♂ très adulte).

Least52.9 per cent. (11997, Fort Macon, young).

[Note48.7 per cent. in fetus, 24300, Hatteras.]

Proportion of width of beak at base to its length:

Greatest.....51.9 per cent. (Dr. Fischer, No. 4, ♀, épiph.).

Least41.5 per cent. (22080, Hatteras, not old).

[Note48.7 per cent. in fetus, 24300, Hatteras.]

Proportion of width of beak at middle to its length:

Greatest.....36.7 per cent. (Dr. Fischer, No. 11, ♀, épiph.).

Least24.8 per cent. (22080, Hatteras).

[Note31.6 per cent. in fetus, 24300, Hatteras.]

The skull absolutely longest of this series is Dr. Fischer's No. 1, a male "très adulte," 55^{cm}; my largest specimen is No. 22304, old female, 52.9^{cm}.

Tursio eurynome Gray.

I pass now to the consideration of the species identical with or allied to *T. tursio*. The first of these is *T. eurynome*, Gray, founded on a single skull, No. 356a, in the British Museum. The chief characters which Gray gives are cranial proportions. Regarding its relationships he says:

The skull of this species is most like *D. tursio*; but the nose is one-fourth longer than the length of the head, slenderer and more rounded, and the teeth smaller.*

In the diagnosis of *D. tursio*, however, he has: "Skull-nose five-ninths the entire length." On comparing his measurements of *T. eurynome*, it appears that this proportion exists here also. In relative breadth the beak exceeds several of the North Carolina skulls, notably No. 22304, ♀, from Hatteras, which is only 3^{mm} larger. It agrees very closely in absolute size of parts with Dr. Fischer's ♂ No. 1. In none of its relative proportions does it fall outside the limits of variation of the series discussed on page 35. Speaking of this skull and others in the series, Gray himself says: "These are all very much alike."† Professor Flower includes it in his "section" *T. tursio*, with others, saying that

*Cat. Seals and Whales, p. 261

†Suppl. Cat. Seals and Whales, p. 75.

some of them "may be specifically distinct."* With this skull, the type of *T. metis*, and the skulls called *T. truncatus* in the British Museum before me, I wrote in my note book, "It is doubtful if any distinction is to be made between these."

For my own part I have no hesitancy in making *T. curynome* a synonym of *T. tursio*. The species is founded on a single skull, and its characters are drawn from proportions. It has been shown that neither in absolute size nor in proportions does it lie outside the limits of variation of *T. tursio*. It should be borne in mind that in cases of this kind we can never hope to acquire specimens agreeing *exactly* with the type. Among a thousand skulls of the same species it is doubtful if any two absolutely alike could be found.

Tursio metis Gray.

The second of Gray's species to be considered is his *Tursio metis*. Gray states that the skull "differs from *Delphinus Tursio's* in the nose being much shorter and more conical and acute."† As a matter of fact, the beak is relatively longer than the skull of *T. tursio* from Montagu's collection in the British Museum (353a), which Gray includes in the latter species in the Catalogue. That the beak is more acute than in many specimens of *T. tursio* is true; but it is less acute than in No. 22080 of that species from Hatteras, which was picked up on the beach with others by myself. Comparing it with the latter, I find that the beak is a trifle shorter, but somewhat wider both at the base and at the middle, and that the intermaxillæ are also wider. I cannot but regard it as a narrow-beaked specimen of *T. tursio*.

Tursio cymodice Gray.

Tursio cymodice is founded on a youngish skull. It has an almost exact counterpart in No. 20767, from Point Lookout, Maryland.

Measurements.	355a. <i>Tursiops cymodice</i> . Type.	20767. <i>Tursiops tursio</i> . Point Lookout, Maryland.
	<i>Cm.</i>	<i>Cm.</i>
Total length.....	45.7	45.2
Length of beak.....	24.9	24.8
Breadth of beak at maxillary notches .	11.6	11.4
Breadth of beak at middle.....	6.8	6.9

Professor Flower very justly says:

T. cymodice may be at once expunged from the list. It is founded on a single skull of a very young animal.‡

* Flower, P. Z. S., 1883, p. 487.

† Cat. Seals and Whales, p. 257.

‡ Proc. Zool. Soc. London, 1883, p. 480.

It is interesting, however, to know that it is in all probability simply a young specimen of *T. tursio*.

In the following table are brought together measurements of the type skulls of *T. metis*, *eurynome*, and *eymodice*, and of some other skulls in the British Museum, labeled *tursio*, *metis*, etc.:

Table of measurements.

TURSIOPS TURSIO.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxilla at middle of beak.	Greatest breadth between outer margins of intermaxilla, proximally.
							At base of maxillary notches.	At its middle.		
356a	Brit. Mus.	<i>T. eurynome</i> ..	North Sea ?.....	.....	<i>Cm.</i> 52.6	<i>Cm.</i> 50.5	<i>Cm.</i> 13.5	<i>Cm.</i> 8.5	<i>Cm.</i> 4.5	<i>Cm.</i> 9.9
357	.. do ..	<i>T. metis</i> ..	.....	.....	52.1	29.3	13.0	7.3	4.3	9.1
355a	.. do ..	<i>T. eymodice</i> ..	.....	Jr.	45.7	24.9	11.5	6.7	4.0	9.1
353a	.. do ..	.....	.....	.....	54.6	30.5	14.5	10.2	5.6	10.9
353g	.. do ..	.....	Frith of Forth..	.....	57.8	32.0	15.8	9.7	5.7	11.2
353h	.. do ..	.....	.....	.....	49.3	27.3	13.12	8.7	4.5	9.9
357b	.. do ..	.....	Herne Bay.....	.....	55.1	31.4	13.7	8.5	4.6	10.2

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.					
356a	<i>Cm.</i> 25.6	<i>Cm.</i> 5.8	<i>Cm.</i> 35.6	<i>Cm.</i> 38.6	<i>Cm.</i> 23.0	.....	<i>Cm.</i> 10.6	<i>Cm.</i> 7.8	<i>Cm.</i> 45.6	<i>Cm.</i> 6.2	<i>Cm.</i> 24.6	<i>Cm.</i> 9.5	{ 25—25 23—23
357	25.4	4.8	35.6	36.0	21.3	16.4	11.7	8.3	44.2	6.7	24.5	9.8	{ 23—23 23—23
355a	20.8	5.2	28.9	31.1	19.8	16.4	9.9	7.2	38.1	6.2	20.8	8	{ 24—23 21—21
353a	25.8	5.6	35.7	38.5	25.4	15.0	12.7	9.4	.....	.....	.....	.....	{ 21—20 21—20
353g	26.7	6.0	39.4	41.7	28.0	16.9	13.2	8.5	50.8	8.0	26.7	10.9	{ 21—20 21—21
353h	23.4	5.3	31.5	33.7	23.1	17.5	10.9	7.5	41.9	6.1	22.6	9.4	{ 21—26 20—20
357b	26.2	6.6	37.3	.....	23.9	16.8	11.1	7.9	46.7	6.7	26.2	9.7	{ 24—24 23—24

TURSIOPS CATALANIA (Gray).

Delphinus catalania, Gray, Proc. Zool. Soc. London, 1862, p. 143.

Tursio catalania, Gray, Cat. Seals and Whales, 1865, p. 232.

This species is distinguishable from *T. tursio* by its smaller size, relatively longer beak, and style of coloration.

The skull (No. 1391*a*) of the larger of the two specimens reported by Gray, though only 43.4^{cm} long, belonged to an adult animal, as is attested by the fact that from this individual were taken two fœtuses.* The length of the beak in this specimen is 58 per cent. of the entire length of the skull, and in the second type-skull (No. 1391*b*), 57.8 per cent. So long a beak is rarely or never found in *T. tursio*.

The lower surfaces of the body in both of Gray's specimens were covered with spots or blotches of dark color, a style of coloration which, so far as I am aware, has never been observed in *T. tursio*.

There are some peculiarities in the types which merit attention. In No. 1391*a*, the larger of the two skulls, the pterygoids are widely separated (the tips being 5^{cm} apart), while in 1391*b* they are in contact in the median line. The relation of the parts in the former specimen would, according to Professor Flower's arrangement of the genera, throw it into *Sotalia*, to which genus this skull taken alone would probably have been relegated. But there is no other essential difference between this and the second skull, and taking into consideration the data we have regarding the two individuals, there can be little doubt that they belong to one and the same species.

The front mandibular teeth are much worn in 1391*a*, and considerably also in the second specimen. The symphysis in both is moderately keeled. The intermaxillæ are very convex and high and somewhat "humped" near the middle of the beak. They are apart anteriorly. The triangular prenasal area extends 8.2^{cm} from the nares and is concave.

Professor Flower has already assigned to this species No. 3012 in the Museum of the Royal College of Surgeons, and No. a3070 in the Paris Museum from "China Seas." To these should probably be added No. a3059 in the Paris Museum, whose label bears the words "? Mers d'Inde." Measurements of these three specimens and of the types are appended.

* Gray, l. c.

Table of measurements.

TURSIOPS CATALANIA.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Greatest breadth between outer margins of intermaxillae, proximally.
							At base of maxillary notches.	At its middle.	
1391a	Brit. Mus	<i>T. catalania</i> .	Cape McVillev, Austr.	♂	Cm. 43.4	Cm. 25.2	Cm. 10.2	Cm. 6.1	Cm. 7.3
1391b	do	do	C. Flattery, Austr . .	♀	41.3	23.8	10.4	6.1	7.1
3012	R. Col. Surg	do	China Seas	♂	43.6	25.4	10.4	5.1	7.0
a3070	Mus. d'Hist. nat. 4	do	Mers d'Inde ?	♂	43.6	25.4	10.9	5.9	7.6
a3059	do	do		♂	46.2	26.0	10.9	5.8	8.1

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of teeth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
1391a	Cm. 21.3	Cm. 4.7	Cm. 28.7	Cm. 30.5	Cm. 18.5	Cm. 12.8	Cm. 9	Cm. 7	Cm. 37.4	Cm. 6.6	Cm. 21.1	Cm. 7.7	Cm. 0.76	{ 28-28 25-25
1391b	19	5.8	27.7	29.3	19	14.1	9.4	7.5	35.6	16.1	119.3	7.9	0.6	{ 21+21 23+23
3120	29.9	4.7	30.5	28.2	18.4	12.3	9.5	7.9	37.4	6.7	20.9	7.3	.....	{ 7-24 7-22
a3070	20.8	5.6	28.2	.....	19	12.9	9.7	7.4	37.9	6.6	.....	7.4	.....	{ 23-23 23-23
a3059	21.6	5.3	30.5	.....	20.1	14	9.1	6.9	39.2	5.8	.....	7.6	.....	{ 25-25 25-25

* Montigny, 1851.

† About 2mm should be added for breakage of tip of beak.

TURSIOPS ABUSALAM (Rüppell).

Delphinus abusalam, Rüppell, Museum Senckenbergianum, III, 1845, p. 140, pl. xii, figs. 1-6.

This species closely resembles *T. catalania*, and may be identical with it. Rüppell has appended no measurements of the skull to his admirable description, but from his figure it would appear that the beak, though rivaling that of *T. catalania* in length, has the same proportional breadth as in *T. tursio*. The teeth are slightly more numerous than is usual in the latter species, and in this again we are reminded of *T. catalania*.

In color *T. abusalam* agrees with neither of the species with which I have compared it, the upper parts being dark sea-green. *T. tursio*, as

I have observed it, is always clear plumbeous gray above. The color of dead specimens is very dark, but I have never observed a greenish tinge in the coloration. The types of *T. catalania* were lead-colored. We might divide, therefore, the three species by their coloration as follows:

1. Upper parts lead-colored.
 - a. Belly spotted *T. catalania*.
 - b. Belly unspotted *T. tursio*.
2. Upper parts dark sea green.
 - Belly spotted *T. abusalam*.

The proportions of the body are much alike in *T. catalania* and *T. abusalam*, as will be seen from the following comparative table:

Measurements.	<i>T. catalania</i> (from Macgillivray, reduced to meters), ♀.	<i>T. abusalam</i> (from Rüppell, reduced to meters), ♀ adult.
Total length.....	2.058	1.949
Tip of snout to eye.....	0.305	0.297
Tip of snout to anterior base of dorsal fin.....	0.915	0.893
Height of dorsal fin (vertical).....	0.203	0.216
Distance between the extremities of the flukes.....	0.559	0.514

The skeleton of *T. catalania* is unknown; for *T. abusalam* Rüppell gives the following vertebral formula: C., 7; D., 12; L., 16; Ca., 26=61.

In two of the skeletons of *T. tursio* in the national collection, however, but twelve pairs of ribs are present, and in one of these, which appears to be perfect, the total number of vertebræ is but sixty-one. We can, therefore, make no separation on the basis of the total number of vertebræ.

From such indications as we possess, this species appears to be intermediate between *T. tursio* and *T. catalania*, but most closely allied with the latter. It would not be a matter of surprise if it should prove to be identical with *T. catalania*.

Since the foregoing remarks were written Dr. W. Kobelt, director of the Senckenberg Museum, has very obligingly sent me some measurements of the type-skull in the collections of that institution. From these it appears that the beak is longer than in *T. tursio*, as already stated, and is much narrower at the base than in either *T. tursio* or *T. catalania*. Its breadth at the middle is about as in the latter species. The breadth at the orbits, however, is less than in either of the others. I subjoin the measurements:

	Centimeters.
Total length.....	46.0
Length of beak.....	27.0
Breadth of beak before the notches.....	9.2
Breadth of beak at its middle.....	6.8
Breadth of intermaxillæ at same point.....	3.4
Breadth between centers of orbits.....	18.7

Measurements of the type skull of Tursiops abusalam, ♀.

TURSIOPS PARVIMANUS Lütken.

Tursiops parvimanus Lütken, K. Danske Vidensk. Selsk. Skr., 6th Raekke, IV, 1887, p. 354.

Dr. Lütken has described under this name a small form, which is closely allied to *T. tursio*.

It differs chiefly in having the *third digit longer than the second, with more numerous phalanges*. The formula of the phalanges is 2, 6, 8, 3, 1. The vertebral formula is as follows: C., 7; D., 13; L., 15; Ca., 27=62. In color the species is blackish on the back and fins, and grayish-white on the belly.

The species is founded on a single young individual from the Adriatic. A diagnosis is given in the second part of this work.

TURSIOPS GILLII Dall.

Tursiops gillii, Dall, Proc. Cal. Acad. Sci., v, 1873, p. 13; Scammon, Marine Mammalia, 1874, p. 288.

This species was founded by Mr. Dall upon a single mandible, No. 13022, from Monterey, Cal.,* collected by Capt. C. M. Scammon. It belonged apparently to an adolescent individual. Although the mandible, as a rule, possesses no characters which will serve for the distinction of closely allied species, there is one in this case which seems of value, namely, the comparative size of the condyles. In this mandible the greatest diameter of the condyle is contained twice only in the greatest depth of the ramus. In all the mandibles of *T. tursio*, on the contrary, the greatest diameter of the condyle is contained two and a half times in the greatest depth of the ramus. The comparatively large condyles of *T. gillii* are found again in a skull of *Tursiops*, 54^{cm} long, from Lower California, No. 12054, collected by Captain Scammon. This skull belonged to an aged individual; the sutures are largely obliterated and the teeth are much worn.

From its proportions alone this skull could scarcely be distinguished from one of *T. tursio*, but the relations of the bones on the under surfaces are decidedly different. In *T. tursio* the optic canal rises gradually to the level of the antero-internal border of the frontal, and the whole inferior surface of the frontal is nearly plane. In *T. gillii* the optic canal ends abruptly without reaching the level of the prominent rounded antero-internal border of the frontal, which latter bone is deeply concave.

In the wall of the temporal fossa of *T. gillii* the lower part of the parietal appears as a narrow band between the anterior margin of the

* Although this specimen is not marked "type" there can be no doubt but that it is the one from which the species was described. Mr. Dall, who kindly examined the mandible at my request, could not decide whether it was his type or not, fourteen years having passed since he last saw it. It corresponds, however, absolutely to his measurements, and is furthermore, the only separate mandible of a *Tursiops* from California in the collection.

squamosal and the posterior margin of a backward extension of the frontal, while in *T. tursio* the frontal has no backward extension and the parietal is broad inferiorly. Numerous other differences are present, which, with those mentioned, I have not found in any of the variations of *T. tursio*.

Of the external appearance of this dolphin we know but little. Seamon, from two "momentary observations," describes it "as black all over, lightened a little below." His outline resembles that of a *T. tursio*, except that the dorsal fin is narrower than is common in that species.

Table of measurements.

TURSIO'S GILLII.

Catalogue number.	Collection.	Type of	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxilla at middle of beak.	Greatest breadth between outer margins of intermaxillae proximally.
							At base of maxillary notches.	At its middle.		
13022	U. S. Nat. Mus.	<i>T. gillii</i> .	Monterey, Cal.		<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>
12054	do		Lower California.	Ad.	54.0	29.8	14.1	8.8	4.6	10.0
a3060	Mus. d'Hist. Nat.		Monterey, Cal.		50.8	27.7	13.7	7.9	4.3	9.2

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Transverse diameter of largest tooth.	Number of teeth.
			Anterior margin of superior naves.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
13022	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	{ ?—2 21—22 23—23 22—22 21—19 19—19
12054	25.4	5.6	35.5	36.6	24.5	15.4	13.5	8.5	46.1	6.3	25.5	9.7	0.9	
a3060	24.2	6.4	33.8	34.8	22.9	.....	11.7	7.4	43.2	6.6	.....	9.4	.....

4. DELPHINUS Linné.

Delphinus, Linné, Systema Naturæ, 10th ed., 1758, p. 77.

The most salient character by which this genus, in its present restricted limits, is distinguished is the presence of two broad and deep lateral grooves in the palate. This is, indeed, the only character by which

in the present state of our knowledge it is distinguishable from *Prodelphinus*, its nearest ally, and it would even appear that *D. roseiventris*, Wagner, in some degree annuls the value of this distinction, since the grooves of its palate are shallow, though the pterygoids are very narrow, as in *D. delphis*.

DELPHINUS DELPHIS Linné.

Delphinus delphis, Linné, Syst. Nat., 10th ed., 1758, p. 77.

Delphinus major, Gray, Cat. Seals and Whales, 1866, p. 396.

Delphinus fulvofasciatus, Wagner, Schreber's Säugeth., pl. 361, fig. 1; Hombron and Jacquinot, Zool. Voyage de l'Astrolabe et Zélée, III, 1853, p. 37, Atlas, pl. 21, fig. 1, pl. 23, figs. 1, 2.

D. Forsteri, Gray, Cat. Seals and Whales, 1866, p. 248; Synopsis, 1868, p. 8.

Delphinus jaira, Gray, Zool. Erebus and Terror, 1846, p. 41, pl. 23; Catalogue, 1st ed., 1850, p. 123; 2d ed., 1866, pp. 245, 398; Supplement, 1868, p. 68.

Delphinus poncegra, Owen, Trans. Zool. Soc. London, VI, 1869, p. 23.

Delphinus Bairdii, Dall, Proc. California Acad. Sci., V, 1873, p. 12; Seammon's Mar. Mamm., 1874, p. 283.

Delphinus Moerçi, Gray, Catalogue, 1866, p. 396; Supplement, p. 68.

Delphinus Walkeri, Gray, Catalogue, 1866, p. 397; Supplement, p. 68.

? *Delphinus nova-zelandiæ*, Quoy & Gaimard, Voyage de l'Astrolabe, Mamm., 1830, p. 149.

Delphinus albinaus, Peale, U. S. Explor. Exped., 1st ed., VIII, 1848, Mamm. and Ornith., 1848, p. 33; Cassin, ditto, 2d ed., 1858, p. 29, pl. 6, fig. 1.

Delphinus marginatus, Lafont, Actes d. l. Soc. Linn. de Bordeaux, 3d ser., VI, p. 518.

D. fusus, *souverbianus*, *variegatus*, *balteatus*, *moschatus*, Lafont, Fischer, Actes d. l. Soc. Linn. de Bordeaux, 4th ser., V, 1881, p. 127.

The elaborate discussion of this species by Fischer (op. cit.) leaves little to be said until great accumulations of new material have been made. I shall confine myself, therefore, to the consideration of his conclusions in the light of such material as I have at command. From the examination of fresh specimens and skulls, I am convinced that the common *Delphinus* of the Atlantic coast of North America is, as it has generally been considered to be, identical with Linné's *Delphinus delphis*. I have little hesitancy, therefore, in testing the conclusions based upon European specimens by specimens from American waters.

As regards the color of this species, I am convinced of the wisdom of Professor Fischer's remarks: "On ne saurait établir des espèces d'après des caractères aussi instables." There are in my charge drawings of four specimens taken at different times on our Atlantic coast, and a photograph of a fifth. No two of these agree *exactly* with one another nor with any of Lafont's species.

Drawing No. 1 represents an individual similar to that represented by Professor Fischer (Pl. IV, Fig. 1), under the name of *D. delphis*, var. *fuscus*. It differs, however, in having no white area on the side below the dorsal fin. An area over the anus is yellowish, like the anterior portion of the side. The long narrow streaks of color on the sides are gray rather than greenish or black. The sex of this specimen and the next is unfortunately unrecorded.

Drawing No. 2 is similar to the last, but the yellow color of the anterior portion of the side is dull and grayish. The light area back of the dorsal fin is white, as in Professor Fischer's figure of *fuscus*. A black band starts from the lower side of the tail, as in Professor Fischer's figure of *souverbianus*, but reaches the line of the anterior base of the dorsal fin. The lateral lines are light gray.

Drawings Nos. 3 and 4 represent, respectively, a female and male taken at the same time.

The female resembles Fischer's figure of *moschatus* (Pl. v, Fig. 1), but the lower jaw is dark-greenish gray, which color extends to and includes the pectoral. The pinkish white of the belly does not extend back of the anus nor above the level of the pectoral fin. All the upper portion of the side is of a nearly uniform dark gray traversed by a narrow band of lighter gray.

The male is like the female, except that the lower half of the body, from about the base of the pectoral fin to and beyond the anus, is of a uniform light gray.

The photograph represents one female like *fuscus*, but with a light band at the base of the beak like that in *variegatus*.

Another specimen which I examined had a large area in the center of the dorsal fin nearly pure white.

From these five specimens we would be compelled, following Lafont's opinions, to describe three additional species. Such a course appears to me far from advisable. I am strongly of the opinion that these differences of color are to be looked upon as individual variations. The fact that we do not assign them distinct specific names does not imply that we look upon such variations as void of interest.

I shall next consider the cranial characters and proportions of the species.

M. Fischer states that the male has a longer and narrower beak than the female. His tables give the following proportions:

Delphinus delphis. Females. (From Fischer.)

Description.	Total length of skull.	Per cent. of length of beak to total length.	Per cent. of width of beak at middle to its length.
	<i>Cm</i>		
<i>Delphinus delphis</i> , "balteatus B," jr ..	36.3*	55.1	20.0
"fuscus C," jr	37.8	56.9	20.9
"balteatus C," jr ..	39.3	54.7	18.6
"fuscus E"	42.8	59.6	21.6
"variegatus B"	43.3	57.7	20.0
"balteatus A"	43.3	58.9	21.6
"fuscus F"	44.8	59.6	22.5
"variegatus A"	45.3	60.7	18.2
"fuscus B"	47.3	61.1	17.3

* M. Fischer having taken his measurements of the total length from the foramen magnum, while mine are from the surface of the condyles, I have added 1.3^{cm} in each case to make the measurements agree.

We learn from this table that, in a general way, the beak is proportionally longest in the largest, most nearly adult, skull; also that the proportion of the width of the beak to its length is not co-ordinated with the absolute size of the skull. The longest beaks are not always the narrowest.

The shortest beak in this series of females is in length 54.7 per cent. of the total; the longest, 61.1 per cent. The widest beak has a breadth equaling 22.5 per cent. of its length, and the narrowest 17.3 per cent. The average length of the beaks for the three largest skulls is 60.5 per cent.; for the whole series, 58.3. The average width of the three largest is 19.3 per cent.; for the whole series, 20.1.

M. Fischer gives measurements of only two males. The proportions of the beak in these and one additional male in the national collection are shown in the following table:

Description.	Total length of skull.	Per cent. of length of beak to total length.	Per cent. of width of beak at its middle to its length.
	<i>Cm.</i>		
Delphinus delphis, "fusus D" (Fischer)	46.3	59.4	18.1
"fusus" 411' (U. S. N. M.)..	48.0	62.5	20.1
"fusus A" (Fischer)	49.8	61.3	16.6

In these three specimens again we find that there is no correlation between the width of the beak and the absolute size.

The length of the longest beak is 62.5 per cent. of the total, or a little more than that of the longest-beaked female. The average proportional length of the beak is also a little more than in the three largest females, viz, 61.1 per cent. The widest beak has a breadth equaling 20.1 per cent. of its absolute length, and the narrowest 16.6 per cent. The latter proportion is considerably less than in the females, while the average, 18.3 per cent., is also less.

M. Fischer's generalization is borne out by these percentages, but it should be remembered that two of the three males here considered are absolutely larger than any of the females. Since the percentage of the length of the beak rises with the absolute size of the skulls, if the females reach the same size as the males, it appears to me probable that males and females of the same absolute size would give the same percentages of length of beak. This opinion receives some support from the fact that M. Fischer's male "*fusus D*," which is absolutely larger than any of the females except "*fusus B*," has a relatively shorter beak than three of the females.

In addition to the individuals already discussed, I have myself measured a considerable number of similar skulls in the Muséum d'Histoire Naturelle, the British Museum, and elsewhere. In many cases the localities are not given.

In the following table all these specimens are brought together for comparison:

Reference number.	Catalogue number.	Collection.	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak at base of notches.	Breadth of beak at its middle.	Breadth of intermaxilla at same point.	Greatest breadth between outer margins of intermaxilla proximally.
1	a3079	Paris Mus	.....	Young	<i>Cm.</i> 37.4	<i>Cm.</i> 22.1	<i>Cm.</i> 8.4	<i>Cm.</i> 4.6	<i>Cm.</i>	<i>Cm.</i>
2	15781	U. S. Nat. Mus	New York Bay	do	41.2	25.3	8.2	4.9	2.2	7.0
3	3885	do	Unknown	do	42.0	25.2	8.5	5.2	2.1	7.1
4	7063	do	New York Harbor	do	43.3	26.6	9.0	4.5	2.3	7.1
5	a3073	Paris Mus	.....	Adult	43.8	27.4	9.2	5.1	.....	.....
6	a3072	do	Coast of Hérault	do	44.5	27.4	8.9	5.1	.....	.....
7	a3075	do	Unknown	do	44.5	27.2	9.2	5.6	.....	.....
8	a3077	do	Coast of Algeria, 1874.	do	44.5	27.2	8.9	5.1	.....	.....
9	a3088	do	Coast of Algeria	do	45.0	28.2	8.6	4.8	.....	.....
10	a3074	do	Unknown	do	45.5	28.0	9.4	5.6	.....	.....
11	3487 "b".	British Mus Liverpool Pub. Mus.	do	Old	45.7	28.2	9.1	5.3	2.3	8.0
12	20873	U. S. Nat. Mus	Off Block Id, R.I.	Adult	46.7	28.2	9.3	5.3	2.3	7.4
13	574b	Cambridge Zool. Mus.	Sydney Museum	do	46.7	29.5	10.0	5.2	2.2	7.0
14	a3081	Paris Mus	Unknown	Adult	46.8	28.7	9.9	6.1	.....	.....
15	574a	Cambridge Zool. Mus.	Bahama Islands	do	47.4	29.2	10.2	5.6	2.4	7.6

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.		Extremity of beak at—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
		Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.							
a3079	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>
15781	21.6	4.1	29.7	.....	16.3	13.9	6.9	4.9	35.5	.....	.....	6.6	.....	{ ?-49 47-47
3885	20.1	6.0	30.0	30.5	16.6	14.5	7.1	5.2	35.3	.....	.....	6.7	.....	{ ? 45-45? 46-46
7063	22.6	4.9	30.7	32.2	16.1	14.4	7.1	5.3	.....	.....	.....	6.6	.....	{ 49-49 50-48
a3073	.....	.....	.....	.....	16.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
a3072	.....	.....	.....	.....	16.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
a3075	.....	.....	.....	.....	17.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
a3077	.....	.....	.....	.....	16.3	.....	.....	.....	.....	.....	.....	.....	.....	.....
a3088	.....	.....	.....	.....	16.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
a3074	.....	.....	.....	.....	17.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
3488	24.1	4.8	32.5	.....	17.3	14.2	7.0	6.2	38.5	5.3	16.1	7.1	.....	{ 50-50 51-50
.....	24.1	.....	33.4	.....	17.8	14.0	.....	.....	39.4	.....	.....	.....	.....	{ ? 51-? 52 48-49
20873	23.3	5.7	32.8	34.2	17.1	14.4	7.2	5.4	.....	.....	.....	.....	.....	{ 48-48
574b	22.9	.....	33.6	35.2	16.8	13.8	7.8	5.8	38.9	6.4	.....	.....	.....	{ 51-51* 48-50
a3081	.....	.....	34.8	.....	18.5	.....	.....	.....	.....	.....	.....	.....	.....	{ ?-47
574a	.....	.....	.....	.....	17.6	13.8	7.5	5.8	.....	.....	.....	.....	.....	{ ?-49

* Three extra teeth behind forming a double row.

Delphinus major Gray.

Among the skulls resembling *D. delphis* in the various European museums are some which have been made the types of distinct species. Among these species are *D. longirostris*, *major*, *fulrofasciatus*, *Moorei*, *Walkeri*, *janira*, and *Forsteri*. It now becomes our duty to consider these specimens, in order to determine whether they are to be regarded as identical with *D. delphis* or as distinct.

I will first take up *Delphinus major* Gray (Cat. Seals and Whales, 1866, p. 396).

Gray's first character is: "Skull larger than that of *D. delphis*." The total length, according to my measurements, is 52.7^{cm}. This exceeds by 6^{cm} Fischer's largest specimen of *D. delphis* (*D. d. fusus* A.). Another character lies in the length of the beak, which exceeds three times the width of the beak at the base. This relation holds true of five of M. Fischer's eleven females of *D. delphis* and of one of the two males. The depth and width of the palatal grooves is a third character in Gray's diagnosis. Regarding this character I can only say that my observation teaches me that the grooves vary more or less in depth and width in different specimens of *D. delphis*, and that I cannot, therefore, consider this variation as of special importance.

I compared the type-skull (No. 1472a, Brit. Mus.) in the British Museum with skulls of *D. delphis*, and have since compared the photograph of the same, which I was permitted to have made, with skulls in the National Museum. As a result, I cannot find character which seem to me of importance as distinguishing this skull from those of *D. delphis*. The mandible is rather narrower than is common in *D. delphis*, and the alveolar border is less concave, but these are details which are not of prime importance.

As regards proportions, the skull of *D. major* has a relatively longer and narrower beak and narrower brain-case than the majority of *D. delphis* which I have examined. It is, however, approached very closely by the much smaller skull, No. a3088, Mus. d'Hist. nat., from the coast of Algeria (see Table, p. 48, No. 9). The proportions in the two skulls are as follows:

Proportions.	<i>D. delphis</i> , No. a3088, Paris.	<i>D. major</i> , No. 1472a, type, Brit. Mus.
Total length	<i>Cm.</i> 45.0	<i>Cm.</i> 52.7
Proportion of length of beak to total length	<i>Per cent.</i> 62.7	<i>Per cent.</i> 63.8
Proportion of width of beak at mid- dle to its length	17.0	16.6
Proportion of width at orbits to total length, minus length of beak.....	95.2	90.8

There is plainly considerable difference even here, but the approximation is such that in default of finding good characters for *D. major*, I am unable to regard it other than as a large individual of *D. delphis*.

Skull No. 1625a, in the collection of the British Museum.

Among the skulls differing from the ordinary *D. delphis* in some respects is one in the British Museum, No. 1625a, labeled *D. longirostris*. In this skull the pterygoids are somewhat broader at the free extremity than is usual, and the breadth at the orbits is considerably less. This skull is 47^{cm} long, while the breadth at the orbits is but 14^{cm}. No. 574a, in the Cambridge Museum from the Bahamas (see Table, p. 48, No. 15), which is one of the skulls having the least width at the orbits, measures 17.6^{cm} at this point, though but 47.4^{cm} in total length. I am unable, however, to discover any other characters by which to separate it from *D. delphis*, and regard it inadvisable, therefore, to remove it from that species.

Delphinus fulvofasciatus Hombron and Jacquinot.

The type of *D. fulvofasciatus*, Hombron and Jacquinot, No. a3025, in the Paris Museum, from Hobart Town, Tasmania, differs from the average *D. delphis*, so far as I was able to determine, only in being somewhat broader across the orbits, as is also the case with No. a3071 in the same museum from Tasmania, and labeled *D. tasmaniensis*. The length of these skulls and the width at the orbits are compared in the following table with the same measurements of a skull also in the Paris Museum, from Algeria, and with No. 20873 in the U. S. National Museum, from Block Island:

Number.	Collection.	Locality.	Type of—	Total length.	Width at orbits.
a3025	Mus. d'His. Nat.	Hobart Town.....	<i>D. fulvofasciatus</i>	Cm. 44.5	Cm. 17.3
a3071	...do.....	Tasmania.....	Labeled <i>D. tasmaniensis</i> ..	41.5	16.8
a3072	...do.....	Coast of Hérault.....	.....	46.5	18.6
20873	U. S. N. M.....	Block Island, R. I.....	.....	46.7	17.1

No. 15, in the table on p. 48, is of about the same proportions as the skull labeled *D. tasmaniensis*, but the locality is unknown; it may be also from Tasmania.

We have, however, Professor Flower's statement that he has examined a series of skeletons of (apparently) *D. delphis* from New Zealand waters and can find no characters by which to distinguish them from *D. delphis* from the coast of Europe.

The figure of the exterior of *D. fulvofasciatus* in the *Voyage au Pôle sud*

(Pl. XXI, Fig. 1), closely resembles drawing No. 1 in the national collection, described on p. 45, but with the following differences: The color of the light area of the sides in *fulvofasciatus* is pinkish, rather than yellow, and there is no appearance of the crossing of color below the dorsal fin, which is commonly characteristic of *D. delphis*. The white of the belly extends to the flukes, which is not a common disposition in *D. delphis*; it is represented, however, in our drawing No. 2 (see p. 46). Finally, the gray mark at the base of the pectoral extends to the angle of the mouth, rather than to the extremity of the mandible.

Measurements applied to the figure agree very closely with M. Fischer's measurements of *D. delphis* and of specimens of the same in the National Museum. The measurements given in the text* do not agree at all with the figure and are evidently from the dry skin, as would appear from the following remarks: † "*Ce dauphin a malheureusement perdu par la dessiccation et le montage quelques-uns de ses caractères.*"

I do not think that the differences pointed out are sufficient to warrant the separation of *fulvofasciatus* from *delphis*.

To the original description of *D. novæ-zelandiæ*, which Jacquinet and Pucheran regarded as probably the same as their *D. fulvofasciatus*, I have not had access.

D. Forsteri Gray.

Delphinus Forsteri, Gray, is founded upon a drawing made by the younger Forster. Forster's description of the individual from which this drawing was made is mostly taken up with generic and super-generic characters.‡

The colors are described as follows:

Color supra virenti-fuscus s. ferreus, subtus albus. Macula exoleta alba discum pinarum dorsalis et pectoralium occupat, fascia alba trans rostrum.

Gray translates Forster's description (Cat. Seals and Whales, p. 248) and in the *Synopsis* (pl. 24) reproduces the drawing. The drawing does not agree exactly with the original description, the "fascia alba trans rostrum," for example, being replaced by a black band. The manner in which the fins and flukes are depicted would lead one to believe that the figure was from a specimen which had been dead for some time. The eye is entirely too large. The indications of color-markings are very unsatisfactory. I do not think that the figure is sufficiently accurate to merit serious consideration, but it may, perhaps, be pronounced an imperfect figure of *D. delphis*.

The "virenti-fuscus" of the back we find again in M. Fischer's figures, Pl. IV, fig. 1, and Pl. V, fig. 2.

As I have already stated, one of the specimens of *D. delphis* in the

* Voyage au Pôle sud, Zoologie, III, 1853, p. 38.

† L. c., p. 37.

‡ Forster, Descriptionis animalium, etc., 1844, p. 280.

national collection, received from the U. S. Fish Commission, had a large white area on the dorsal fin, and the presence of "a small white spot on the disk of the dorsal and pectoral fin"* in *D. Forsteri* would, therefore, appear to have no special significance.

Delphinus janira Gray.

Another species which appears to be identical with *D. delphis* is *D. janira* of Gray. The type of this species, which is in the Bristol Institute, I did not have an opportunity to examine. I did, however, measure a skull in the British Museum, No. 1470a, which Gray labeled *D. janira*, and which agrees in every particular with the figure of the type in the Zoology of the *Erebus* and *Terror*, except that the beak is a little narrower and the opening between the intermaxillæ proximally runs back further and does not end so abruptly. This skull, which is 43.2^{cm} long, agrees very closely with No. 7063 in the National Museum, from New York Harbor (see table *infra*). Both seem to represent rather small and narrow-beaked individuals of *D. delphis*. Skulls Nos. 1470b and 1470c in the British Museum, the latter from Jamaica, and both labeled *D. janira*, are defective, but do not seem to differ from the two skulls just considered. These three skulls are rather small for their apparently mature age, but I see no reason why they should be regarded as other than small individuals of *D. delphis*. From these skulls we might be led to suppose that there was a small race of *D. delphis* peculiar to the West Indies, but the value of this supposition is lessened by the fact that the type-skull of *D. pomeeagra*, Owen, the next species to be considered, which is like them in every particular, is from India.

Delphinus pomeeagra Owen.

This skull, No. 1478a, in the British Museum, is quite defective. I was unable to find any characters by which it could be distinguished from the preceding. In the table on p. 56 are included measurements of this skull and of skulls of *D. janira*.

Delphinus Bairdii Dall.

Another species whose distinctness has been questioned is *Delphinus Bairdii* Dall (Proc. Cal. Acad. Sci., v, 1873, p. 12), founded on two skeletons of females from Cape Arguello, California. A male skeleton of this species from Santa Cruz, Cal., was forwarded to the National Museum and has a place in the register as No. 13802, but unfortunately the specimen has disappeared, and all efforts on my part to rediscover it have thus far proved fruitless. We have, however, in the national collection two skulls from the Pacific coast, presumably of this species. The smaller (No. 15403) was collected by Lieut. E. Bergland at the mouth of the San Gabriel River, on San Pedro Bay, considerably south of Point

* Gray, Catalogue, p. 24^e.

Arguello where the original specimens were obtained. The second skull (No. 22305) was obtained by Mr. Charles H. Townsend at Monterey. Both these skulls are defective; the smaller is young, while the larger is quite old. In so far as they present characters for comparison I find nothing by which to distinguish them from skulls of *D. delphis* from the Atlantic coast.

Mr. Dall was unfortunately unable to compare his skeleton with that of *D. delphis*, to which species *D. Bairdii*, if distinct, is undoubtedly most closely allied. We have, however, for comparison, the measurements of the exterior of the original specimens, given by Seammon (Marine Mamm., p. 100). I place such of these as are comparable by the side of measurements of *D. delphis* from the Atlantic coast. The conformity of the two series of measurements is certainly remarkable, and the lack of agreement is apparently not more than would be found to exist between four individuals of the same species.

Measurements.	<i>D. Bairdii</i> Point Arguello. ♀. Types.		<i>D. delphis</i> . Off No Man's Land, Mass. ♀. U. S. P. C.	<i>D. delphis</i> . Atlantic coast. ♀.
	No. 1.	No. 2.		
	Inches.	Inches.	Inches.	Inches.
Total length	79.5	81.0	75.5	79.0
Length of pectoral fin	12.0	12.0	11.5	12.0
Expansion of flukes	18.0	17.5	15.5	18.0
Longitudinal width of flukes	5.0	6.0	6.0	6.25
Height of dorsal fin	7.0	7.5	7.0	8.0
Extremity of snout to pectoral fin	20.0	20.0	18.0	18.0
Extremity of snout to dorsal fin	36.0	37.0	35.0	37.25
Extremity of snout to angle of mouth	11.5	12.75	11.0	10.6
Extremity of snout to eye	13.0	13.75	12.5	12.0
Extremity of snout to blowhole	14.0	15.0	14.0	13.0
Girth at the anus	27.5	25.5	22.5	.....
Girth at front of dorsal fin	40.0	39.0	39.0	.....
Depth of caudal peduncle at origin of flukes	3.0	4.0	3.8	3.5

Remembering that these measurements were made by different observers on opposite sides of the continent, I think it will be conceded that they agree as closely as would measurements of different individuals of *D. delphis* made by different persons.

Seammon's description (p. 93) might be applied to the drawings of East-coast specimens, which I have called Nos. 1 and 2 (see p. 45), except that the dark mark before the pectorals in the former is black instead of gray. It is represented as black, however, in M. Fischer's figure of *D. delphis* var. *soonerbianus*.*

There is also among the drawings in the department of mammals a pencil-sketch by Mr. Dall, in which the boundaries of the lines and areas of color correspond almost exactly in position with drawings Nos. 1 and 2.

From the evidence now obtainable I am unable to distinguish between

* Cétacés de France, Pl. iv, fig. 2.

D. delphis and *D. Bairdii*, and must, therefore, regard the latter as identical with the former.

Delphinus Moorei and *D. Walkeri*, Gray.

These two species are founded on two drawings and two skeletons now in the Liverpool Public Museum. Both species are from a point in the South Atlantic, in the vicinity of Tristan da Cunha. I examined the types and original drawings, and verified from the manuscript the measurements given by Gray.* The colors of *D. Moorei* in the original, somewhat crude sketch, are, beginning from below, as follows: Light pure slate-gray; darker greenish slate gray; black. The colors of *D. Walkeri* are: Dirty white; light pure slate-gray; dark pure slate gray; black. The skulls are, as Gray has said, "so similar that it is not easy to point out any difference in words." They appeared to me identical with those of *D. delphis*. The skeletons I was unable to examine in detail, but they are certainly not notably different from those of *D. delphis*.

The colors of these two individuals, as represented in the sketches, are clearly far from identical. Nor are they exactly like those of any figure of *D. delphis* which I have examined. Gray brings up an important issue when he says:

Considering that the coloring of the animals shows that they represent two species, one is struck with the very small difference exhibited in the skull by species showing such marked external differences, and can only conclude by thinking how hasty we have been when we have referred skulls received from very distant parts of the world all to *Delphinus delphis*, etc.†

This is quite the converse of Fischer's opinion, namely:

Je pense que le dauphin vulgaire, qui semble habiter presque toutes les mers du globe, présente d'innombrables races ou variétés.

But what are the facts in the case under consideration? On the one hand we have two crude sketches of dolphins (not the dolphins themselves, it should be remembered), similar to each other and to *D. delphis*, but not absolutely alike. On the other hand we have the two skulls of the same individuals exactly resembling each other and *D. delphis*. Do they represent distinct species or otherwise? Gray decides by the differences of color in the sketches and affirms that they are distinct, while he admits that the skulls are alike. Prof. Fischer, on the other hand, would probably hold that, the skulls being alike, the differences in color must be regarded partly as mistakes of the artist and partly as real variations by which the different social families of *D. delphis* are distinguished from one another.

There is one fact not taken into account by Gray which leads one to believe that the latter opinion is correct, namely, that the proportions of

* Lütken (Danske Vidensk. Selsk. Skr., 6^{te} Raek., 1889), states that these sketches were not made by Walker, but by Capt. Andr ea.

† Cat. Seals and Whales, p. 398.

D. Moorei are identical with those of *D. delphis*. In the following table the measurements of *D. Moorei* are placed by the side of those derived from the No Man's Land specimen of the same sex (♀) already referred to (p. 53):

Measurements.	D. Moorei (from Gray). ♀.	D. delphis. No Man's Land, Mass. U. S. Nat. Mus. ♀.
	<i>Fl.</i> <i>In.</i>	<i>Fl.</i> <i>In.</i>
Mouth to tip of tail	6 3½	6 2½
Length of mouth	11	11
Length of snout	5½	5½
Snout to eye	13	12¾
Snout to snout hole	13	13½
Snout to pectoral fin	18½	18
Snout to back fin	33	35

The agreement here is very close. The measurements of *D. Walkeri*, which I did not see, are stated by Gray to be "nearly the same as in *D. Moorei*." We have, therefore, two dolphins agreeing with *D. delphis* in their skulls and proportions, but represented as differently colored. I believe that they should be looked upon as individuals of that species, inaccurately represented, or at the most as varieties of that species.

Delphinus algeriensis Loche.*

Professor Fischer regards this species as possibly belonging to *P. marginatus*, but in the coloration, which alone is described, it appears to me to most resemble *D. delphis*. It is larger than any of the specimens of which Professor Fischer has given the dimensions, but is equaled by Scammon's specimens of *D. Bairdii* (= *D. delphis*).

Delphinus albimanus Peale.†

There is in the National Museum a mounted skin, in a bad state of preservation and without a trace of the original coloration, which is recorded as the type of this species. It does not closely resemble Peale's figure of the species. Upon cutting open the head, I found only a portion of the mandible in position. This and the bones of the manus, which I also exposed by cutting away the skin, agree with those of *D. delphis*. We may, I think, fairly conclude that Peale's species represents one of the varieties of *D. delphis*, like *D. forsteri*, which have areas of white on the fins. The type was from ———.

* Loche, *Revue et. Mag. de Zoologie*, 2d ser., XII, 1860, pp. 474, 475, pl. 22, fig. 1.

† Peale, *U. S. Explor. Exped., Mamm. and Ornith.*, 1st ed., 1848, p. 33; Cassin, 2d ed., 1858, p. 29, pl. 6, fig. 1.

Table of measurements.
DELPHINUS DELPHIS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—			Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth at base of crown.	Number of teeth.	
							At base of max. notch.	At its middle.	Breadth of intermaxillary		Anterior margin.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
7063	U. S. N. M.		New York Harbor.		Cm. 43.3	26.6	9.0	4.5	2.3	7.1	22.6	4.9	30.7	32.2	16.1	14.4	7.1	5.3			40—49	
20573	do		Wood's Holl, Mass.		46.7	28.2	9.3	5.3	2.3	7.4	23.3	5.7	32.8	34.2	17.1	14.4	7.2	5.4			50—48	
3885	do				42.0	25.2	8.5	5.2	2.1	7.0	20.1	6.0	30.0	30.5	15.6	14.5	7.1	5.2	35.3		457—457	
15781	do			Jr	41.2	25.3	8.2	4.9	2.2	7.1	21.6	4.1	29.7		16.3	13.9	6.9	4.9	35.5		46—46	
1470a	Brit. Mus.	<i>D. janira</i>	"Zool. Soc."		43.2	25.9	9.1	4.8	2.2	7.3	22.6	4.7	31.5	32.8	16.4	14.1	6.4	5.1		0.25	151—50	
1470b	do	do	Jamaica		34.0	22.9	9.5	5.2	2.4	7.6	(?)		27.1	17.0	14.4	7.1	5.5				7—49	
1470c	do	do	do		34.0	23.9	9.3	4.8	2.1	7.1	20.3	3.4	28.2	15.4	13.2	6.5	4.7			0.25	47—47	
1478a	do	<i>D. pomegrana</i>	India		52.4		9.3	4.9	2.0	7.1	20.1	5.1	28.9	15.9	14.0	6.6	5.5			0.25	151—50	
61478	do	do	do																		42—42	
Walker } No. 1. }	Liverpool Pub. Mus.	<i>D. Moorci</i>	do		43.2	26.9	8.6	5.1	2.0		23.0		31.7	16.4	14.0	6.6	4.4	37.1	40.6	6.1	23.5	7.2
Walker } No. 2. }	do	<i>D. Walkeri</i>	do		42.2	26.7	8.6	4.5	2.2		22.2		31.2	16.5	13.1							47—48
1050a	Brit. Mus.?		New Zealand		45.7	28.9	9.9	5.3	2.4	7.6	24.7	5.1	34.3	35.3	17.0	14.0	7.4	5.3	40.0	5.3	15.9	6.6
348f	do				45.7	28.2	9.2	5.3	2.3	8.0	24.1	4.8	32.5		17.3	14.2	7.0	6.2	38.5	5.1	16.2	7.1

1655a	Brit. Mus. ⁸	South Seas.....	47.0	29.2	9.2	4.8	2.3	7.8	24.9	4.8	34.0	31.9	14.0	14.0	7.5	6.0	39.4	5.7	16.5	6.6	0.25	42-42 46-47	
1472a	do.....	<i>D. major</i>	52.7	33.6	10.5	5.6	2.5	7.6	28.7	5.7	38.5	39.4	17.3	14.1	8.4	6.0	44.4	6.2	26.7	.....	0.35	48-50 46-50
(b)	Liverpool Pub. Mus.	.....	46.3	29.0	10.2	5.7	2.9	.....	24.1	.....	33.4	.....	17.8	14.0	.....	.....	39.3	.....	.....	.....	.....	? 51-? 52 48-49
574b	Cambridge Mus. ⁹	Bahama Isl. anis.	46.7	29.5	10.0	5.2	2.2	7.0	22.9	.....	33.6	35.2	16.8	13.8	7.8	5.8	38.9	6.4	.....	.....	.....	51-54 48-50
574a	do.....	Paris Mus.....	47.4	29.2	10.2	5.6	2.4	7.6	.....	.....	34.8	35.5	17.6	13.8	7.5	5.8	.....	.....	.....	.....	.....	?-47 -42
3079a	do.....	Paris Mus.....	Jr 37.4	22.1	8.4	4.6	.....	.....	.....	.....	.....	15.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	?-49 47-47
15781	U.S.Nat.Mus	New York Bay	do 41.9	25.3	8.2	4.9	2.2	7.1	21.6	4.1	29.7	16.3	13.9	6.9	4.9	35.5	6.6	47-47
3585	do.....	Unknown.....	42.0	25.2	8.5	5.2	2.1	7.0	20.1	6.0	30.0	30.5	16.6	14.5	7.1	5.2	35.3	6.7	? 43-43? 40-46
7053	do.....	N. Y. Harbor	43.3	26.6	9.0	4.5	2.3	7.1	22.6	4.9	30.7	23.2	16.1	14.4	7.1	5.3	6.6	49-49 49-49
3072a	Paris Mus	Unknown.....	Ad 43.8	27.4	9.2	5.1	.....	.....	.....	.....	.....	16.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	50-48
3072a	do.....	Coast of Herault	do 44.5	27.4	8.9	5.1	.....	.....	.....	.....	.....	16.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3075a	do.....	Unknown.....	do 44.5	27.2	8.2	5.6	.....	.....	.....	.....	.....	17.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3077a	do.....	Coast of Algeria ria, 1874.	do 44.5	27.2	8.9	5.1	.....	.....	.....	.....	.....	16.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3058a	do.....	Coast of Algeria	do 45.0	28.2	8.6	4.8	.....	.....	.....	.....	.....	16.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	50-50
3074a	do.....	Unknown.....	do 45.5	28.0	9.4	5.0	.....	.....	.....	.....	.....	17.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	51-50
2487	British Mus	Unknown.....	45.7	28.2	9.1	5.3	2.3	8.0	24.1	4.8	32.5	.....	17.3	14.2	7.0	6.2	38.5	5.3	16.1	7.1	.....	51-50 51-52
"b"	Liverpool Pub. Mus.	Unknown.....	Old 46.4	29.0	10.2	5.7	2.9	.....	24.1	.....	33.4	.....	17.8	14.0	.....	.....	39.4	.....	.....	.....	.....	48-48
20873	U.S.Nat.Mus	Off Block Id, R.I.	Ad 46.7	28.2	9.3	5.3	2.3	7.4	23.3	5.7	32.8	34.2	17.1	14.4	7.2	5.4	.....	.....	.....	.....	.....	51-54* 48-50
574a	Cambridge Mus.	Sydney Mus.....	46.7	29.5	10.0	5.2	2.2	7.0	22.9	.....	33.6	35.2	16.8	13.8	7.8	5.8	38.9	6.4	.....	.....	.....	.....
81b	Paris Mus	Unknown.....	Ad 46.8	28.7	9.9	6.1	.....	.....	.....	.....	.....	18.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3573a	Cambridge Mus.	Bahama Islds	47.4	29.2	10.2	5.0	2.4	7.6	.....	.....	34.8	35.5	17.6	13.8	7.5	5.8	.....	.....	.....	.....	.....	.....

* This mandible is from a different individual from the type-skull

⁷ Labelled D. forsteri.

⁸ Labelled D. longirostris.

⁹ From Sydney Museum.

1 May be three or more small teeth on each side.

2 Tip of beak broken; must add at least 3^{mm}.

3 Tip of beak broken; must add about 1.5^{mm}.

4 Twice one-half the width; the fossae are broken.

5 Tip of beak broken; must add at least 7^{mm}.

DELPHINUS LONGIROSTRIS Cuvier (ex Dussumier).

Delphinus longirostris Dussumier, Cuvier, Règne Animal, 2d ed., 1829, p. 288; Gervais, Ostéog. des Cétacés, 1850, p. 604, Pl. XXXIX, figs. 10, 11.

The name *Delphinus longirostris* was employed by Gray in the Spicilegia Zoologica a year prior to the publication of the second edition of the Règne Animal, but it appears that Gray's specimen really belonged to another genus, viz, *Prodelphinus*,* and there is therefore no impropriety in retaining for the long-beaked, many-toothed *Delphinus* the name which Cuvier took from Dussumier's manuscripts. There is some question, however, as to the specimen which Cuvier had in mind, and the determination of this point is made the more necessary by Professor Flower's recent interesting discovery that the specimen which Gray made the type of his *D. capensis* is a true *Delphinus*, with a longer beak and more numerous teeth than *D. delphis* (List, p. 26).

Cuvier's diagnosis of the species, if diagnosis it may be termed, is very brief. He simply states that it "surpasses even the common dolphin in the number of its teeth, having from fifty-five to sixty throughout. From the coast of Malabar."† There is in the Paris Museum a skull, No. a3065, labeled "*Eudelphinus longirostris*, Malabar. Dussumier, 1827." This is undoubtedly the skull figured by Van Beneden and Gervais (Ostéog., Pl. XXXIX, figs. 10, 11), but those authors give the number of teeth as $\frac{55-55}{54-53}$ ‡ although their figure shows 65-63 teeth in the upper jaw. In the same skull I counted 65-65 teeth in the upper jaw. Pucheran, on the other hand, gives the formula $\frac{55-55}{53-54}$, corresponding to that given by Van Beneden and Gervais in the text, except that the number on the left and right sides of the mandible, respectively, is reversed.

No mention is made of this species in the first edition of the Règne Animal; it appears for the first time in the second edition, of which the first volume was issued in 1829, two years later than the date on the label of Dussumier's specimen. From the evidence at command I believe that the skull which I examined is identical with that which Cuvier had in mind.

Whether this species is identical with Gray's *D. capensis* (Spic. Zool., 1828, p. 2) remains to be determined. If such proves to be the case, Gray's name will have to be adopted for the species. Professor Flower

* Pucheran (Rev. and Mag. de Zoologie, 1856, 452) is at a loss to understand how Gray could apply the terms "osse palatino carinato" (Spicilegia, p. 2) to a skull in which the "palate" is flat, but had he studied the matter more closely I think he would have concluded, as I have, that Gray's term "palate-bone" means in reality the pterygoid.

† McMurtrie, Cuvier's Animal Kingdom, i, 1831, p. 202. The original second edition of the Règne Animal is not at command.

‡ Ostéog., p. 604.

states that the skull which he extracted from the type-skin of *D. capensis* has a longer beak than any other *Delphinus* in the collection, but he does not specify whether absolute or relative length is intended and does not give the number of teeth.

The skull No. a3065, which I believe to be the type of *D. longirostris*, is certainly different from that of *D. delphis*. The skull is 49.5^{cm} long, the beak being 67.9 per cent. of this length, a proportion not reached by any skulls of *D. delphis* which I have examined. It is also much narrower across the orbits, and the teeth, as already stated, are more numerous, viz, $\frac{65-65}{57-58}$. The temporal fossæ are large and rounded, the pterygoids very narrow and sharply keeled. The palatine grooves are very deep, the intermaxillæ are very high near the notch, and are rounded. The specimen does not appear to be old. I did not find any other which I thought specifically identical with it.

Table of measurements.

DELPHINUS LONGIROSTRIS.

Catalogue number.	Collection.		Type of—		Locality.		Sex and age.		Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
											At base of maxillary notches.	At its middle.		
a3065	Mus. d' Hist. nat.		<i>D. longirostris</i> ..		Malabar ..		Ad.	Cm. 49.5	Cm. 33.7	Cm. 8.4	Cm. 3.8	Cm. 2.0	Cm. 7.4	
Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Breadth of anterior nares.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossæ.	Length.	Depth.						
a3065	Cm. 30.2	Cm. 4.7	Cm. 38.1	Cm. 38.8	Cm. 14.7	Cm. 12.9	Cm. 7.4	Cm. 6.1	Cm. 43.7	Cm. 9.9	.....	Cm. 6.3	Cm. 4.6	Cm. { 65-65 57-58

DELPHINUS CAPENSIS Gray.

Delphinus capensis, Gray, Spicilegia Zoologica, 1, 1828, p. 2.

For remarks upon this species, see p. 58.

DELPHINUS ROSEIVENTRIS Wagner.*

Delphinus roseiventris, Wagner, Schreber's Säugeth., Pl. CCCLX, fig. 1.

Dauphin à ventre rose, Jacquinot & Pucheran, Zool. Voyage Astrolabe et Zélée, iii, 1853, p. 39; Atlas, Pl. 22, fig. 2, Pl. 23, figs. 3-4.

I am led to retain this species in the genus *Delphinus* (restricted) on account of the form of the palate and the style of coloration of the exterior.

Pucheran and Jacquinot had three skulls before them when at work upon their account of the species. Two of these skulls, Nos. a3026 and a3027, are in the Paris Museum; the third (apparently) is No. 569 of the museum of Cambridge University. There are figures of both skull and exterior in the atlas of the voyage, and the former is also figured in Messrs. Van Beneden and Gervais' *Ostéographie*, Pl. XXXVIII, figs. 6 and 6a.

The skulls are peculiar for their small size and the unevenness of the surface of the different bones. The palate shows a condition in some measure intermediate between that found in *Prodelphinus* and that characteristic of *Delphinus*. The pterygoids are narrow and small, as in *Delphinus*, and a distinctly marked channel extends on either side of them nearly to the extremity of the beak. These channels are in no wise so deep, however, as in *D. delphis* or *D. longirostris*.

In proportions it differs from the other species of the genus. Its small absolute size would alone serve to distinguish it from the remaining species.

Table of measurements.

DELPHINUS ROSEIVENTRIS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
							At base of maxillary notches.	At its middle.		
a3026	Mus. d'Hist. nat. †	<i>D. roseiventris</i>	.....		Cm. 37.5	Cm. 24.4	Cm. 7.1	Cm. 3.9	Cm. 1.9	Cm. 5.1
569	Cambridge Mus. ‡	.....do.....	Torres Strs	.....	35.4	22.8	6.3	3.6	1.8	5.3

* So far as I have been able to ascertain, the custom of citing Wagner as the authority for the name of this species has arisen simply from the fact that the name occurs on one of the plates which accompany the seventh part of Schreber's *Säugethiere*. The species is not mentioned in the text, nor even in the list of plates.

† L'Astrolabe, 1840.

‡ Voyage de l'Astrolabe.

Table of measurements—Continued.

Catalogue number.	Length of tooth-line.		Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Breadth of anterior nares.	Number of teeth
	Cm.	Cm.	Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hindler margins of temporal fossæ.	Length.	Depth.						
a3026	21.6	3.3	27.9	.....	12.7	10.6	6.1	4.3	32.8	6.4	.....	5.3	3.2	{ 47+— 48—?
569	20.3	.....	25.9	27.0	12.0	.....	.....	.....	30.0	5.3	.....	.....	.....	{ 48—48? 45—45

5. PRODELPHINUS Gervais.

Prodelphinus, Gervais, Ostéog. des Cétacés, 1880, p. 604.

This genus is closely allied to *Delphinus* and *Tursiops*. The chief character which has been brought forward as separating it from *Delphinus* is a negative one—the absence of deep lateral palatine grooves. From *Tursiops* it is distinguished by its smaller and less numerous teeth and (generally) more numerous vertebrae. These latter characters, it must be confessed, are not very trenchant, and it may be found necessary at a later day to unite *Prodelphinus* with *Tursiops*.

The genus comprises a large number of nominal species, for the most part founded upon single skulls. Nearly every large collection contains a considerable number of skulls which may be assigned to this genus. It is found, however, in many cases that when a large number of these skulls is brought together they tend to form continuous series. The differences between the extremes of these series are often striking and perfectly definable, but in the middle they melt away and elude definition. From this fact and from the absence of material the task of revising the species of this genus is a very difficult and disheartening one. Professor Flower has, however, led the way (in the *Characters and Divisions* and also in the *List*) to a better knowledge of the group, and in his opinions I for the most part concur.

In the succeeding pages I shall consider about 23 species which appear to me to belong to this genus, including some which have not been touched upon by Professor Flower. I bring together the names of all these species in the following table:

<p><i>Prodelphinus</i> <i>cæruleo-albus</i> (Meyen). <i>enphrosyne</i> (Gray). <i>styx</i> (Gray). <i>euphrosynoides</i> (Gray).</p>	<p><i>Prodelphinus</i> <i>dorides</i> (Gray). <i>tethyos</i> (Gervais). <i>marginatus</i> (Duvernoy). <i>dubius</i> (Cuvier).</p>
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Prodelphinus doris (Gray).
plagiodon (Cope).
normalis (Gray).
brevimanus (Wagner).
frenatus (F. Cuvier).
frontalis (Dussumier).
attenuatus (Gray).
capensis (Gray).

Prodelphinus punctatus (Gray).
malayanus (Schlegel).
pseudodelphis (Wagner).
longirostris (Gray).
stenorhynchus (Gray).
microps (Gray).
alope (Gray).

Several other species were assigned to this genus by Professor Flower which seem to me to belong elsewhere. Of these *C. obscura* Gray, *C. similis* Gray, and *Electra thicolea* Gray, seem to me to belong to *Lagenorhynchus*; *Delphinus roseiventris*, Hombron and Pucheran, I prefer to leave in the genus to which it was originally assigned; *D. superciliosa*, Lesson and Garnot, is not sufficiently well defined to admit of an opinion.

PRODELPHINUS CÆRULEO-ALBUS (Meyen).

Delphinus caeruleo-albus, Meyen, Nova Acta Nat. Curios., xvi, pt. 2, 1833, pp. 609, 610, pl. 43, fig. 2; Wagner, Schreber's Säugeth., 7th Th., 1816, p. 336, pl. 363; Gray, Zool. Erebus and Terror, 1846, p. 42.

Lagenorhynchus caeruleo-albus, Gray, Catalogue of Cetacea, 1st ed., 1850, pp. 100, 101; 2d ed., 1866, pp. 268, 269.

This species is based on a specimen obtained by Meyen on the east coast of South America, in the vicinity of the Rio de la Plata, and deposited in the Zoological Museum of Berlin.

The skull, which I was enabled to examine in 1887 through the kindness of Dr. Hilgendorf, resembles that of *P. euphrosyne*, and also in some respects that of *P. doris*. It is peculiar in having very small oval temporal fossæ, which are directed upwards strongly behind. The intermaxillæ are much arched in the middle of the rostrum, and the pterygoids are strongly carinate. In the skeleton I counted 7 cervical vertebræ, 14 dorsal vertebræ, and 52 lumbar and caudals, but a few more should probably be added to the number of the latter. The transverse processes of the lumbar vertebræ are slender and are directed forwards.

The color of the species, as indicated in Meyen's figure and description, is apparently quite different from that of any other known species. (See *Synopsis*, p. 163.)

Why this species was included by Gray in the genus *Lagenorhynchus* is not clear, since the form of the skull and beak are characteristic of *Prodelphinus*. Cassin's reasons for associating with this species the *Delphinus albirostratus* of Peale are equally unsatisfactory.* I have been unable to identify the latter species.

* Cassin, U. S. Explor. Exped., Mammalogy and Ornithology, 2d ed., 1858, p. 31; Atlas, pl. 6, fig. 2.

PRODELPHINUS EUPHROSYNE (Gray).

Delphinus euphrosyne, Gray, Zool. Erebus and Terror, 1846, p. 40, Pl. XXII.

Delphinus styx, Gray, Zool. Erebus and Terror, 1846, p. 39, Pl. XXI.

Delphinus tethys, Gervais, Bull. Soc. d'Agric. Hérault, XL, 1853, p. 150, pl. 1, figs. 1-4.

Delphinus marginatus, Pucheran, Revue et Mag. Zool., 2^{me} sér., VIII, 1868, p. 545, pl. 25.

Tursio dorcides, Gray, Cat. Seals and Whales, 1865, p. 400.

Clymene dorides, Gray, P. Z. S., 1866, p. 214.

Clymenia euphrosynoides, Gray, Synop. Whales and Dolph., 1868, p. 6. (No description.)

The type of the species above named, together with three skulls in the Paris Museum (Nos. a3022-a3024), and skull No. 179 from Jamaica, in the collection of the Royal Victoria Hospital, Netley, agree well together, both as regards absolute size, relative proportions, and the disposition of parts. The length of the beak varies from 56.2 per cent. to 61.5 per cent. of the length of the entire skull. From the series which groups itself around the type of *P. doris* they are distinguished by their greater absolute size, relatively longer beak, broader intermaxillæ, and larger temporal fossæ, and by the possession of rather a larger number of teeth. It must be confessed, however, that the recognition of these and similar characters is rendered difficult, as already stated, on account of the blending of differences at the extremes of the series. The type *P. euphrosyne* in the Norwich Museum (where I examined it) is well figured in Gray's *Synopsis*, pl. 22. It appears to be the skull of an adult individual.

The type of *D. styx* is lost and we have only Gray's figure (*Synopsis*, pl. 21) to work from. The obliging secretary of the Royal United Service Institution informed me by letter that this skull, with others, had "long ago been disposed of." I agree with Professor Flower that *D. styx* is probably identical with *P. euphrosyne*. Indeed, Gray himself was inclined to take the same view (see the *Catalogue*, p. 250). There is little, however, except its rather large size by which to distinguish it from *P. doris*.

D. tethys, Gervais, is founded on a single skull from Valreas, at the mouth of the Orb. It is broken behind and appears as if diseased along the frontal suture on the left side. The temporal fossæ are rounded. The pterygo ds are not wide and have a sharp keel. Gervais compared this species only with *Delphinus delphis* and *Prodelphinus dubius* and *frænatus*. Whether he regarded the two latter species (which he thought identical) as identical with or distinct from *P. euphrosyne* we have no means of knowing. At all events we lack the authority of his opinion for uniting *P. tethys* with *P. euphrosyne*. On the other hand there seems equally to be no reason for regarding these species as distinct. If there are characters by which the skulls may be

really separated they have yet, as Professor Flower has already said, to be detected.

In *D. marginatus*, Pucheran, we have for the first time in this genus an instance in which both the external and osteological characters are known. We are fortunate enough to have also complete data regarding three individuals of a closely allied species, *P. plagiodon*, Cope, and are able to point out the distinctions between the two species very satisfactorily (see p. 67). As regards the skull of *P. marginatus*, it so very closely resembles that of *P. euphrosyne*, both in size, proportions, and details of structure, that I am unable to find any ground for the separation of the species. Professor Flower and Dr. Fischer both advance the same opinion, though with some hesitation.

Clymene dorides and *Clymenia euphrosynoides*, Gray.

The type-skulls of these two species are of the same absolute length and exhibit the closest agreement in the relative proportions of parts. No one who has examined them side by side, can, I think, doubt that they represent the same species. They are smaller than the type of *P. euphrosyne*, but agree with that skull in proportions and details of structure. *C. euphrosynoides* was not described by Gray, and the name has therefore no validity except for those who hold that reference to a figure answers in the place of a description.

Table of measurements.

PRODELPHINUS EUPHROSYNE.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
							At base of maxillary notches.	At its middle.		
1473a	Brit. Mus.....	<i>C. dorides</i>...	.....	..	Cm. 43.8	Cm. 25.4	Cm. 11.1	Cm. 5.7	Cm. 3.1	Cm. 8.0
351a	..do	<i>C. euphrosynoides</i>.	.....	..	43.8	25.6	10.9	5.8	2.5	8.1
179	Roy. Vic. Hosp., Netley.	.....	Jamaica	Ad.	43.6	25.2	10.4	5.2	2.3	7.8
n. n.	Norwich Mus...	<i>P. euphrosyne</i>.	.....	..	47.0	28.7	11.4	5.8	.....	.....
n. n.	Mus. d'Hist. nat.	<i>D. marginatus</i> .	Dieppe	♂	47.5	29.2	11.7	6.3	3.3	9.2
a3021	..do	<i>D. tethyos</i> ...	Mouth of Orb .....	..	44.3	24.9	10.9	5.6	3.1	8.9
a3022	..do .....	.....	.....	..	41.9	24.4	10.7	5.6	2.3	7.6
a3023	..do .....	.....	?Mediterranean.....	..	43.7	25.7	10.4	5.6	2.7	8.6
a3024	..do .....	.....	.....	..	46.2	27.5	11.6	6.6	3.1	8.3

Table of measurements—Continued.

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superciliary nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.						
1473a	Cm. 21.8	Cm. 4.8	Cm. 30.5	Cm. 32.2	Cm. 18.7	Cm. 15.2	Cm. 6.3	Cm. 4.6	Cm. 37.1	Cm. 5.1	Cm. 21.6	Cm. 6.6	Cm. .25	{ 42—41 44—44 50—50 ?—?
351a	22.9	3.8	30.5	.....	.....	.....	5.8	4.5	.....	.....	.....	.....	.25	{ 45—45 45—45 45—45 43—43
179	21.6	4.6	29.5	.....	17.8	14.0	6.3	4.3	.....	4.3	.....	6.6	.....	{ 48—48 45—44 46—45 41—42
n. n.	.....	.....	.....	.....	20.3	.....	6.1	4.0	41.1	.....	.....	.....	.....	{ 44—44 44—45 44—45 44—45
n. n.	25.4	4.6	34.5	35.8	20.3	15.3	6.3	5.1	40.9	*5.6	.....	7.4	.....	{ 46—45 41—42 41—46 44—45
a3021	21.6	4.3	30.3	32.0	19.8	15.3	7.1	5.8	36.2	5.3	.....	7.2	.....	{ 46—48 44—43 42—42 40—40
a3022	21.1	4.3	29.2	31.6	19.6	14.8	5.6	4.3	35.6	4.7	.....	6.3	.....	{ 42—42 40—40
a3023	22.1	4.6	31.1	.....	18.8	14.0	6.9	4.8	37.1	5.6	.....	7.4	.....	{ 42—42 40—40
a3024	24.2	4.3	33.5	35.3	21.0	15.0	7.1	4.8	39.9	5.1	.....	6.9	.....	{ 42—42 40—40

*Extreme.

PRODELPHINUS (?) LATERALIS Peale.

Delphinus lateralis, Peale, Mamm. U. S. Expl. Exped., 1st ed., 1848, p. 35, Pl. VIII, fig. 1.

Lagenorhynchus lateralis, Cassin, Mamm. U. S. Expl. Exped., 2d ed., 1853, p. 32, Pl. VII, fig. 1.

Every student must be struck with the general resemblance of Peale's figure to the figure of *P. marginatus* given by Pucheran.* The color of the two type-specimens seems to have been similar, but there are certain differences which make it impossible to refer *P. lateralis* to *P. marginatus* without question.

The general color of the upper surfaces of *P. marginatus* is represented as black, while Peale's animal is said to have been "light purplish-gray." It should be borne in mind, however, that the specimens of the former species were drawn some time after they were captured, while it is probable that Peale's sketch was made immediately. The general arrangement of the dark bands is much alike in both figures, and the color of the fins is identical.

On the other hand, there is nothing corresponding to the spots so plainly indicated in Peale's sketch to be found in the drawing of *P.*

* Revue et Mag. de Zool., 2^{me} sér., VIII, 1856, p. 545, pl. 25.

marginatus. The dorsal fin is situated much farther back in *P. marginatus* than in *P. lateralis*.

The localities from which the different specimens were derived are far apart.

On account of the presence of these differences, real or apparent, and of others which may be perceived by comparison of the figures, it is not possible to unite the species at the present time.

Why Cassin should have regarded Peale's species as belonging to the genus *Lagenorhynchus* is not clear. The shape of the beak is certainly not characteristic of that genus. Since *Prodelphinus* is not distinguishable from *Delphinus* by external characters in the present state of knowledge, I have referred Peale's species to this genus with a mark of interrogation. Its close resemblance to *P. marginatus* externally is my chief reason for placing it here.

PRODELPHINUS PLAGIODON Cope.

Delphinus plagiodon, Cope, Proc. Acad. Nat. Sci. Phila., 1866, p. 296.

Complete data regarding three individuals belonging unquestionably to this species are at command. The skeletons, photographs of the exterior, certain of the viscera, and measurements of these specimens are in the collection of the National Museum. There is also a cast of one individual. One specimen, No. 22017, was captured off Hatteras, North Carolina, by the naturalist of the United States Fish Commission steamer *Albatross*. The second specimen, No. 15030, was purchased by the Smithsonian Institution from the fishermen of Pensacola, Fla., through Messrs. Warren & Stearns of that place. A description of this individual has been given by the writer in the Smithsonian Report for 1884 (pt. 2, pp. 317-324, Pls. 1-VI). It is therein identified with *P. plagiodon* (Cope), which species is in turn regarded as apparently identical with *P. doris* (Gray). While, after further reflection and comparison of specimens, I am more than ever convinced of the correctness of the identification of the freshly-acquired specimens with *P. plagiodon* (Cope), on the other hand I begin to doubt whether the latter species should be regarded as identical with Gray's *Clymenia doris*. If the relative proportions of the species alone are considered, the two species do, indeed, appear to be identical, but when the absolute size is regarded the matter assumes a different aspect. The type-skull of *P. plagiodon* is from a youngish individual, yet it is larger than the type of *P. doris* or any of the skulls called *doris* or *dubius* in the collections of the British Museum, the Royal College of Surgeons, and the Museum d'Histoire naturelle. The Pensacola and Hatteras specimens, which are clearly not old (the epiphyses of the vertebral centra are not ankylosed), are still larger than the type of *P. plagiodon*. They exceed the type of *P. doris* in length by 2.55 inches and 2.3 inches, respectively. The Pensacola skull is more than an inch longer than the largest of the twenty-nine skulls of the

doris series which I examined in the European collections. Furthermore the teeth are considerably larger than in *P. franatus*. They measure 5^{mm} in diameter at the base, and but 4 to 4½ are included in 26^{mm} (=1 Danish inch). In Dr. Lütken's specimens the teeth measured about 3^{mm} in diameter, and 5 to 5½ were included in a Danish inch.

I am inclined to believe that *P. plagiodon* must be regarded as a larger species than *P. doris*, though the skulls of both are much alike in appearance.

The skull of *P. euphrosyne* differs from that of *P. plagiodon*, chiefly by its more numerous teeth and smaller temporal fossæ. The skeleton of the type of *P. marginatus* gives the following formula: C. 7; D. 15; L. 21; Ca. 23 = 76.

The two specimens of *P. plagiodon* give the following formulæ: No. 15030 ♂ Pensacola, Fla., C. 7; D. 14; L. 19; Ca. 29 = 69. No. 22017 ♂ Hatteras, N. C., C. 7; D. 14; L. 19; Ca. 28 = 68.

Other differences in the skeleton are as follows:

In <i>P. marginatus</i> .	In <i>P. plagiodon</i> .
(1) The third cervical vertebra is united to the second.	(1) It is free.
(2) The neural spines cease at the 68th vertebra.	(2) At the 60th vertebra.
(3) The transverse processes cease at the 63d vertebra.	(3) At the 54th vertebra.
(4) The foramina at the base of the transverse process begin at the 59th or 60th vertebra.	(4) At the 49th vertebra.
(5) The centra are flattened and oblong at the 68th vertebra.	(5) At the 61st vertebra.
(6) The anterior zygapophyses end at the 28th vertebra, and begin again at the 44th vertebra.	(6) They end at the 29th vertebra (as distinct processes) and begin again at 40th vertebra.
(7) The phalanges are as follows: I, 1; II, 8(+); III, 6; IV, 2; V, 0.	(7) As follows: I, 2; II, 9; III, 7; IV, 3; V, 1.

P. plagiodon is readily distinguishable from *P. marginatus* (= *P. euphrosyne*) externally by its spotted skin.

1. PRODELPHINUS MALAYANUS (Lesson).

Delphinus malayanus, Lesson, Voyage de la Coquille, Zool., I, pt. i, 1826, p. 184; atlas, pl. 9, fig. 5; Schlegel, Abhandl. Gebiete Zool., Hft. 1, 1811, p. 20, Pl. I and II, fig. 2; Pl. IV, fig. 3.

? *Delphinus brevirmanus*, Wagner, Schreber's Säugeth., 1846, pl. 361, fig. 2.

? *Dauphin à petites pectorales*, Jacquinot & Pucheran, Voyage de la Astrolabe & Zélée, Mamm. & Ois., 1853, p. 38; atlas, pl. 21, fig. 2; pl. 23, figs. 7 and 8.

2. PRODELPHINUS ATTENUATUS (Gray).

Steno attenuatus, Gray, Zool. Ere. & Terr., 1846, p. 44, Pl. XXVIII.

Delphinus pseudodelphis, Wiegmann in Schreber's Säugeth., pl. 358; Wagner in do., 1846, p. 332; Schlegel, Abhandl. Gebiete Zool., Hft., I, 1841, p. 22.

Steno capensis, Gray, Proc. Zool. Soc., London, 1865, p. 522.

Clymene punctata, Gray, Proc. Zool. Soc., London, 1865, p. 738; Cat. Seals and Whales, 1866, p. 398, fig. 101.

3. PRODELPHINUS FRÆNATUS (F. Cuvier).

Delphinus frænatus, F. Cuv., Mamm. de la Ménag., liv. 58, liv. 59; Hist. nat. des Cétacés, 1836, p. 155, pl. 10, fig. 1.

Delphinus frontalis, Dussumier, in Cuv. Règne Animal, 1, p. 288. (Fide Wagner.)

Delphinus doris, Gray, Zool. Ere. & Terr., 1846, p. 39, Pl. XX.

? *Delphinus dubius*, G. Cuv., Ann. du Muséum, XIX, 1812, p. 14.

Delphinus clymene, Gray, Cat. Seals and Whales, 1866, p. 249.

Clymenia normalis, Gray, Proc. Zool. Soc. London, 1866, p. 214.

The relationships of these three species (if such they be) are so close that I have thought best to consider them conjointly. Professor Flower has said (*List*, p. 30) that—

Though single well-marked specimens of Gray's *Clymenia doris* and *Steno attenuatus* may be so unlike as to justify their being placed in distinct species, yet when a large series, such as those of the British Museum and College of Surgeons combined, are compared together, the two extremes pass so insensibly into each other that it is difficult to avoid the suspicion that the differences depend upon age, or sex, or on individual variation. Unfortunately these forms are known at present only by skulls. When the remaining parts of their organization can be correlated with them probably other specific distinctions will be demonstrated.

That it is unsound to combine all these nominal species at present appears from the fact that there are indications that the exterior of the individuals from which some three or four of the skulls were derived differed much in appearance.

In the atlas of the Voyage of the *Coquille* (pl. 9, fig. 5) is figured the exterior of a dolphin, taken between Java and Borneo, and in the text styled *D. malayanus*. With this species Schlegel, in the *Abhandlungen*, identifies a skull from Celebes, two skulls from Java, and a young individual, somewhat over one and one-half feet long, from Borneo. This individual appears to have been a suckling, as is indicated both by its size and by the fact that "it still had some hairs on the sides of the snout," and that the teeth were "still only incompletely broken through the gums." "The color is bluish-black gray, the under parts somewhat clearer." The skull from Celebes, which I examined, closely resembles the type of Gray's *C. attenuatus*, but is absolutely larger, with relatively longer beak and shorter tooth-row. The number of teeth is, however, nearly the same.

Of the individual which served for the type of *D. malayanus* of the *Coquille* no parts appear to have been brought home. The color is described as "uniformément cendrée."* It was 5 feet 11 inches (French) long.

It is, of course, impossible to determine whether Schlegel's identification of his specimens with *D. malayanus* was a correct one, but the young individual was at all events not unlike that species in color.

In the atlas of the Voyage of the *Astrolabe* and *Zélée* (pl. 21, fig. 2; pl. 23, figs. 7 and 8) are figured the skull and exterior of another dark

* All the figures on plate 9 of the atlas of the *Coquille* are colored bluish-green, which is evidently not intended as the natural color.

gray species, called *Dauphin à petites pectorales*. Gray (*Catalogue*, page 236) states that it was from Banda, Singapore, but on what authority I have been unable to determine. In the figure of the exterior the pectoral fins are entirely too small. The measurements in the text agree well with those given by Lesson for *D. malayanus*. Furthermore, the skull figured on plate 23, figs. 7 and 8, very closely resembles the skull which Schlegel identified with *D. malayanus*. It is a little smaller and has rather smaller temporal fossæ, but otherwise agrees with Schlegel's skull in details of structure.

From such evidence as presents itself it seems to me probable that Schlegel was correct in his identification, and that *D. malayanus* Lesson and *D. brevimanus* Wagner are identical.

That this species is distinct from *P. attenuatus*, though closely related, is apparently indicated by the differences in the proportions derived from the measurements given on page 72.

In 1865 Gray, in the *Catalogue*, page 398, described a species under the name of *Clymene punctata* from a specimen in the Public Museum, Liverpool. Through the kindness of Mr. Moore, I examined the original material upon which this species was based. My time was so limited, however, that I could only examine and measure the skull and note the colors in the original sketch of the exterior.

The skull very closely resembles *P. frenatus* both in size and proportions, and I think there can be little doubt that it is identical with the latter specifically. The exterior is as Gray figured it (*Catalogue*, page 398, fig. 101). The upper parts (see diagnosis, p. 166) are black, the under surface, the lower jaw, pectoral fin, and the band over the tail are very dark slate-gray. There are numerous white spots on the sides. The measurements and locality are correctly quoted by Gray from the original.

The exterior in this species is plainly different from that of *P. malayanus*, while, as already stated, the skull is precisely like *P. frenatus*.

The skull of *P. attenuatus* closely resembles two others, namely, one called *D. pseudodelphis* Wiegmann, in the Leyden Museum, and the type *Steno capensis* Gray. I examined in the Leyden Museum a skull which in all probability is that referred to by Schlegel in the *Abhandlungen* as *D. pseudodelphis*. It closely resembles Gray's *S. attenuata*, and if Schlegel's identification is correct, *D. pseudodelphis* would, therefore, seem to be identical with Gray's species. If the identification can be proven correct, *pseudodelphis* would supplant *attenuata* as the name of the species under consideration.

The type skull of *Steno capensis*, Gray, scarcely differs at all from *S. attenuata* except in size. It is about an inch longer than the type-skull of the latter species. Professor Flower holds that the two species are "not distinguishable" (*Char. and Dir.*, p. 498), and there is every reason to regard this opinion as the correct one.

The evidence at command seems, therefore, to warrant the union of the three nominal species *D. pseudodelphis*, Wieg., *S. attenuata*, and *S. capensis* into one.

Prodelphinus frænatus (F. Cuv.).

The two skulls in the Paris Museum labeled *P. frænatus*, and presumably the types of that species, are precisely like the type-skull of *P. doris* (Gray). The exterior of *P. frænatus* is different from that of *P. punctata* (= *P. attenuata*). It lacks the spots of the latter species, and the pectoral fins are black, like the back, rather than light-colored, like the belly.

I was formerly inclined to regard *Delphinus plagiodon* as probably synonymous with *P. doris* (= *P. frænatus*). It is somewhat different in color, however, and the greater size of the skulls now at command appears to indicate that it is a somewhat larger species than *P. frænatus*.

Supplementary remarks.

Dr. Lütken, in his recently-published contribution to the history of *Prodelphinus* and other genera, to which reference has already been made, gives much new information in regard to this very perplexing group of species.* He presents measurements and other data regarding four skeletons and three skulls of *P. doris* (= *P. frænatus*), and the same regarding two skeletons which he identifies with *P. attenuatus*.

These two species have the following vertebral formulæ: *P. doris*, C. 7; D. 14; L. 16-18; Ca. 31-33=70. *P. attenuatus*, C. 7; D. 15; L. 21; Ca. 36-38=79-81.

One individual of *P. doris* is represented in a sketch by Captain Andréa as being dark on the back, white on the belly, and covered with very numerous spots. Another individual is represented as dark greenish-gray on the back, light gray on the belly, and with but few spots or streaks, which are confined to the region in front of the pectoral fin. There is a well-marked band between the pectoral fin and the forehead. (A copy of Dr. Lütken's figures is given in the plates. These figures are given only to show the color-marking; the outlines are diagrammatic.) *P. attenuatus* is represented as dark on the back and ashy-gray below.

Except as regards their different vertebral formulæ and the correlated disposition of the processes and foramina of the vertebrae, the specimens identified by Dr. Lütken as *P. attenuatus* might be placed under *P. frænatus*. I am not aware, however, that any such considerable variations in the number of vertebrae as are here pointed out have been recorded as occurring among individuals of a single species.

* Lütken, K. Danske Vidensk. Selsk. Skrifter, 6^{te}. Raekke, v, 1889.

Nevertheless, since the skulls and external proportions of the specimens identified by Dr. Lütken as *P. doris*, *attenuatus*, and *alope* are almost identical, the question naturally arises whether the difference in number of vertebræ may not possibly be due to individual variation.

It would be very interesting in this connection to know the vertebral formula of Gray's *P. punctatus*, the skull of which seems to me identical with the type-skull of *P. attenuatus*, but whose style of marking resembles Dr. Lütken's *P. doris*, No. 4. Since Dr. Lütken states that the types of Gray's *D. moorei* and *D. walkeri* (= *D. delphis*), which are labeled "Walker's No. 1" and "Walker's No. 2," were really obtained by Captain Andréa, it occurs to me that the type of *D. punctatus*, which is labeled "Walker's No. 3," may also have been obtained by Captain Andréa. It is from a point near the Cape Verde Islands, only a few miles distant from the place in which Dr. Lütken's *P. doris*, No. 2, was derived, and was probably caught in the same year.

The specimen which Dr. Lütken places under "*P. obscurus* (Gray)"* certainly does not belong to that species, which is, I believe, a *Lagenorhynchus*. In color this specimen seems to me intermediate between the two specimens figured on page 34.† In external proportions it agrees with *P. doris* No. 4,‡ and in skeletal proportions with this and other specimens on pages 32-33.

In conclusion, it may be said that it is necessary for the present to regard *P. attenuatus* as a distinct species, on account of its different vertebral formula.

The difference in color between *P. frænatus* and Dr. Lütken's specimen of *P. doris* may be regarded as due to difference in age. As already stated, however, if it should be shown hereafter that the number of vertebræ is subject to variation, there is apparently no other reason why all the specimens should not be regarded as belonging in one variable species.

**Op. cit.*, p. 42.

†*Op. cit.*

‡*Op. cit.*, p. 31.

Table of measurements.

PRODELPHINUS MALAYANUS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Greatest breadth between outer margins of intermaxillary proximally.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysi of mandible.	Length of tooth row of mandible.	Depth between angle and coronoid process.	Number of teeth.	
							At base of maxillary notches.	At its middle.				Anterior margin of upper jaw.	End of crest of pterygoid.	Orbits.	Under margin of temporal fossae.	Length.	Depth.						
3028a	Mus. d'Hist. nat.	<i>D. brevimanus</i>	Strs. of Malacca.	.....	Cm. 41.3	Cm. 25.4	8.8	4.2	2.3	6.9	2.4	3.8	29.8	15.8	13.2	5.9	4.8	34.9	7.1	.....	.....	.....	41—38 41—40
5	Mus. Pays-Bas.	.....	Bet. Java and Celebes.	.....	Cm. 42.5	Cm. 26.7	9.2	4.4	2.1	7.0	23.0	4.0	36.0	.....	12.5	6.9	5.2	.....	7.5	.....	.....	.....	39 30

PRODELPHINUS ATTENUATUS.

347b	Brit. Mus.	<i>S. attenuatus</i>	.....	.....	Cm. 38.3	Cm. 22.9	8.7	3.8	2.0	6.1	19.2	4.3	26.2	14.7	11.8	6.5	5.0	32.9	7.4	19.3	5.3	.....	43—43 42—42
1519a	.....do	<i>S. capensis</i>	Cape Good Hope.	.....	Cm. 41.3	Cm. 25.1	9.3	4.2	2.4	6.7	21.4	4.3	29.2	30.0	16.4	6.7	5.6	35.0	7.5	20.3	5.7	.....	40—41 38—37
127	R. Vic. Hosp'l, Nedley.	.....	.....	Ad.	Cm. 36.8	Cm. 25.4	18.6	4.1	2.2	6.8	21.6	4.2	29.5	30.5	16.0	6.0	4.7	34.3	6.9	21.1	6.0	.....	40—40 40—40
3	Mus. Pays-Bas.	.....	.....	.....	Cm. 39.2	Cm. 24.4	9.3	4.1	2.3	7.4	20.5	4.2	28.0	.....	12.5	6.4	4.2	.....	6.7	.....	.....	.....	45 41

1 Least.

PRODELPHINUS FRENATUS.

352a	Brit. Mus.....	<i>D. doris</i>	38.3 23.5	9.4	5.0 2.8	7.4 20.3 4.1	26.9	28.7 16.4 13.1	7.1	5.3 33.9 6.3 19.3	6.1	{ 38-34 34-34
22, 12, 69 1.	Liverpool Pub. Mus ¹.	.....	40.6 21.8	8.9	4.4 2.5	20.3	26.9	16.5 13.1	7.0	5.1	.....	{ 36-36 34-36
	.....do	.....	41.3 24.8	8.6	4.1 3.6	21.6	29.2	15.2 12.7	6.1	34.9	.....	{ 37-39 37-39
Walker's No. 3.	Liverpool Pub. Mus.	Cape Verde Ids	38.5 23.3	8.3	4.1 2.3	20.3	26.4	15.2 11.9	.....	32.2 6.6	.....	{ 42-42 41-40
	.....do	.....	38.1 21.6	8.9	4.8 2.9	18.4	25.0	16.3 12.4	7.3	5.8 31.1	.....	{ 38-38 33-33
126	Roy. Vic. Hosp ¹ at Netley.	Atlantic	38.8 22.6	49.0	5.1 2.8	7.1 19.0 3.9	25.4	26.9 18.2 13.1	6.6	5.3 33.4 25.8 18.0	6.1	{ 35-33 32-32
63036	Mus. d'Hist. nat.	.....	340.6 25.2	18.7	4.2 2.3	7.0 20.6 5.1	29.4	29.5 15.8 11.2	6.9	5.0	.....	{ 34-145 ?-?-
63029	.....do	Indian Ocean	41.3 25.2	18.7	4.2 2.3	6.6 21.9 3.7	29.5	31.0 15.4 12.8	5.8	5.0 34.9 7.9	5.6	{ 37-38 37-38
63030	.....do	.....	41.7 25.7	49.2	4.1 2.2	6.7 22.1 4.5	29.5	16.0 13.0	6.0	5.0 35.0 8.0	6.1	{ 40-39 39-38
63039	.....do	.....	41.3 25.4	18.7	4.3 2.2	6.6 22.4 3.7	29.2	31.0 15.8 11.7	6.6	5.1 34.9 7.9	5.6	{ 44-44 43-44
63038	.....do	.....	40.9 24.9	18.7	4.3 2.3	6.6 21.4 4.6	29.2	30.0 15.5 12.5	6.6	4.6 33.8 7.6	6.0	{ 34-40 41-40
63032	.....do	.....	36.2 20.3	18.5	4.3 2.3	6.6 17.8 3.6	24.2	15.3 12.6	6.6	4.6 30.5	5.9	{ 37-37 37-37
63027	.....do	Madagascar	38.8 23.1	8.7	4.5 2.5	6.3 19.7 4.2	26.9	28.0 15.4 12.2	6.3	4.3	.....	{ 42-43 ?-?
63040	.....do	.....	41.3 25.4	8.7	4.1 2.3	6.9 21.9	36.0	30.7 15.0 12.5	6.3	4.8	.....	{ 39-38 ?-?
63031	.....do	Parages de St. Helene.	38.6 22.6	8.7	4.8 2.6	6.9 19.1 3.8	25.4	27.0 16.2	6.9	5.3 32.4 5.3	5.8	{ 37-38 36-35
63056	.....do	Indian Ocean	42.2 26.4	8.4	4.1 2.0	6.6 23.1 4.0	30.7	32.0 16.0 12.2	6.7	4.8 36.1 8.4	6.1	{ 41-42 42-41
63034	.....do	Cape Verde	37.5 21.4	8.7	4.7 2.6	7.1 18.6 3.7	24.9	27.2 15.3 12.4	6.9	4.3 31.8 5.9	6.1	{ 36-37 34-35
63033	.....do	.....do	37.6 21.8	8.9	5.2 2.7	7.3 18.9 3.8	25.7	26.9 16.4 12.7	7.1	5.0 32.0 5.9	6.3	{ 37-38 36-35
63035	.....do	<i>P. frontalis</i>.....do	39.1 22.6	9.2	4.6 2.3	7.5 19.8 4.6	26.4	29.2 15.8 12.2	6.9	4.8 33.5 6.3	6.0	{ 38-37 37-36

¹Least.

²Greatest.

³The beak is somewhat damaged at the tip.

* From Mr. Tyerman.

Table of measurements—Continued.
PRODELPHINUS FRENATUS—Continued.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Greatest breadth between outer margins of intermaxillæ at middle of beak.	Length of tooth-line.	Last tooth to base of maxillary notches.	Anterior margin of superior nares.	End of crest of pterygoid.	Extremity of beak to—		Breadth between—	Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
							At base of notches.	At its middle.						Length.	Depth.		Orbits.	Under margin of temporal fossæ.					
576f	Cambridge Mus.				43.1	26.6	8.8	4.3						Com.	Com.	15.9	6.8		7.7			{ 41—	
573	do				40.4	24.3	8.0	4.0						Com.	Com.	16.0	6.6		7.1			{ 38— 38—	
570a	do				35.1	19.7	8.4	4.6						Com.	Com.	15.1	7.0		4.7			{ 34— 34—	
576i	do				37.7	21.2	9.0	5.3						Com.	Com.	16.2	6.7		4.8			{ 32— 38—	
1667	Oxford Mus.			Ad.	38.3	22.6	8.3	4.8	2.5	6.3	19.6	3.6	26.1	Com.	Com.	14.8	6.6	5.3	31.9	5.8	18.4	6.1	{ 37—38 37—36
3032	R. Coll. Surg.				40.3	24.7	8.9	3.8	2.2	7.0	20.9	3.8	28.7	Com.	Com.	26.8	6.3	5.2	34.3	20.6	5.7		{ 40—40 40—40
3033	do				40.0	24.4	8.8	4.4	2.5	6.3	20.3	4.9	28.7	Com.	Com.	30.0	7.0	4.4	33.6	20.0	5.7		{ 40— ?—35
3034	do				38.1	22.8	11.4	3.8	2.2	6.0	15.2	4.8	16.0	Com.	Com.	14.0	5.7	4.4	31.4	6.6	19.2	5.2	{ 39—39 38—39
3035	do				39.8	23.9	8.9	3.8	2.2	7.0	20.0	4.8	28.2	Com.	Com.	28.2	5.6	4.3	34.3	7.1	20.3	5.7	{ 40—? 40—39
3036	do				39.6	22.8	8.8	4.6	2.5	7.3	20.0	3.5	28.5	Com.	Com.	27.3	6.6	4.4	33.1	5.4	19.5	6.5	{ 37—36 35—86
3038	do				42.2	24.4	9.2	5.1	2.5	7.6	21.2	3.8	30.5	Com.	Com.	28.2	7.0	4.4	35.5	6.3	20.6	5.8	{ 35+—38 35—37
350a	Brit. Mus.	<i>D. clymene</i>			39.1	23.9	8.9	5.3	2.5	6.9	19.7	4.8	27.3	Com.	Com.	29.5	4.7	3.6					{ 37—40 ?—8—

PRODELPHINUS LONGIROSTRIS (Gray).

Delphinus longirostris, Gray, Spic. Zool., 1823, p. 1.

Delphinus microps, Gray, Zool. Ere. & Terr., 1846, p. 42, pl. 25.

Delphinus alope, Gray, Cat. Cet. Brit. Mus., 1850, p. 118.

Delphinus stenorhynchus, Gray, Cat. Seals and Whales, 1866, p. 396.

This species is distinguishable from those of the same genus, which we have already considered, by the small size of the cranium as compared with the beak. In the *Characters and Divisions*, Professor Flower places the four names given in the foregoing synonymy in one of his sections of *Clymenia*. In the *List* he unites *stenorhynchus* with *longirostris*, and holds *alope* and *microps* as distinct species. Of the latter, however, he remarks that it is "probably the same as the next (*P. longirostris*)."

To the union of *stenorhynchus* and *longirostris* I subscribe with little hesitation. Furthermore, the specific identity of *stenorhynchus* and *microps* does not appear to me very doubtful. The type of *microps* is, however, somewhat smaller than the type of *stenorhynchus*, though both skulls seem to be of the same age. The intermaxillæ are a little narrowed in front of the "triangle" in the former species but not in the latter. The beak is relatively longest and narrowest in *stenorhynchus*. On the other hand, in the remaining proportions the two skulls are alike, and the teeth are equally numerous and similar in form; the pterygoid bones are alike in form, having flat sides and a very sharp keel. The difference in the proportional width of the intermaxillæ at the middle of the beak is due to the partial absorption of these bones in *P. stenorhynchus*.

The coronoid process of the mandible is strongly developed in both skulls. The roots of the teeth in *P. stenorhynchus* are flattened, a little thickened, and imperforate.

If *Delphinus alope* is to be kept separate it must be because of its relatively broader beak and keeled mandibular symphysis. There is, however, in the collection of the National Museum, a skull, No. 21168, which is intermediate in form between *alope* and *longirostris*, and binds these two species together. The beak is broader than in *longirostris* or *microps* but narrower than in *alope*, and the symphysis mandibuli is more strongly keeled than in the two former species, but less than in *alope*. The skull is nearly as large as that of *stenorhynchus* (see table of measurements, page 76).

The specimens described by Dr. Lütken in his recent work,* under the name of "*Prodelphinus alope*," are certainly not the *Delphinus alope* of Gray (= *P. longirostris* Gray). On the other hand, the skeleton described as "*P. longirostris* (Schl.)" does, I believe, belong to the species under consideration.

* Lütken, K. Danske Vidensk. Selsk., Skr., 6th Raekke, v, pt. 1, 1889, pp. 43-47.

The description given by Dr. Lütken* applies almost equally well to a skeleton recently collected by the naturalists of the U. S. Fish Commission Steamer *Albatross*, in the Pacific Ocean, between the Galapagos Islands and Panama. The vertebral formula in each is as follows:

Dr. Lütken's specimen.....	C. 7; D. 14; L. 17; Ca. 34=72
U. S. Nat. Mus., No. 23302.....	C. 7; D. 14; L. 18; Ca. 34=75

The relations of the processes and foramina of the vertebrae are as follows:

	Dr. Lütken's specimen.	U. S. Nat. Mus., No. 23302.
First foramen perforans on vertebra number.....	48-49	48-49
Last distinct transverse process on vertebra number.....	55	56
Last neural spine on vertebra number.....	61	62
Vertebrae without zygapophyses	11(=31-41)	10(=32-41)

The length of the pectoral fin in the specimen in the National Museum is 256^{mm}. The formula of the phalanges is as follows: I, 2; II, 9; III, 7; IV, 3; V, 0.

The entire skin of this individual was not preserved, but the fins and a piece of skin from the side of the body were received with the skeleton. From these it appears that the dolphin was dark slate-gray above and white below. The darker color, which extends on to the fins, is everywhere mottled with very small blotches of a lighter gray. The white parts appear to have been covered with small streaks and stellate blotches of gray. Measurements of the skull will be found in the following table.

Table of measurements.

PRODELPHINUS LONGIROSTRIS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—			
							At base of maxillary notches.	At its middle.	Breadth of intermaxillae at middle of beak.	Greatest breadth between outer margins of intermaxillae proximally.
					Cm.	Cm.	Cm.	Cm.	Cm.	Cm.
349a	Brit. Mus.....	<i>D. microps</i>.....	.....	.....	39.4	25.3	6.5	4.3	2.0	6.1
1471a	.. do	<i>D. stenorhynchus</i>.....	.....	.....	45.1	30.3	8.4	4.3	2.0	6.9
847'b	.. do .....	.....	.....	.....	47.0	26.9	8.7	5.3	2.5	6.2
n. n.	Norwich Mus.....	.....	.....	Old	44.2	29.1	7.6	4.2	.....	.....
a567	Cambridge Mus.....	.....	.....	.....	44.0	29.0	8.4	4.6	2.2	6.4
3039	R. Coll. Surg.....	.....	.....	.....	42.2	27.3	7.6	4.5	2.1	6.4
12	Mus. Pays-Bas.....	<i>D. longirostris</i>	Cape Good Hope.....	.....	42.0	28.0	7.5	4.6	2.1	5.5
14	.. do .....	.....	do.....	.....	42.0	27.2	7.9	4.6	2.3	6.8
21168	U. S. Nat. Mus.....	.....	.....	Ad.	43.6	28.5	8.6	5.2	2.3	6.5
23302	.. do .....	.....	Near Panama.....	.....	39.4	25.1	8.05	4.5	2.05	6.0

* *Op. cit.*, pp. 47, 48.

Table of measurements—Continued.

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fosse.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fosse.	Length.	Depth.						
349a	22.8	3.6	29.2	30.5	13.0	11.7	4.7	3.7	31.3	5.6	21.7	5.6	0.24	{ 51—55 52—51
1471a	25.2	5.2	33.6	35.2	14.7	12.3	5.3	4.2	39.7	6.3	26.7	1.9	0.25	{ 53—56 55—56
847b*	23.1	3.8	30.9	31.7	15.4	12.8	5.6	4.1	36.0	6.1	23.4	5.9	0.19	{ 49—51 49—51
n. n.	.....	.....	.....	.....	14.6	13.1	5.6	4.2	37.5	7.6	.....	.....	.....	{ 48—48 49—49
a567	25.8	.....	33.0	34.4	15.0	12.8	5.4	4.3	.....	.....	.....	.....	.....	{ 55—55 53—? } 53—? } 53—? } 53—? }
3039	24.1	4.0	32.2	29.8	14.0	12.1	5.3	4.1	26.2	4.8	23.5	5.4	.....	{ 50—51 51—51
12	24.5	4.0	31.8	32.6	14.0	?12.8	5.0	4.0	37.0	?6.8	.....	5.7	.....	{ 55—? } 54—52
14	24.0	4.0	31.0	32.2	?14.2	?12.8	4.2	3.8	35.5	6.5	.....	5.8	.....	{ 55— 53—
21168	24.9	4.3	32.2	33.6	14.4	13.9	4.3	3.45	37.5	.....	23.8	6.0	0.3	{ 49—47 46—47
23302	21.7	4.0	29.0	30.1	14.3	13.0	5.05	3.8	33.5	5.0	21.7	5.9	0.3	{ 47—17 48—46

* Labeled *Clymenia atopc.*

6. TURSIO Wagler.

Tursio, Wagler, Nat. Syst. Amphib., 1830, p. 34.*Leucorhamphus*, Lilljeborg, Upsala Univ. Årsskrift, 1861, p. 5.

Professor Flower (*List*, p. 497) is inclined to believe that the finless dolphins on which this genus is erected may prove to belong to *Prodelphinus*. Until the skeleton is obtained it will be impossible to decide whether this view is correct or otherwise. The skull in the National Museum (No. 8160, obtained by Mr. Dall), however, which is known to be that of a finless dolphin, presents certain characters which make it probable that this genus has claims to recognition equally with *Lagenorhynchus*, *Prodelphinus*, and other genera of the family.

In the skulls in the College of Surgeons, London, and the National Museum, respectively, and in that figured in the *Ostéographie* (Pl. xxxviii, figs. 3 and 3a) the pterygoids are apart at their base, and, except in the first mentioned, throughout their entire length. In an adult skull in the Berlin Museum from Yeddo, Japan, collected by Dr. Hilgendorf, the pterygoids are long and are not in contact distally. If, when more specimens have been accumulated, this character is found

to hold good, it will aid in distinguishing this genus from *Lagenorhynchus*, *Prodelphinus*, *Tursiops*, and *Delphinus*, its nearest allies.

In the skull in the National Museum the free margins of the maxillæ behind the notch are thinned out as in *Sagmatias*. I neglected to note this character in the skull in the College of Surgeons, and Van Beneden and Gervais figure only the lower side of their specimen.

The mandible of our specimen is remarkable for its extreme attenuation anteriorly. It is bent downward and is not keeled anteriorly. In Cuvier's figure of *L. peronii* the mandible is bent downward, but is distinctly keeled (*Oss. fossiles*, 4th ed., pl. 222, figs. 5-6).

The scapula of *L. peronii*, figured by Cuvier (*Oss. foss.*, 4th ed., pl. 224, fig. 20), is, as pointed out, remarkable for its width as compared with its height. The acromion and coracoid are also very large.

The genus may be provisionally defined as follows: No dorsal fin. Pterygoids apart in the median line, at least at the base. Maxillæ not thickened behind the notch.

Two species are tolerably well known, the one, *L. peronii*, from the South seas, and the other, *L. borealis*, from the North Pacific. They may be distinguished by their coloration, as follows:

- | | |
|--|--------------------|
| 1. Beak and pectoral fins white..... | <i>L. peronii</i> |
| 2. Beak and pectoral fins dark, like the back..... | <i>L. borealis</i> |

TURSIO PERONII (Lacépède).

Delphinus peronii, Lacépède, Hist. nat. des Cétacés, 1804, p. 316.

Delphinus leucorhamphus Peron (MS.), *vide* Lacépède, Hist. nat. des Cétacés, 1804, p. 316.

Leucorhamphus peronii, Lilljeborg, Upsala Univ. Årsskrift, 1861, p. 5.

Neither Lacépède nor Desmarest (*Mammalogie*, p. 517) seems to have suspected that Peron's *Dauphin leucorhamphe* was without dorsal fin, but Cuvier,* having obtained a skin from India through Dussumier, in which the dorsal was absent, while the colors corresponded to those of Peron's dolphin, concludes that the latter was finless. He identifies his specimen with the *D. peronii* of Lacépède.

Very few specimens of this species have been preserved. The skull figured by Van Beneden and Gervais (*Ostéog.* pl. 38, fig. 3) is presumably that received by Cuvier from Captain Houssard,† though these authors do not state that it is the same. I unfortunately failed to see this specimen when in Paris. Gray (*Cat. Seals and Whales*, p. 277) gives measurements of a skull in the same museum "from Peron," but I think that there must be some mistake regarding this statement. There is a skull (No. 3029) in the College of Surgeons, London, which Professor Flower has identified with this species. The four skulls (Nos. 17, 18, 19, 20) in the Leyden Museum, which are labeled *D. peronii*, do not

* *Recherches sur les Ossements fossiles*, 4^{me} éd., viii, pt. 2, 1836, p. 107.

† F. Cuvier has *Houssart* (*Hist. nat. Cétacés*, p. 165).

seem to me to belong to this species. One of them (No. 20) is apparently that mentioned by Schlegel under this species in the *Abhandlungen* (Heft 1, p. 24). It most resembles *Prodelphinus fronatus*.

Judging from an authentic skull of *L. borealis* in the National Museum (presently to be described), I believe that there can be no reason to doubt the correctness of Professor Flower's identification of skull No. 3029 in the College of Surgeons. It is from Tasmania. The total length is 44^{cm}. The triangular area in front of the nares is but slightly concave. The intermaxilla, which are much depressed, do not touch in the median line; they are farthest apart at the distal extremity. The central portion of the symphysis below is raised above the level of the lower surface of the rami. The coronoid is high. The pterygoids, as already stated, touch only at the tip. The palate is convex.

All these characters are presented by the skull of *L. borealis* and are, therefore, of no moment in distinguishing the two species. Indeed, I am at a loss to find cranial characters by which to distinguish them, since the proportions of the two skulls (see p. 82) are on the whole very much the same. In the skull of *L. peronii*, however, the temporal fossæ are relatively smaller, the mandible is shorter, its depth opposite the coronoid process is less, and it is less attenuated at the extremity. The right intermaxillary bone in our skull of *L. borealis* ends proximally opposite the *middle* of the nares, instead of running back to the posterior wall, but this is very probably an individual variation.

The skull figured in the *Ostéographie* is also much like that of *L. borealis* from California, but we know that the former is from south of the equator, while, so far as I am aware, no porpoise having the coloration of *L. borealis* has been observed in southern waters. It would appear, therefore, that the two species are closely alike in cranial characteristics, but widely dissimilar in coloration.

The figures of *L. peronii* given by D'Orbigny and Gervais (specimens from Cape Horn) and Gray (specimens from midway between Cape Horn and New Zealand) agree very closely, the chief difference being that in the former the pectoral fin is represented as dark in the center of the posterior margin.

Lesson's figure (*Voyage of the Coquille*, pl. 9, fig. 1) represents a dolphin with white flukes and an elongated beak, which characters are also mentioned in the text.*

This may be a distinct species, though it is more than probable that the figure is inaccurate. The measurements of the exterior given by Lesson † differ much from those which I find in the notes upon *L. bore-*

* Zoology, Voyage of the *Coquille*, 1, pt. 1, p. 180.

† *L. c.*

alis which Mr. Dall has kindly placed at my disposal. In the following table are given both series of measurements, reduced to centimeters:*

Measurements.	L. peronii. From Lesson.	L. borealis. From Mr. Dall's notes. 8160 ♂, 200 miles off Cape Mendocino, Cal.
	Centimeters.	Centimeters.
Total length.....	184.1	246.4
Circumference opposite the genitals.....	64.9	53.3
Circumference of the head at the eyes.....	73.1	57.2
Length of the tail.....	43.3	40.6
Length from extremity of snout to pectoral.....	59.5	63.5
Length from angle of mouth to eye.....	5.4	9.5
Length from eye to pectoral.....	25.7	30.5
Length of the pectoral.....	31.1	30.5
Length from extremity of snout to corner of mouth.....	27.1	24.8
Length of the tail.....	14.9	.....
Length of the penis.....	21.7	.....
Length of the eye.....	2.7	.....
Length from anus to extremity of tail.....	44.7	57.2
Length of the anus.....	1.8	.....

*I understand this to be the antero-posterior length of either fluke. The fourth measurement is the width between the extremities of the flukes.

It appears that Lesson's specimen was much stouter than the *L. borealis* observed by Mr. Dall, and had wider flukes and longer pectoral fins and mouth. Mr. Dall's sketch of his specimens shows these characters. It represents a dolphin more slender than even that figured by D'Orbigny and Gervais; and while, in all the figures of the southern forms the snout and pectoral fins at least are white, in Mr. Dall's figure the black color extends to all parts of the body except an area on the belly and a small space on the under side of the lower jaw.

There is a painted skin of this species (No. 6086) in the Zoological Museum of Berlin. The beak and pectoral fins are painted white, and the same color extends upon the upper anterior margin of the flukes.

That there are two distinct species of right-whale porpoises can not, I think, be doubted.

TURSIO BOREALIS (Peale).

Delphinapterus borealis, Peale, U. S. Explor. Exped., Mamm. Ornith., 1848, p. 35, Pl. VIII, fig. 2.

Leucorhamphus borealis, Dall, in Scammon's Marine Mamm., 1874, p. 296.

The general accuracy of Peale's figure of this animal is confirmed by Mr. Dall's MS. notes upon, and figure of, a second specimen (already referred to) taken 200 miles off Cape Mendocino, California, a short distance south of the locality in which it was first observed by Peale. Peale's brief description applies to Mr. Dall's figure, except that in the latter the lower jaw is represented as protruding beyond the upper and is white at the extremity. In both figures the pectorals and flukes are black and in both there is a lozenge shaped, white area on the breast, drawn out posteriorly into a line which extends to the flukes. In Mr.

* For fuller measurements of *L. borealis*, see p. 81.

Dall's figure the central portion of the under side of the flukes is white. It should be remembered that the individual which Peale sketched was probably young, being only about 4 feet long. Mr. Dall's specimen was a male 8 feet 1 inch long.

Seammon also figures this species in his *Marine Mammalia* (Pl. XIX, fig. 3). He gives the colors as in Mr. Dall's sketch, but makes the form much more robust and the head high like that of a young *Hyperoodon*. We have no means of knowing whether this figure was made from memory or from a captured specimen of the species.

The general color of the specimens obtained by Dr. Hilgendorf, in Yeddo, Japan, was black. On the belly is a white area, which in the young individual begins on a line with the eye, but in the adult extends farther forward and ends on a bluish fork, which goes to the corner of the mouth. The anterior third of the lower jaw is whitish violet, and the margin of the lower lip is black.

The following measurements were taken by Mr. Dall. A part of them, reduced to centimeters, have already been given in comparison with Lesson's measurements of *L. perouii* on page 80.

Measurements of Tursio borealis (Peale), male, taken 200 miles off Cape Mendocino, California, October, 1868.

	Inches.
Length over all	97.0
Extremity of snout to angle of mouth	9.75
Extremity of snout to eye	13.0
Extremity of snout to blowhole	14.0
Extremity of snout to anterior edge of pectoral fin	25.0
Extremity of snout to posterior edge of pectoral fin	28.5
Angle of mouth to eye	3.75
Height of eye above line of mouth	0.75
Length of anterior edge of pectoral fin	12.0
Length of posterior edge of pectoral fin, from base to angle	3.5
Length of posterior edge of pectoral fin, from angle to tip	5.5
Width of pectoral fin at base	4.0
Width of pectoral fin from posterior angle to middle of anterior margin	3.5
Length of beak	2.5
Length of portion of lower jaw protruding beyond upper	0.5
Breadth across the flukes	16.0
Antero-posterior length of either fluke	6.0
Distance from median notch to extremity of either fluke	10.25
Distance from median notch to the ending of the superior margin or keel of the tail	2.0
Height of the caudal peduncle at insertion of flukes	3.75
Diameter (from side to side) at same point	1.5
Distance from notch of flukes to anus	22.5
Length of anus	1.0
Length of genital slit	6.0
Distance from notch of flukes to genital slit	27.5
Length of penis	15.0
Girth of head at eyes	26.5
Distance around head from eye to eye below	12.5
Distance between pectoral fins	12.0

	Inches.
Width across the mouth at the angles	9.0
Girth of body at insertion of flukes.....	7.0
Girth of body at anus.....	15.5
Girth of body at genital slit.....	21.0
Girth of body at a distance of 4 feet from flukes.....	33.0
Girth of body behind the pectoral fins	36.0
Girth of body in front of the pectoral fins.....	34.0

Scammon states that he has seen this species as far south as San Diego Bay, California, and as far north as Bering Sea.

The differences in color and proportions between this species and *L. peronii* are so great that we may expect to find differences in the skeletons when the latter become known. The skulls, however, as already stated, show few differences. I have already referred to the shortness of the right intermaxillary bone, and it may be that this is a character peculiar to *L. borealis*. In Cuvier's figure of *L. peronii* the proximal end of the right intermaxilla is in the normal position.

TURSIO BOREALIS AND PERONII.

Table of measurements.

Catalogue number.	Species.	Collection.	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—			Greatest breadth between outer margin of intermaxillary proximally.
							At base of maxillary notches.	At its middle.	Breadth of intermaxillary at middle of beak.	
3029	<i>Tursio peronii</i> ..	R. Col. Surg ..	Tasmania ..	♂	<i>Cm.</i> 44.0	<i>Cm.</i> 24.7	<i>Cm.</i> 11.2	<i>Cm.</i> 6.1	<i>Cm.</i> 3.6	<i>Cm.</i> 8.1
.. do ..	.. do ..	[From Cuvier, Oss. foss.] ..	..	..	42.6	24.2	11.1	6.2	..	..
8160	<i>Tursio borealis</i> ..	U.S. Nat. Mus	200 miles off Cape Mendocino, Cal.	♂	43.7	24	11.0	5.6	3.1	7.8
n. n.	.. do ..	Berlin Mus ..	Yeddo, Japan ad.	..	..	26.9	11.5	..	..	..

Catalogue number.	Length of tooth line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth row of mandible.	Depth between angle and coronoid process.	Transverse diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
3029	<i>Cm.</i> 21.3	<i>Cm.</i> 4	<i>Cm.</i> 31.2	<i>Cm.</i> 30.5	<i>Cm.</i> ..	<i>Cm.</i> 16	<i>Cm.</i> 6.9	<i>Cm.</i> 5.1	<i>Cm.</i> 36.4	<i>Cm.</i> ..	<i>Cm.</i> 21.3	<i>Cm.</i> 6.6	<i>Cm.</i> ..	{ 42—43 41—43
..	20.5	..	..	..	..	..	..	..	36.2	..	..	6.5	..	..
8160	20.1	5.1	29	30.8	17.6	15.8	7.1	5.3	37.5	..	20.7	6.9	0.3	{ 42—44 47—47
n. n.	..	..	..	..	17.8	..	6.3	5.25	..	..	..	..	..	..

7. LAGENORHYNCHUS Gray.

- = *Lagenorhynchus*, Gray, Zoology of the Erebus and Terror, 1846, p. 31.
 < *Delphinus* of authors prior to 1846.
 > *Electra*, Gray, Suppl. Cat. Seals and Whales, 1871, p. 76.
 > *Leucopleurus*, Gray, Suppl. Cat. Seals and Whales, 1871, p. 78.
 > *Lagenorhynchus*, Gray, Suppl. Cat. Seals and Whales, 1871, p. 79.

Professor Flower, in his recent admirable review of the family *Delphinidae*, gives the following diagnosis of the genus *Lagenorhynchus* : *

Rostrum scarcely exceeding the length of the cranium; broad at the base and gradually tapering toward the apex; depressed. Pterygoid bones normal, meeting in the middle line. Teeth small, not exceeding 4^{mm} in diameter, $\frac{23}{29}$ to $\frac{33}{33}$. Vertebrae very numerous, 80 to 90. Spinous and transverse processes of the lumbar vertebrae very long and slender; bodies short. Externally, head with a short but not very distinct beak.

In the course of my studies upon the genus I have found no cause to take exception to this diagnosis, except so far as the number of teeth and vertebrae are concerned. If the opinion that the *Lagenorhynchus thicola* of Gray belongs to this genus is correct, the maximum number of teeth must be set down as $\frac{42}{42}$ or $\frac{45}{45}$, instead of $\frac{33}{33}$. On another page I have shown that *Lagenorhynchus obliquidens*, Gill, has but 74 to 76 vertebrae.

In addition to the characters summed up by Professor Flower, I have observed that the mandibular foramina in this genus are usually more crowded together at the symphysis than in *Prodelphinus* and *Delphinus*, and are not preceded by so deep canals. The presence of an area of bright color rather high up on the side, between the dorsal fin and the flukes, likewise appears to be characteristic of the genus.

The genus is, unquestionably, very closely allied to *Prodelphinus*. The teeth are, *on the whole*, more numerous, and the vertebrae less numerous in the latter genus, but some species of *Prodelphinus* have a less number of teeth and a greater number of vertebrae than some species of *Lagenorhynchus*, and *vice versa*. The proportional length of the beak, the breadth and flatness of the intermaxilla, appear to be the chief cranial distinguishing characters which can be brought forward at present.

The number of species which have been assigned to this genus is quite large. In the following lists are included: (1) The species which appear to me valid and as properly belonging in the genus, and their synonyms; (2) species referred to the genus by previous writers, but which I regard as belonging elsewhere; (3) nominal species.

I. VALID SPECIES AND THEIR SYNONYMS.

1. *Lagenorhynchus acutus* Gray. 1828.
 Syn. *Delphinus eschrichtii* Schlegel. 1841.
Delphinus leucopleurus Rasch. 1843.
Lagenorhynchus perspicillatus Cope. 1876.
Lagenorhynchus gubernator Cope. 1876.

2. *Lagenorhynchus fitzroyi* Waterhouse. 1840.
3. *Lagenorhynchus albirostris* Gray. 1846.
4. *Lagenorhynchus electra* Gray. 1846.
Syn. *Lagenorhynchus asia* Gray. 1846.
Phocæna pectoralis Peale. 1848.
Delphinus fusiformis Owen. 1866.
5. *Lagenorhynchus cruciger* d'Orbigny and Gervais. 1847.
Syn. *Lagenorhynchus clanculus* Gray. 1849.
Lagenorhynchus latifrons (Paris Museum).
6. *Lagenorhynchus thicola* Gray. 1849.
Syn. *Lagenorhynchus breviceps* of Wagner.
7. *Lagenorhynchus obliquidens* Gill. 1865.
8. *Lagenorhynchus superciliosus* Schlegel. 1841.

2. SPECIES TRANSFERRED TO THE GENUS BY PREVIOUS WRITERS, BUT WHICH I REGARD AS BELONGING ELSEWHERE.

- Lagenorhynchus lateralis* of Cassin. Upon *Delphinus lateralis*, Peale.
Lagenorhynchus ceruleo-albus of Gray. Upon *Delphinus ceruleo albus*, Meyen.
 ? *Lagenorhynchus albirostratus* of Dall. From a skull supposed to be identical with
Delphinus albirostratus, Peale.
Lagenorhynchus de Castelnau of Van Beneden.

3. NOMINAL SPECIES, UNDESCRIBED, OR DESCRIBED ONLY FROM INDIVIDUALS SEEN AT A DISTANCE.

- Delphinus cruciger* Quoy and Gaimard.
Delphinus albigenus Quoy and Gaimard.
Delphinus bivittata Lesson and Garnot.

SPECIES INCORRECTLY REFERRED TO THE GENUS.

1. *Lagenorhynchus lateralis* Cassin.

Upon *Delphinus lateralis* Peale. U. S. Explor. Exped., VIII, Mamm. & Ornith., 1848, p. 35, Pl. VIII, fig. 1.

Cassin assigns this species to Gray's genus *Lagenorhynchus* without giving any reason for so doing. He states that he was unable to "find any specimen in the collection of the expedition."* I have been equally unsuccessful in finding any traces of it. The species must, therefore, be judged by Peale's figure and description.

The figure in question represents a dolphin having a long beak, such as exists in *Delphinus* and *Prodelphinus*, and which does not at all resemble the short plowshare-like beak of *Lagenorhynchus*. Again, the style of coloration is more like that which obtains in *Delphinus* or *Prodelphinus* than that of *Lagenorhynchus*. Finally, the teeth exceed the number usual in *Lagenorhynchus*, viz, $\frac{41}{41}$.

For these reasons, taken together, I should exclude the species from *Lagenorhynchus*. It will be impossible to say whether it is a *Delphinus* or *Prodelphinus*, unless more external characters distinguishing those genera are brought forward. On the whole, however, it seems to me most probable that Peale's dolphin belongs to *Prodelphinus* and is closely allied to *P. marginatus* (Duvernoy).

* Cassin, U. S. Explor. Exped., Mamm. and Ornith., 1858, p. 33.

2. *Lagenorhynchus caruleo-albus* Gray.

Founded on *Delphinus caruleo-albus*, Meyers.

I reject this species on account of the shape of its head and the coloration, which seem to me characteristic of *Prodelphinus*. The type-skull is that of a *Prodelphinus*. (See page 62.)

3. *Lagenorhynchus albirostratus* (?) Dall.

Scammon's Marine Mammalia, 1874, Appendix, p. 293.

Mr. Dall refers to the *Delphinus albirostratus* of Peale (which he assigns to the genus *Lagenorhynchus*), a skull obtained by Captain Marston in the Pacific. He does so apparently because Captain Marston's description of the exterior of the individuals of the school from which the specimen in question was obtained seemed to him to agree with the description of Peale's *D. albirostratus*. I am inclined to believe, however, after studying the measurements of the skull, that Captain Marston's specimen should be referred to *Prodelphinus aoris*. Whether *D. albirostratus*, Peale, should also be referred to that species must always be more or less uncertain, because it is only known from the exterior. Whatever decision may be finally reached regarding that species, it seems to me best for the present to refer Mr. Dall's specimen to *Prodelphinus* rather than to *Lagenorhynchus*.

4. *Lagenorhynchus de Castelnau* Van Beneden.

Bull. de l'Acad. R. Belgique, 2^{me} sér., xxxvi, 1873, p. 38, fig. 2.

This name has been applied by Professor Van Beneden to a figure of a young dolphin, executed by the Comte de Castelnau. From the fact that the name was not given in Latin form it is evident that it was not intended as a formal scientific appellation, but simply as a common name, *i. e.*, Castelnau's *Lagenorhynchus*.

Judging from the form of the head and the coloration I am inclined to believe that the figure represents a young *Delphinus delphis*, and I shall therefore omit further reference to it.

REVIEW OF THE VALID SPECIES OF LAGENORHYNCHUS.

LAGENORHYNCHUS ACUTUS Gray.

Delphinus acutus, Gray, Spic. Zool., 1828, p. 2.

Lagenorhynchus acutus, Gray, Zool. Erebus and Terror, 1846, pl. XII.

Delphinus eschrichtii, Schlegel, Abb. Gebiete Zool., etc., 1841, p. 23.

Delphinus leucopleurus, Rasch, Nyt Mag. for Naturvidens., iv, 1843, p. 97, pls. 2, 3.

Leucopleurus arcticus, Gray, Synopsis Whales and Dolphins, 1863, p. 7.

Lagenorhynchus perspicillatus, Cope, Proc. Acad. Nat. Sci. Philadelphia, 1876, p. 136.

Lagenorhynchus gubernator, Cope, Proc. Acad. Nat. Sci. Philadelphia, 1876, p. 138, pl. iv.

It is much to be regretted that the type of Gray's *D. acutus* is lost, as Professor Flower's painstaking investigation seems to prove it to be.

The original description is far from satisfactory, and, indeed, applies equally well to several other species of the genus. Since, however, Gray expanded his description in later publications so that it is plain to what species he referred, it seems best on the whole to retain the name which has secured a footing in the literature rather than to displace it by Schlegel's *D. eschrichtii*, published many years later.

I am unable to enter into the question of the identity of Schlegel's *D. eschrichtii* and Rasch's *D. leucopleurus*, since I saw the type-skeleton of neither. Professor Flower does not state that he saw the type of the former himself, but simply that it "is still to be seen in the Leyden Museum." He is convinced, however, of the identity of the two species. If such be the truth (I do not presume to appeal from Professor Flower's decision), the statement of the number of vertebrae in Schlegel's description must be incorrect. The formula derived from his description would be as follows: C. 7; D. 15; L. 32; Ca. 37 = 91. This number corresponds more closely with that found in *L. albirostris* than with that found in *L. leucopleurus*. I shall use Gray's name, *L. acutus*, throughout this section as synonymous with *L. leucopleurus* and *L. eschrichtii*.

The *Lagenorhynchus perspicillatus* and *Lagenorhynchus gubernator* of Professor Cope I regard identical with *L. acutus*. *L. gubernator*, however, is founded on a young individual (as I have determined from an examination of the type-cast and a photograph of the individual from which the same was made), and may, therefore, be disregarded. The type-cast of *L. perspicillatus* agrees absolutely in color with Rasch's figure of *L. leucopleurus*, and the measurements also agree. The measurements of *L. perspicillatus* also agree very closely with those given by Duguid for *L. acutus*. Moreover, the measurements of the large series of skulls mentioned by Professor Cope, which is still in the Museum, agree with those of the type of *L. leucopleurus*, as will be seen by reference to the table on p. 87. I have also carefully compared one of the skeletons from Cape Cod, referred to by Professor Cope, with a skeleton of *L. acutus* from the Faröe Islands, which was lent me for study by Dr. J. S. Billings, Director of the U. S. Army Medical Museum, and can find absolutely no differences but such as are referable to individual variation. The figure accompanying Professor Cope's paper (Proc. Acad. Nat. Sci. Phila., 1876, pl. iv), though styled *Lagenorhynchus perspicillatus*, is really that of one of the casts of the young *L. gubernator*. It agrees exactly with the photograph in the Department of Mammals, and may be regarded as an excellent figure of a young *L. acutus*. The name *L. bombifrons*, alluded to by Professor Cope (l. c., p. 138), is a slip of the pen, *L. perspicillatus* being intended.

The distinctions between this species and the remaining members of the genus will be pointed out in treating of the latter.

Table of measurements.

LAGENORHYNCHUS ACUTUS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Breadth of beak—					Greatest breadth between outer margins of intermaxillae proximally.
					Total length.	Length of beak.	At base of maxillary notches.	At its middle.	Breadth of intermaxillae at middle of beak.	
360a	Brit. Mus. ....	.....	Greenland .....	.....	<i>Cm.</i> 38.8	<i>Cm.</i> 19.8	<i>Cm.</i> 10.2	<i>Cm.</i> 6.6	<i>Cm.</i> 4.1	<i>Cm.</i> 8.1
3026	R. Col. Surg. ....	.....	Drobak, Norway .....	.....	39.7	20.6	10.4	7.0	3.8	8.3
3025	do .....	.....	Coast of Norway .....	.....	40.6	20.9	11.1	7.3	4.4	8.3
22256	U. S. Nat. Mus. ....	.....	Norway .....	.....	38.9	19.6	10.2	6.4	3.8	8.4
14327	do .....	.....	Cape Cod .....	.....	41.7	21.4	11.2	6.9	3.8	8.4
14261	do .....	.....	do .....	.....	39.9	20.1	10.7	6.9	4.2	8.4
14—(?)	do .....	.....	do .....	.....	40.9	21.1	10.9	6.9	3.8	8.4
14281	do .....	.....	do .....	.....	41.4	21.1	11.7	7.9	4.8	8.4
14244	do .....	.....	do .....	.....	42.5	21.6	11.4	7.6	4.3	8.4
14260	do .....	.....	do .....	.....	41.4	20.8	11.4	7.3	4.1	8.4

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process of.	Transverse diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nates.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossae.	Length.	Depth.						
360a	<i>Cm.</i> 17.4	<i>Cm.</i> 3.0	<i>Cm.</i> 25.2	<i>Cm.</i> 26.7	<i>Cm.</i> 19.8	<i>Cm.</i> 17.8	<i>Cm.</i> 7.8	<i>Cm.</i> 4.6	.....	.....	.....	.....	.....	{ 35—34 ? — ?
3026*	18.1	3.0	27.9	26.0	20.3	17.7	7.3	4.1	33.0	4.1	18.7	6.3	.....	{ 40—37 37—38
3025	16.5	5.4	27.9	26.3	21.2	17.9	7.9	4.4	33.6	4.4	16.5	6.6	.....	{ —30 —31
22256	17.3	3.3	23.9	27.2	19.8	18.0	6.9	4.3	32.3	.....	.....	6.4	0.4	{ 36—37 37—37
14327	19.1	3.3	25.9	29.3	20.3	18.8	7.9	4.3	.....	.....	.....	.....	.....	{ 36—34
14264	17.6	3.6	24.7	27.5	20.6	18.6	7.6	4.6	.....	.....	.....	.....	0.4	{ 35—36
14—(?)	19.1	3.3	25.5	27.8	21.1	18.1	7.1	4.3	.....	.....	.....	.....	.....	{ 35—35
14281	18.6	3.6	26.0	29.0	22.4	19.6	7.9	4.1	.....	.....	.....	.....	.....	{ 37—37
14244	18.6	3.6	26.2	29.1	21.6	18.3	8.4	4.3	.....	.....	.....	.....	.....	{ 35—35
14260	18.6	3.0	26.7	29.3	21.6	18.0	7.6	4.6	.....	.....	.....	.....	.....	{ 37—38

* One of Rasch's types of *L. leucopleurus*.

LAGENORHYNCHUS FITZROYI (Waterhouse).

Delphinus Fitzroyi, Waterhouse, Zoology of the Voyage of the Beagle, II, Mammalia, 1839, p. 25, pl. 10.*Lagenorhynchus Fitzroyi*, Flower, Proc. Zool. Soc. London, 1883, pp. 490 and 511.

Regarding this species I can say nothing except to express my concurrence in Professor Flower's opinion, namely, that it is possibly

identical with *L. clanculus*. The type-specimen consists only of the beak (with the integuments) cut off close behind the last teeth. The length of the superior tooth row is 6.8 inches; width between the last upper teeth on opposite sides, 2.4 inches; length of tooth row of mandible, 6.6 inches; symphysis, 1.5 inches; depth of ramus at last tooth, 1.3 inches; width of elevated portion of the maxillary joining the palatines, 1.4 inches; teeth, $\frac{29-29}{28-27}$.

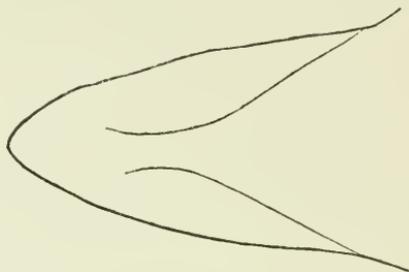


FIG. 1.

Fig. 1 represents the type specimen seen from above, reduced to a little more than two-fifths natural size.

I have carefully compared the measurements of the exterior given by Waterhouse with Duguid's measurements of *L. acutus*,* and with my own measurements of the type-cast of Professor Cope's *L. perspicillatus* but find no correspondence between them.

Compared with *L. perspicillatus* (which I regard as identical with *L. acutus*), Fitzroy's dolphin appears to have a smaller dorsal fin, situated farther from the extremity of the snout; and longer pectorals also relatively farther from the extremity of the snout. The shape of the head and the pattern of coloration seem to be very different.

This species cannot be properly studied until more specimens have been obtained.

LAGENORHYNCHUS THICOLEA Gray.

Lagenorhynchus thicola, Gray, Proc. Zool. Soc., London, 1849, p. 2.

Electra thicola, Gray, Synopsis, Whales and Dolphins, 1862, p. 7, pl. 36; Suppl. Cat. Seals and Whales, 1871, p. 77.

Clymenia (Electra) thicola, Flower, Proc. Zool. Soc., London, 1883, p. 512.

? *Delphinus brevicaeps*, Wagner, Schreber's Säugeth., pl. 360, fig. 1; Jaquinot et Pucheran, Zool. Voyage de l'astrolabe et Zélée, III, 1853, p. 39; Atlas, Pl. 22, fig. 1.

This species, like *L. longidens*, is one whose affinities are uncertain. Founded upon a single defective skull, reported to have been obtained on the west coast of North America, no opportunities are afforded for an estimate of the individual variation to which it is prone, or even for a very accurate determination of its cranial proportions.

Gray first placed the species in his genus *Lagenorhynchus*, and after-

* Ann. & Mag. N. H., (3), XIV, 1864, pp. 134, 135.

wards relegated it to the section *Electra*, which he raised to generic rank. Professor Flower, in his recent admirable essay, seems first in doubt as to whether it should not be assigned to *Lagenorhynchus* (P. Z. S., 1883, p. 490), but later describes it in connection with the genus *Prodelphinus*, and finally places it in his tentative list of species of that genus (P. Z. S., 1883, pp. 496 and 512) near *P. obscurus*.

The considerations which lead me to assign this species to *Lagenorhynchus* are the same which influenced me in the case of *L. longidens* (p. 99), to which in fact the present species appears to be closely related. It differs from that species in that the beak is shorter and narrower, the intermaxillaries narrower, the temporal fossæ smaller and more oval. But it differs also especially from *L. longidens*, and indeed from all other species to which it can be approximated, in having about 42 teeth in each ramus of the mandible. The teeth in the upper jaw would appear to be 45-45, but their number can only be estimated on account of the imperfect condition of the skull.

The label states that this skull was derived from the west coast of North America, and was taken out of Dr. Dickie's collection. If the record is correct, it is somewhat singular that the species was not met with by Captain Scammon or Mr. Dall. There are no specimens in the national collection which can be assigned to it.

LAGENORHYNCHUS BREVICEPS Wagner.

A skull of this species is figured by Messrs. Van Beneden and Gervais,* under the name of *Lagenorhynchus breviceps*, but the authors do not state explicitly that it is the type of Hombron and Jacquinot, figured in the atlas of the voyage of the *Astrolabe*. That the two figures are not from the same specimen appears probable from the fact that the latter represents an entire skull, while the former represents one from which the top of the brain-case has been removed. In general appearance the two figures though much alike are not identical. Professor Flower has referred Messrs. Van Beneden and Gervais's figure to *Prodelphinus*.* Hombron and Jacquinot's figure of the exterior,† however, represents a dolphin having the contours and the coloration of a *Lagenorhynchus*, and the species must, I think, be referred to that genus. Whether it should be regarded as identical with *L. thicolea* is perhaps somewhat questionable, for while the skull figured in the atlas of the *Astrolabe* expedition agrees with the type-skull of *L. thicolea* the teeth are considerably more numerous in the latter. The original specimen of *D. breviceps* was from the Río de la Plata.

It is to be observed, however, that the naturalists of the *Astrolabe* expedition state that they found only fragments of a skull, etc., in the collection. It is possible, therefore, that the skull which is figured as

*Ostéographie des Cétacés, pl. xxxvi, fig. 2.

† Proc. Zool. Soc., London, 1883, p. 496.

† Zool. Voyage Astrolabe et Zéléé, atlas, pl. 22, fig. 1.

entire in the atlas of the *Astrolabe* expedition, was afterwards broken, and that it is this same skull which was figured by Messrs. Van Beneden and Gervais.

Table of measurements.

LAGENORHYNCHUS THICOLEA.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
							At base of maxillary notches.	At its middle.		
934a	Brit. Mus...	<i>L. thicola</i> , Gray.	W coast North America.	.....	Cm. 37.5	Cm. 20.0	Cm. 9.7	Cm. 5.3	Cm. 2.8	Cm. 7.8

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.						
934a	Cm. 17.3	Cm. 3.7	Cm. 23.7	Cm.	Cm. 16.3	Cm.	Cm. 5.6	Cm. 4.1	Cm. 31.1	Cm. 3.0	Cm. 18.1	Cm. 6.1	Cm. 0.25	$\frac{(45)-(45)^2}{42-42}$

¹One centimeter should be added for breakage.

²An estimate.

LAGENORHYNCHUS CRUCIGER (d'Orbigny et Gervais).

Delphinus cruciger, d'Orbigny et Gervais, Voyage dans l'Amér. mérid., IV, pt. 2, 1847, p. 32; IX, Pl. XXI, fig. 1-4.

Lagenorhynchus clauculus, Gray, Proc. Zool. Soc., London, 1849, 1.

Electra claucula, Gray, Synopsis, 1863, p. 7, pl. 35; Malm, Sven. Akad. Handl., n. f., IX, 1, 1870, p. 68.

? *Delphinus cruciger*, Quoy et Gaimard, Zool. Voy. Uranie et Physicienne, 1824, Pl. XII, figs. 3, 4. (Fide Gray.)

The skulls which I refer to this specimen are the following:

Paris Museum, No. a3045, labeled *L. cruciger*, d'Orbigny, 1830 (type).

Paris Museum, No. a3041, labeled *L. latifrons*, New Zealand.

British Museum, No. 935a, type of *L. claucula*, Gray.

Royal College of Surgeons, No. 3027, labeled *L. clauculus*.

If the skull in the Paris Museum, No. a3045, labeled "d'Orbigny, 1830," is that which d'Orbigny figured in the "Voyage dans l'Amérique

méridionale," under the name of *Delphinus cruciger* (and after close examination I find no reason to believe otherwise), there can be no doubt that this species is the same as the *L. clanculus* of Gray, described in 1849.

With these skulls must also be associated two other specimens, No. a3041, of the Paris Museum, labeled *L. latifrons* (a name which I have been unable to find in the literature), and No. 3027, of the Royal College of Surgeons.

In all these specimens the "triangle" is more or less elevated, and is flat and slightly or not at all rugose. The intermaxillæ are flat and nearly horizontal, and are not twisted into a vertical position at the distal extremity. The temporal fossæ are full ovals in the Paris specimens, but in the type of *L. clanculus* the anterior side is straight, so that the fossæ present the appearance of half ovals. The pterygoids are short but wide; they touch the median line. The normal dental formula is probably $\frac{28-28}{28-28}$, though the teeth in the specimens themselves present the variations in number common to all the toothed whales.

It has been the fashion, since the time of F. Cuvier at least, to seriously consider the identity of the *D. cruciger* of Quoy and Gaimard and the *D. bivittatus* of Lesson, species which were "*vis en mer et dessinés à distance*." D'Orbigny fell into this error (though hesitatingly) in adopting Quoy and Gaimard's name for the animal which he captured and of which he sent the skull to Paris. He thereby produced confusion in the nomenclature. The misstep of the French explorers was not that they made drawings of animals which they only saw at a distance, but that they introduced them into their narrative under special scientific names. Considering that such names have no validity, I hold that d'Orbigny and Gervais's binomial is the proper one to apply to the species in question.

It is not to be denied, however, that much interest frequently attaches to such representations as have been referred to.

Malm, in his account of the specimens of Cetaceans in the Swedish Museums* describes a skeleton and skin of this species obtained by Captain Wärngre at Cape Horn.

The skull is a little smaller than that of the type of *L. cruciger*, but agrees with it perfectly in proportions (see table below). The vertebral formula is as follows: C. 7; D. 13; L. 22; Ca. 29; total 71. For a full account of this individual the reader is referred to Malm's original article.

* A. W. Malm, K. Svenska Vetens.-Akad. Handl., ny följd., ix, pt. 1, 1870, p. 68.

Table of measurements.

LAGENORHYNCHUS CRUCIGER.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—			Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
							At base of maxillary notches.	At its middle.			
a 3045	Mus. d'Hist. nat.	<i>D. cruciger</i> d'Orb. & Gerv.	.....	.....	Cm. 34.9	Cm. 17.8	Cm. 10.7	Cm. 6.6	Cm. 4.1	Cm. 8.7
935a	Brit. Mus.	<i>D. clanculus</i> , Gray.	.....	.....	34.9	17.6	10.4	6.4	3.3	7.8
a 3041	Mus. d'Hist. nat.	.....	.....	.....	34.9	18.3	10.7	5.6	3.4	8.1
3027	R. Coll. Surg. Stockholm Mus.	(From Malm)	Cape Horn	.....	33.8	17.8	10.5	6.0	3.3	7.9

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fosse.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fosse.	Length.	Depth.						
a3045	Cm. 15.2	Cm. 3.3	Cm. 22.1	Cm. 22.4	Cm. 17.1	Cm. 16.3	Cm. 6.9	Cm. 4.1	Cm. 28.2	Cm. 3.5	.....	Cm. 6.6	.....	{ 28—27 28—27 30—30 30—29 28—28 28—28 1—29 —29 31—32 32—33
935a	15	3.6	21.9	22.6	17.4	16.2	6.9	3.4	29	3.3	15.8	7.1	0.23	
a3041	15.2	4.1	22.9	23.1	17.6	16.3	7.1	4.2	28.7	3.5	.....	6.9	.....
3027	16.1	3.2	.....	23.1	17.7	23.8	.....	.....	29.1	3.8	16.2	6.6	.....
n. n.	.....	.....	.....	.....	.....	.....	.....	.....	28.6	.....	.....	.....	.....

LAGENORHYNCHUS SUPERCILIOSUS Schlegel.

Delphinus superciliosus, Schlegel, Abhandl. in der Geb. Zool., Heft 1, 1841, p. 22, Pls. 1-11, fig. 3 (skull), fig. 4 (teeth).

Schlegel (l. c.) identifies a skeleton sent to the Leyden Museum by Van Horstok from the Cape of Good Hope with the *D. superciliosus* of Lesson and Garnot, though for what reason does not appear. I found no specimens of the latter species in the Paris Museum, and from the remarks of F. Cuvier (Nat. Hist. des Cétacés, pp. 148, 149) I am led to believe that none were brought home by Lesson and Garnot. Re-

garding the skeleton in question, Schlegel makes the following statements:

That this species (*D. superciliosus*), moreover, occurs off the Cape of Good Hope appears from the observations of our late explorer, Dr. Van Horstok, who has sent us a complete skeleton of the species.*

What the observations of Van Horstok were does not appear. They seem to have been such as to convince Schlegel that his skeleton belonged to Lesson and Garnot's *D. superciliosus*.

The following is a description of this skeleton: No. 40; Voy. Horstok; Cape of Good Hope. Vertebrae: C. 7; D. 13; L. and Ca., 53; total, 73. Lumbar twenty. Chevrons twenty. Only the atlas and axis united. Superior transverse process of the seventh cervical vertebra long; the others rudimentary. Inferior transverse process of the sixth cervical rather long; of the fifth shorter; of the other cervicals, rudimentary. Neural spines of the third to the seventh cervicals very short. Neural spine of the first dorsal pointed; the succeeding ones increase in breadth backward to the tenth or eleventh dorsal, then again decrease. Those of the lumbar subequal. Neural arch obsolete on the sixtieth vertebra. Transverse process obsolete on the fifty-fifth vertebra. First six ribs with heads; these ribs also join the sternum. Sternum of four segments; the first largest, the last rather rudimentary. Acromion long and broad, reaching to the anterior angle of the scapula; coracoid about one-half the length of the acromion, broadened at the extremity. Radius and ulna straight. Carpals five; three large ones in the distal row, two smaller ones in the proximal row. (Manus defective.)

Skull.—The skull resembles that of *P. obscurus*, but the intermaxillae are more nearly flat. The prenasal triangle extends about an equal distance before and back of the maxillary notch, and is depressed, but flat and not rugose. The sides of the intermaxillae bordering the nasal aperture are beveled as in *Cephalorhynchus*. The maxillae are but little bent. A wide opening (1^{cm} at the widest point) intervenes between the premaxillae and extends along the entire beak. Palate very flat. Pterygoids on a wide base (4.1^{cm}); they are broken, but were apparently in contact, except at the tip. The ramus of the mandible is slender toward the symphysis, which is not strongly keeled. Teeth, $\frac{30-30}{30-29}$.

Scapula, 15.5^{cm} long; 9.8^{cm} high. Highest neural arch, 8.4^{cm}. Total length of the skeleton as mounted, 153^{cm}.

The chief peculiarities of the skull of this species are the flatness of the premaxillae and the beveling of their proximal extremities. In these respects it is very different from that of *P. obscurus*, with which it agrees well in proportions. On account of the flatness of the intermaxillae and the crowding of the foramina at the symphysis of the mandible, I am inclined to place this species in the genus *Lagenorhynchus*. The small

* Schlegel, Abhandlungen, Heft 1, 1841, p. 22.

number of vertebræ, however, and the comparative shortness of the transverse processes, are more characteristic of *Prodelphinus*.

In addition to the type at Leyden, I observed at Louvain a skull and a beak which appeared to belong to this species. These I did not have an opportunity to examine closely. While resembling *P. obscurus*, however, in general appearance, they differ in having flat premaxillæ. In the complete skull the pterygoids appear to be separate, a character the importance of which is strongly insisted upon by Professor Flower. The beak was purchased from a dealer, and possibly came from Africa.

Table of measurements.

LAGENORHYNCHUS SUPERCILIOSUS.

Catalogue number.	Collection.		Type of—		Locality.		Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
										At base of maxillary notches.	At its middle.		
40	M. Pays-Bas*.		<i>L. superciliosus</i> Schlegel.		Cape of Good Hope.		....	Cm. 35.6	Cm. 19.4	Cm. 8.5	Cm. 5.4	Cm. 3.2	Cm. 6.9

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Orbits.	Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior naris.	End of crest of pterygoid.		Hinder margins of temporal fossæ.	Length.	Depth.							
40	Cm. 16.6	Cm. 3.5	Cm. 22.8	Cm.	Cm. 14.0	Cm. 13.0	Cm. 6.8	Cm. 4.5	Cm.	Cm. 3.3	Cm.	Cm. 6.0	Cm. 0.3	} 30—30 29—29	

* V. Horstok.

LAGENORHYNCHUS ALBIROSTRIS Gray.

Lagenorhynchus albirostris, Gray, Ann. & Mag. Nat. Hist., xvii, 1846, p. 84.

There is, fortunately, no obscurity surrounding this species. Gray correctly characterized Brightwell's specimen as the type of a new species of the genus *Lagenorhynchus*, and since that time its distinctness has not been questioned.

The most closely allied species is *L. acutus*, from which it is dis-

tinguished by its color-markings and their disposition, as well as by numerous skeletal characters.

Brightwell's specimen, the type of the species, is in the Norwich Museum, where I had the privilege of examining and measuring it. It is not an old individual.

Table of measurements.

LAGENORHYNCHUS ALBIROSTRIS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxilla at middle of beak.	Greatest breadth between outer margins of intermaxilla proximally.
							At base of maxillary notches.	At its middle.		
555e	Cambridge Mus.	.....	.....	.....	<i>Cm.</i> 44.1	<i>Cm.</i> 21.9	<i>Cm.</i> 14.4	<i>Cm.</i> 8.1	<i>Cm.</i> 5.3	.....
555f	do	.....	Ramsgate	.....	42.2	20.2	14.0	7.4	.....	.....
3028	R. Coll. Surg.	.....	.....	.....	43.0	21.2	14.6	7.9	4.4	10.4
n. n.	Norwich Mus.	<i>L. albirostris.</i>	Yarmouth	Ad.	45.7	21.6	13.5	8.4	5.1	10.9
916c	Brit. Mus.	.....	Cromer.	.....	44.5	21.9	14.6	8.4	5.0	10.7
916b	do	.....	.....	.....	43.9	20.3	14.0	8.0	5.5	10.9
n. n.	Mus. Sci. and Art, Edinburgh.	f	.....	.....	46.0	22.9	15.2	8.7	5.1	10.8

Catalogue number.	Length of tooth-line.		Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
	Last tooth to base of maxillary notch.	Anterior margin of superior barres.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossae.	Length.	Depth.						
555e	.....	.....	.....	.....	22.6	18.7	.....	.....	.....	.....	.....	.....	{ 26—26 26—27
555f	.....	.....	.....	.....	21.9	18.0	.....	.....	.....	.....	.....	.....	{ 26—24 27—28
3028	18.7	3.8	28.2	28.2	23.1	17.7	10.1	6.0	35.5	4.4	18.4	8.5	{ 24— 23—
n. n.	.....	.....	.....	.....	23.4	.....	9.5	.....	36.9	5.1	.....	.....	{ 26— 26—
916c	22.3	3.9	28.9	.....	23.1	18.9	8.3	4.8	.....	.....	.....	.....	{ 28—27 ?—?
916b	18.2	4.1	27.0	28.7	23.1	19.3	9.2	6.4	35.6	4.6	18.0	8.1	{ 26—26 27—25 (+7)
n. n.	.....	.....	.....	.....	23.5	18.8	7.9	6.4	.....	.....	.....	.....	.....

* Least.

† Collected by Traill.

LAGENORHYNCHUS OBLIQUIDENS Gil.

- Lagenorhynchus obliquidens*, Gill, Proc. Acad. Nat. Sci., Phila., 1865, p. 177.
? *Delphinus longidens*, Cope, Proc. Acad. Nat. Sci., Phila., 1866, p. 295.
? *Clymenia longidens*, Dall, Scammon's Marine Mammalia, 1874, p. 288.
? *Clymenia similis*, Gray, Proc. Zool. Soc. London, 1863, p. 147.

This species is unquestionably valid, although closely related to *L. acutus*, Gray, and to *L. cruciger*, d'Orbigny. It would appear to be absolutely larger than the latter, judged by the skull, and more robust though not longer than the former. The National Museum is at present in possession of four adult skulls of Dr. Gil's species, and two entire skeletons, representing, respectively, an adult and a rather young individual. On comparing one of the adult skulls with a similar one from the large series of *L. acutus* in the Museum numerous differences become apparent. The margins of the rostrum in *L. obliquidens* converge very gradually from a point about an inch anterior to the notch to a point about the same distance from the tip. The outline of the rostrum does not suggest a triangle, therefore, as in *L. acutus*, but rather a rectangle, of which the anterior corners are rounded off. The surface of the intermaxillæ is more convex in *L. obliquidens* than in *L. acutus*, and the prenasal triangle is more elevated and extends further upon the rostrum. The orbits are much further apart in *L. acutus*, owing to the great expansion of the proximal half of the maxillæ. Viewed from the side, the skulls of the two species are strikingly different owing to the large size, quadrate form, and the posterior and superior extension of the temporal fossæ of *L. obliquidens*. The biting-power of this species must be much greater than that of *L. acutus*, not only on this account but because the teeth are larger and more deeply implanted in the alveoli. In both species the roots of the teeth are abruptly turned backward at their extremity, a character which is common in this genus.

The inferior surfaces of the skulls present many differences, but these are difficult to express on account of the complexity of the parts. The pterygoids are the least bell-shaped in *L. acutus* and extend much farther back than in *L. obliquidens*. The shape of their free margin and the extent of contact in the median line is widely different in these two skulls, but this is a character which is subject to much variation.

In proportions of parts the skulls of *acutus* and *obliquidens* show no consonance. The distance from the maxillary notch to the anterior end of the temporal fossa exceeds the width of the beak at the notch in *acutus*, but is less than the latter width in *obliquidens*. The breadth across the proximal end of the right maxilla from the lateral free margin to the superior nares equals the width of the beak at the notch in *acutus*, but the former only equals three-fourths the latter in *obliquidens*. The length of the free border of the malar only exceeds by a little more than one-half the length of the orbit in *obliquidens*, while in *acutus* the

two are very nearly equal in length. The pre-maxillæ scarcely form any part of the palate in *obliquidens*, but appear in nearly the whole of its distal half in *acutus*.

There are numerous other differences of proportions in the skulls which are equally striking. Taken together they form a sufficient basis for specific distinction.

The numerical relations of parts in the skeletons also offer characters for discrimination. The number of vertebræ in specimens of *L. obliquidens*, *L. acutus*, and *L. albirostris*, are as follows:

Collection.	Species.	C.	D.	L.	Ca.	Total.
U. S. N. M.	<i>L. obliquidens</i> (n. n. adult).....	7	13	24	30	74
U. S. N. M.	<i>L. obliquidens</i> (14329, Juv.).....	7	13	23 (or 24)	32 (or 31)	75
	<i>L. acutus</i> (Poelman).....	7	15	19	39	80
R. C. S. E.	<i>L. albirostris</i> (3028).....	7	14	67		88

The last-named species clearly has many more vertebræ than *L. acutus*, while *L. obliquidens* has fewer. A critical examination of the immature skeleton of *L. obliquidens*, however, makes it necessary to allow for one or possibly two more caudal vertebræ, so that the total number in the latter species is brought nearer that in *L. acutus*, which sometimes has but seventy-nine vertebræ. The transverse processes of the twenty-first vertebra in the immature skeleton of *L. obliquidens* are long and truly lumbar in character and do not appear to have given attachment to a fourteenth pair of ribs, but such a pair would doubtless be found in some specimens of a series, and as *L. acutus* sometimes has but fourteen pairs the character will probably prove of no value in distinguishing the species. The difference in the relative number of lumbar and caudal vertebræ can not be in like manner disposed of, and would appear to constitute a real distinction between the two species.

The number of phalanges in the left manus of our skeleton of *L. obliquidens* is as follows: I, 2; II, 7; III, 5; IV, 1; V, 0. One phalange should probably be added in the case of figures III, IV, and V, as the specimen appears to be defective at these points. The numbers would then agree with those given by Gervais for *L. acutus*, viz. I, 2; II, 7; III, 6; IV, 2; V, 1.* Malm, it should be observed, gives quite a different formula, for *L. acutus*, namely, I, 2; II, 10; III, 6 (+1); IV, 3 (+ ?); V, 2.†

In *obliquidens* the transverse processes of the posterior lumbar vertebræ point forward, but in *acutus* backward.

There are two other species (known only from the skulls) with which *L. obliquidens* must be compared. These are *L. thicola* and *L. clanculus*. The measurements given on p. 100 sufficiently indicate the differences existing between the skulls of *L. thicola* and *L. obliquidens*. The rostrum

*Van Beneden and Gervais. Osteographie des Cétacés, pl. xxxv, fig. 33.

†Malm, Hvaldjur i Sveriges Museer, år 1869, p. 70.

in the former is relatively longer and narrower; the intermaxillaries are much narrower; the brain-case is narrower at the orbits; and the temporal fossæ are smaller. The teeth are more numerous and the skull is much lighter in all its parts. The skulls of *L. clanculus*, as already stated, appear to belong to a smaller species than *L. obliquidens*, and are much lighter. The rostrum is relatively broader than in *L. obliquidens* as is also the brain-case at the orbits, and at the posterior margin of the temporal fossæ. These fossæ, although of about the same length as those of *L. obliquidens*, are more depressed.

In the younger specimen of the species under consideration the teeth have been reset, and the number can not therefore be relied upon. In the adult skull, No. 1962, the teeth in the superior maxillary number 32 on each side; in the mandible, 29 on each side. They are conical and acute and lean strongly outward.

The color of *L. obliquidens* has been recorded both by Captain Scammon and Mr. Dall. The former describes it as follows:

In point of color it is greenish-black on the upper surface, lightened on the sides with broad longitudinal stripes of white, gray, and dull black, which in most examples run into each other, but below it is of a pearly or snowy white. The posterior edge of the dorsal fin is tipped with dull white or gray, and sometimes the flukes are marked in the same manner.*

In another part of the same work Mr. Dall describes the color as follows:

The animal is rather thick in proportion to its length; black above, with a strongly falcate dorsal. Below, white, to the edge of the patch passing from the lower lip below the pectorals and terminating a short distance behind the vent. A broad gray smouch on each side above the line of the black color, and interrupted about the middle of the animal on each side; the edges of the gray are ill-defined. The posterior edges of the pectorals and dorsal are also grayish.†

From these descriptions and the figures given by Scammon it would appear that the coloration of *L. obliquidens* differs somewhat from both of the well-known species *L. acutus* and *L. albirostris*, for in the last-named the white of the belly extends upon the upper lip, and in *L. acutus* the light color of sides occupies only an area rather high up and back of the dorsal fin.

Captain Scammon gives to this species a very wide range, but does not state localities. Mr. Dall, however, states that the specimens described by him were taken at Monterey, November 20, 1872. Dr. Gill's types (Nos. 1961-63) were obtained on the coast of California by Lieut. W. P. Trowbridge. The skeleton described above (No. 14329) was also obtained on the coast of California, but no particular localities are given in either instance. A defective cranium (No. 3123) is from Puget Sound.

* Scammon, Marine Mammalia, 1874, 98.

† Dall in Scammon's Marine Mammalia, 1874, 293.

Lagenorhynchus Longidens Cope.

This species is known only from the single skull (No. 3886) briefly but accurately described by Professor Cope in 1866, under the name of *Delphinus longidens*. There is but one point in this description which I would criticise. Professor Cope writes as follows:

Delphinus longidens. Of the type of *D. (Tursio) obscurus* Gray, but with a considerably longer muzzle and much longer prenares triangle, etc.

Measurements of the two type-skulls, according to the system which I have adopted, show that the total length and length of rostrum are absolutely the same in each, viz, total length 14.5 inches; length of rostrum, 7.9 inches.

In commenting upon his description Professor Cope justly remarks:

From the above [measurement] it will be seen that the nearest ally of this species is the *Delphinus (Lagenorhynchus) clanculus* Gray, in which the muzzle is considerably shorter and the cranium relatively longer and wider—that is, length of cranium proper equal in the latter to the length of the muzzle, and breadth at orbit a little greater than either. Its form renders a distinction between *Lagenorhynchus* and *Delphinus** improbable on present bases.†

Mr. Dall regards this latter view untenable in the light of Dr. Gray's revision of 1871, and places the species in the genus *Clymenia* (= *Prodelphinus* Gervais).

The skull upon which this species is based was received with the spoils of the United States Exploring Expedition, but the locality was unfortunately not given. The records show nothing except that the skull was packed with other objects in a box marked "B. 26—Z. (L.)" There is a second mandible in the collection (No. 4117), which bears the same marks, and undoubtedly belongs to the same species, but of this also the locality is unrecorded. After following out all the clues suggested by the original records, and the statements in both editions of the Mammalogy of the United States Exploring Expedition, I am forced to believe that it will never be possible to ascertain the history of these specimens, or to make sure that they did not form the basis of some of the species erected by Peale.

The type-skull is considerably broken, the pterygoid, malar, and tympanic bones being absent. Professor Cope states that the pterygoid bones were not in contact. After repeatedly examining this skull, I have become convinced that it is simply a small and youngish example of *L. obliquidens*. It presents no characters which can not be found in skulls of the latter species.

Clymenia Similis Gray.

The skull on which this species is founded can not be distinguished from skulls of *L. obliquidens*. It is nearly of the same size as the largest of our skulls of the latter species. The pterygoid bones are divergent posteriorly and the palatine table is constricted.

* *Prodelphinus*, as now understood.—F. W. T.

† Cope, l. c., p. 296.

The skull also agrees in many points with *L. obscurus*, as Professor Flower has stated, and it is not at all impossible that the skulls now distributed among the three species, *obscurus*, *obliquidens*, and *similis*, represent only the individual variations of a single species.

Table of measurements

LAGENORHYNCHUS OBLIQUIDENS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillary at middle of beak.	Greatest breadth between outer margins of intermaxillary proximally.
							At base of maxillary notches.	At its middle.		
14329	U. S. Nat. Mus.	.....	.....	Jr	<i>Cm.</i> 39.4	<i>Cm.</i> 19.7	<i>Cm.</i> 10.2	<i>Cm.</i> 7.1	<i>Cm.</i> 4.6	<i>Cm.</i> 8.4
1962	..do	.....	.....	.....	41.9	20.7	11.2	7.9	4.6	9.4
3886	..do	<i>D. longidens</i>	.....	.....	35.8	20.1	9.1	5.8	3.4	7.9
15096	Brit. Mus	<i>C. similis</i>	.....	.....	38.1	20.8	10.3	6.1	3.4	7.6

Catalogue number.	Length of tooth-line.	Least tooth to base of maxillary notch.	Extremity of break to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Transverse diameter of teeth.	Number of teeth.
			Anterior margin of superior nare.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
14329	<i>Cm.</i> 16.5	<i>Cm.</i> 3.5	<i>Cm.</i> 24.7	<i>Cm.</i> 26.2	<i>Cm.</i> 17.8?	<i>Cm.</i> 15.3?	<i>Cm.</i> 8.9	<i>Cm.</i> 7.1	<i>Cm.</i> 31.3	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i> 6.9	<i>Cm.</i>	{ —27 28—28 32—32 29—29 31—31 29—29 29—29 ? — ?
1962	18.4	3.3	25.7	27.5	18.6	17.4	8.3	6.5	.....	.....	.....	.....	.5	
3886	17.5	3.6	24.5	.....	16.0	13.2	6.8	5.0	31.2	3.8	17.2	6.3	.....
15096	17.4	.....	24.9	.....	16.3	14.4	7.4	5.3	.....	.....	.....	.....	.5	

*Greatest.

LAGENORHYNCHUS ELECTRA Gray.

Lagenorhynchus electra, Gray, Zool. Erebus and Terror, 1846, p. 35, pl. 13.

Lagenorhynchus asia, Gray, Zool. Erebus and Terror, 1846, p. 35, pl. 14.

Electra obtusa, Gray, Synopsis, 1868, p. 7.

Delphinus (Lagenorhynchus) fusiformis, Owen, Trans. Zool. Soc., London, VI, 1866, p. 22, pls. v, fig. 1 (animal); VII, figs. 1-5 (skull).

Phocena pectoralis, Peale, Mamm. and Ornith. U. S. Explor. Exped., 1st ed., 1848, p. 32; Atlas, pl. VI, fig. 1 (animal).

Delphinus pectoralis, Cassin, Mamm. and Ornith. U. S. Explor. Exped., 2d ed., 1858, p. 28, pl. v, fig. 2 (animal).

In the European collections which I examined I found seven skulls which, in my estimation, should be accredited to this species. These are as follows:

British Museum:

- No. 358a. Type of the species.
 No. 358a. Type of *L. asia* Gray.
 No. 1475a. Type of *L. fusiformis* Owen.

Paris Museum:

- No. a3044. Labeled *L. asia*.
 No. a3082. Labeled *L. asia*.

Cambridge University Museum: -

- No. 555a. Labeled *L. electra*.

Royal College of Surgeons of England:

- New No. 3024. Labeled *L. electra*.

To these should be added a mandible in the—

U. S. National Museum:

- No. 4108. Type of *Phocæna pectoralis* Peale.

The differences between the types of *L. electra* and *L. asia* are very slight, and are only such as might result from a difference in age. Even Dr. Gray, who was notoriously prone to exaggerate the importance of slight differences, regarded the latter species as possibly a variety of the former.* He pointed out clearly the differences of the two skulls in the following words:

The skull, which is without teeth, very much resembles, in the depressed and expanded form of the brain-cavity and shape of the beak, the skull of *L. electra*, but it differs from that in the beak being rather more acute in front and more contracted in the middle of the sides, and in being rather smaller in size.†

So far as the width of the beak at the middle is concerned, it will be seen from the measurements that the type of *L. asia* is intermediate between the type of *L. electra* and the skull in the Royal College of Surgeons, which is also identified with the latter species.

Furthermore, laying aside the identifications with which the different specimens are ticketed, they can not be divided into two groups according to the width or the narrowness of the rostrum, but form a continuous series, the specimen in the College of Surgeons having the narrowest rostrum and that at Cambridge the widest. The single distinction given by Gray can not, therefore, have any value, and I was unable to discover any other valid characters.

The principal difference between the skulls of *L. fusiformis* and *L. electra* noted by Professor Owen in his original description of the former species is in the width of the rostrum at the maxillary notch. This character, as I have already stated above, I do not regard as sufficiently pronounced to have any weight.

The description, and especially the figure of *L. fusiformis*, becomes interesting, however, in connection with my discovery of the real affinity of Peale's *Phocæna pectoralis*. This species, which has been banded

* Gray, Catalogue, 1866, p. 269.

† Gray, l. c.

about for some time between the genera *Phocaena* and *Delphinus*, must, if my determination is correct, be placed in the genus *Lagenorhynchus*. The type-mandible from Hawaii agrees perfectly with that of the specimen of *L. electra* in the Paris Museum, which is, fortunately, from the same locality. It agrees also with the type (Brit. Mus., No. 358a) of that species. It may seem unwise to attempt to determine a species of *Lagenorhynchus* from the jaw alone, and in most cases I believe that it would be so. But the mandible of *L. electra* is so peculiar in its stout form and rounded coronoid region that it is at once distinguishable.

A difficulty now arises, however, because there is a decided lack of agreement between Peale's figures of *P. pectoralis* and Owen's figures of *L. fusiformis*, which, if my conclusions are correct, represent the same species. It should be remembered, however, that Owen described the external appearance of his species from drawings of an Indian artist,* while Peale had the specimen which he figured before him in the flesh. The animal figured by Professor Owen is represented as having a distinct, elongated beak, a character which arouses my suspicion of the accuracy of the drawing, for the reason that it is at variance with the shape of the head of all other species of *Lagenorhynchus* of which the external appearance is known.

The external measurements agree fairly together, but count for little, since those of *L. fusiformis* were apparently taken from the drawing.†

The descriptions of color agree but little, though the discrepancy may perhaps be due to the fact that the Indian specimen may not have been entirely fresh. The descriptions are as follows:

Phocaena pectoralis.

Color, blue-black; a white spot on each side of the breast in front of the pectoral fins; a frontal band of light slate-color extends a short distance behind the eyes; vent and abdomen light reddish-white; lips margined with reddish-white. (Peale, U. S. Explor. Exped. Mamm. & Ornith., 1848, p. 32.)

Lagenorhynchus fusiformis.

The color of the spindle-shaped Dolphin is less darkly plumbeous than in the Gadamm, and becomes more gradually lighter towards the belly; the dorsal fin, the fore part of the pectoral and caudal fins, and the snout have the darkest pigment; the light ashy-gray belly shows no spots. (Owen, T. Z. S. VI, p. 23.)

We have, therefore, two specimens whose bones (so far as we know them) are alike, but whose external appearance is represented as widely different. As there are, so far as I am aware, no casts or mounted skins of *L. electra* in any museum we must pend judgment until more material has been collected. I believe, however, that the figure of *P. pectoralis* will be found to be essentially correct.

The reference to *L. electra* in the "Ostéographie des Cétacés" (p. 597) is very much confused. Three distinct specimens are referred to as figured in pl. XXXVI (fig. 6). The figure seems to be taken from No.

* Trans. Zool. Soc., London, VI, 1869, p. 17, pl. v, fig. 1.

† In the legend accompanying the plates of Professor Owen's Memoir (l. c., p. 46), the figure of *L. fusiformis* is said to be "diminished to scale." This scale is not that given on pl. v, but is apparently $7\frac{1}{2}$ in. = 6 feet.

a3044, obtained by M. Ballieu in Hawaii. "Notre second exemplaire" is probably No. a3082, but the label does not state from whence it was derived. Is it the specimen "dont la présence a été constatée aux îles Bissagos, situées dans le golfe de Guinée?" This is a matter of some importance since all other specimens, of which the record is known, are from the Indian and tropical Pacific Oceans.

Table of measurements.

LAGENORHYNCHUS ELECTRA.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.		Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
						At base of maxillary notches.	At its middle.	At base of maxillary notches.	At its middle.		
358a	Brit. Mus.	<i>L. asia</i> , Gray. ....	.....	.....	<i>Cm.</i> 42.5	<i>Cm.</i> 23.0	<i>Cm.</i> 12.6	<i>Cm.</i> 8.0	<i>Cm.</i> 5.35	<i>Cm.</i> 9.1	
359a	.....do.....	<i>L. electra</i> , Gray. ....	.....	.....	45.7	24.35	13.95	9.2	6.1	9.7	
1475a	.....do.....	<i>D. fusiformis</i> Owen	India	♂	44.5	24.4	13.7	9.1	5.5	9.2	
a3044	Mus. d'Hist. nat. ....	.....	Hawaii.	.....	45.8	24.9	13.2	8.7	5.6	8.2	
a3082	.....do.....	.....	.....	.....	45.8	24.9	13.5	9.4	6.1	10.4	
555a	Cambridge Mus. ....	.....	.....	.....	44.8	24.0	15.6	10.3	5.8	10.2	
3024	R. Col. Surg. ....	.....	.....	.....	47.2	25.7	13.0	8.2	5.7	9.6	
4108	U. S. Nat. Mus.	<i>D. pectoralis</i> Peale.	Hawaii.	.....	.....	.....	.....	.....	.....	.....	.....

Catalogue number	Length of tooth-line.	Last tooth to base of maxillary notches.		Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
		Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.								
358a	<i>Cm.</i> 17.0	<i>Cm.</i> 6.9	<i>Cm.</i> 28.65	<i>Cm.</i> 29.2	<i>Cm.</i> 22.6	<i>Cm.</i> 15.75	<i>Cm.</i> 7.5	<i>Cm.</i> 6.35	<i>Cm.</i> 34.65	<i>Cm.</i> 3.8	<i>Cm.</i> 16.4	<i>Cm.</i> 8.15	<i>Cm.</i> 0.46		{ 23(+3)-23(+3) 23-23
359a	18.1	7.9	31.3	.....	25.2	16.3	9.4	5.5	37.1	4.3	16.8	6.1	0.41		{ 25-25 23-24
1475a	16.6	9.2	30.7	31.5	24.2	15.8	8.5	5.6	36.2	3.6	.....	8.5	0.41		{ 22-22 (23)-(23)
a3044	17.6	8.2	30.5	31.9	23.6	17.5	8.1	5.6	37.4	4.1	.....	.....	.....		{ 22-22 24-23
a3082	18.0	7.9	30.5†	32.5	24.9	18.0	9.9	6.6	.....	.....	.....	.....	.....		{ ..... .....
555a	17.5	.....	29.6	30.1	26.0	18.4	9.6	5.8	.....	3.2	.....	.....	.....		{ 21-22 19-19
3024	17.7	9.5	.....	31.7	24.4	17.1	9.2	5.4	38.4	3.6	17.0	9.2	.....		{ 23-22 23-24
4108	.....	.....	.....	.....	.....	.....	.....	.....	35.6	3.8	16.3	9.1	.....		{ 23? 23? † 23-23

* Least.

† From Peale.

LAGENORHYNCHUS OBSCURUS (Gray).

Delphinus obscurus, Gray, Spic. Zool., 1828, p. 2; Zool. Ere. & Terr., 1846, p. 37, pl. 16; Catalogue of Cetacea, 1st ed., 1850, p. 107.

Tursio obscurus, Gray, Catalogue, 2d ed., 1866, pp. 264 and 400.

Clymenia obscura, Gray, Proc. Zool. Soc., London, 1866, p. 215; ditto, 1868, p. 147, fig. 1 (pterygoid bones); synopsis, 1868, p. 6, pl. 16; supplement, 1871, p. 71, fig. 3 (pterygoid bones); Flower, Proc. Zool. Soc., London, 1883, p. 512.

? *Phocæna australis*, Peale, U. S. Explor. Exped., 1st ed., 1845, p. 33, pl. 6, fig. 2.

This species was originally described by Gray from a stuffed skin, but he afterwards included in the species a number of skulls in the British Museum. That the latter were properly referred to the species appears to have been confirmed by Professor Flower upon removing the skull from the type-skin in 1884. (See his *List*, p. 28.)

It has been customary among authors since 1868 to refer this species to *Clymenia* (= *Prodelphinus*). In the *Catalogue*, however, Gray, although referring the species to *Tursio*, makes the remark that "the skull of this species is intermediate between the *Lagenorhynchus* and *Delphinus*" (*Catalogue* Seals and Whales, p. 265). After going over the data many times it seems to me that it should properly be referred to the former genus. There is nothing in the characters of the skull that would militate against this view, and certain considerations regarding the exterior seem to confirm it.

First, the form of the head in the type specimen is unlike that of any species of *Prodelphinus* of which the exterior is known. There is no real beak, but on the contrary the head slopes gradually from the blowhole to the extremity, as in *Lagenorhynchus æetus*.

Again, the color seems rather that of a *Lagenorhynchus* than of a *Prodelphinus*. Gray's original description contains the following data regarding the color of the body:

Collo ventreque albidis, fascea nigra ab angulo oris usque ad primas pectorales; striga obliqua laterali, alba postica; cæterum totus niger.

In a young specimen in the same collection the colors are more defined; but even in the older specimens the lateral streaks are to be seen in certain positions—a fact which is not shown in the drawing. (Spic. Zool., p. 2.)

The figure of the young individual is not unlike Waterhouse's figure of *L. Fitzroyi* (Zool. Beagle, pl. 10), which species, indeed, Gray made synonymous with *obscura*. Though somewhat generalized, the figure in question, as also that of the older individual on the same plate of the *Spicilegia* (Pl. II, fig. 3), is certainly unlike any *Prodelphinus* we know.

The dimensions of the adult type-skin are as follows (measured in straight lines): Total length, 65 inches; tip of snout to corner of mouth, 8.7 inches; to eye, 10 inches; to blowhole, 9.5 inches; to anterior base of pectoral fin, 16.5 inches; to anterior base of dorsal fin (following the curves), 31.75 inches; length of the dorsal fin, 9 inches; vertical height of dorsal fin, 7.5 inches; length of pectoral fin, 11 inches; greatest breadth of pectoral fin, 3.5 inches; breadth of caudal fins, 15.75 inches.

Table of measurements.

LAGENORHYNCHUS OBSCURUS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxille at middle of beak.	Greatest breadth between outer margins of intermaxille proximally.
							At base of maxillary notches.	At its middle.		
354a	Brit. Mus.	.....	.....	.....	<i>Cm.</i> 36.8	<i>Cm.</i> 20.1	<i>Cm.</i> 9.3	<i>Cm.</i> 6.1	<i>Cm.</i> 3.3	<i>Cm.</i> 7.8
4117	U. S. Nat. Mus.	.....	.....	.....	.....	.....	.....	.....	.....	.....
354d	Brit. Mus.	.....	Coquimbo, Chili	.....	35.5	19.3	8.7	5.5	3.0	7.1
81,10,28,1	do	.....		.....	40.6	32.9	10.1	6.5	3.7	8.0
576m	Cambridge Mus.	.....		.....	38.2	21.4	9.0	6.0	.....	.....
3030	R. Coll. Surg.	.....	.....	.....	36.1	20.3	*8.9	5.7	3.2	7.6
3031	do	.....	.....	.....	36.1	19.7	*8.4	5.8	2.8	7.6

Catalogue number.	Length of tooth-line.		Last tooth to base of maxillary notches.		Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.								
354a	17.3	3.8	24.1	25.3	15.5	14.2	6.7	4.8	29.9	3.7	16.7	6.2	0.25	.....	.....	{ 32-34 30-30
4117	.....	.....	.....	.....	.....	.....	.....	.....	29.9	3.6	16.9	5.8	.....	.....	.....	{ ..... 30-30
354d	16.3	3.4	22.6	.....	14.1	13.5	5.9	3.8	29.4	2.8	16.2	6.2	0.32	.....	.....	{ 32-31 30-29
81,10,28,1	18.8	3.8	27.6	.....	16.7	14.1	7.6	5.1	33.0	.....	17.3	.....	0.30	.....	.....	{ 31-32 2-26
576m	.....	.....	.....	.....	15.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	{ 32 33
3030	17.1	3.2	24.6	24.1	15.2	13.6	6.3	4.4	29.8	3.8	17.4	5.7	.....	.....	.....	{ 32-33 32-31
3031	16.5	3.8	24.7	23.8	15.5	13.3	7.3	4.7	29.2	3.2	16.3	6.3	.....	.....	.....	{ 33-32 30-28

*Least.

8. SAGMATIAS.

Sagmatias, Cope, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 294.

This genus must be considered valid unless the characters given by Professor Cope can be proven to be the result of age or individual variation. These characters are the elevation of the premaxillæ immediately in front of the superior nares and the thinning out of the lateral free margin of the expanded portion of the maxillæ. Except in these two characters the genus shows a close approximation to *Lagenorhynchus*, with which I was at first inclined to unite it.

The genus is based upon the single skull described by Professor Cope under the name of *S. amblodon*. It belonged to an aged individual, as appears from the coalescence of the cranial elements and the bluntness of the teeth. Nothing is known of its history, except that it was captured at sea by the ship *Vincennes*, of the United States Exploring Expedition.

In size and proportion the skull resembles that of *Lagenorhynchus superciliosus*. The beak is more sharply pointed than is usual in that genus.

SAGMATIAS AMBLODON Cope.

Sagmatias amblodon, Cope, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 294.

Table of measurements.

SAGMATIAS AMBLODON.

Catalogue number.	Collection.	Type of—		Locality.	Sex and age.	Total length.	Length of beak.		Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.		
							At base of maxillary notches.	At its middle.	Cm.	Cm.				
3887	U. S. Nat. Mus.	<i>S. amblodon</i> *			Cm. 37.2	Cm. 18.5	Cm. 9.7	Cm. 6.2	Cm. 3.4	Cm. 7.3			
Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—	Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Transverse diameter of teeth.	Number of teeth.	
			Anterior margin of superior nares.	End of crest of pretygoid.		Orbits.	Hinder margins of temporal fossæ.							Length.	Depth.
3887	Cm. 15.7	Cm. 4.0	Cm. 22.3	Cm. 25.1	Cm. 16.7	Cm. 16.4	Cm. 7.9	Cm. 6.1	Cm. 5.0	Cm. 3.4	Cm. 14.3	Cm. 6.9	{ 32—32 31—32

* Caught at sea. United States Exploring Expedition.

9. FERESA Gray.

Feresa, Gray, Suppl. Cat. Seals and Whales, 1871, p. 78.

Feresia, Flower, Proc. Zool. Soc. London, 1883, p. 510.

The future development of our knowledge of this genus will be watched with much interest by cetologists. At present there is nothing to add to Gray's original description, and no additional specimens have been discovered.

I concur in Gray's opinion that the two typical skulls are clearly allied to *Lagenorhynchus electra*, and it may be found necessary eventually to include *Feresa* in that genus.

FERESA INTERMEDIA Gray.

Dolphinus intermedius, Gray, Ann. Phil., 1827, p. 396.

Grampus intermedius, Gray, List of Mammalia, 1843, p. 106.

Orca intermedia, Gray, Zool. Ere. & Terr., 1846, p. 34, pl. 8; Catalogue of Cetacea, 1st ed., 1850, p. 96; 2d ed., 1866, p. 283.

Feresa intermedia, Gray, Suppl. Cat. Seals and Whales, 1871, p. 78.

Feresia attenuata, Gray, Journal du Muséum Godeffroy, Heft VIII, 1875.

I append measurements of the two typical skulls described by Gray, and which Professor Flower very properly brings together under the same specific name.

Table of measurements.

FERESA INTERMEDIA.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.		Length of beak.		Breadth of beak—		Greatest breadth between outer margins of intermaxillae proximally.
					At base of maxillary notches.	At its middle.	Breadth of intermaxillae at middle of beak.				
362a	Brit. Mus ...	<i>Orca intermedia</i>	.....	.....	<i>Cm.</i> 36.2	<i>Cm.</i> 17.3	<i>Cm.</i> 12.0	<i>Cm.</i> 8.9	<i>Cm.</i> 6.1	<i>Cm.</i> 9.1
1672a	do	<i>F. attenuata</i>	South seas.....	.....	35.0	16.8	10.7	7.5	5.2	9.1

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Anterior margin of superior nares.	Extremity of beak to end of crest of pterygoid.	Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
					Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
362a	<i>Cm.</i> 12.9	<i>Cm.</i> 5.1	<i>Cm.</i> 22.6	<i>Cm.</i>	<i>Cm.</i> 21.1	<i>Cm.</i> 15.3	<i>Cm.</i> 9.2	<i>Cm.</i> 7.3	<i>Cm.</i> 28.9	<i>Cm.</i> 3.0	<i>Cm.</i> 13.5	<i>Cm.</i> 7.9	.....	{ 11—11 10—11
1672a	12.7	5.5	22.1	22.9	20.1	17.3	8.4	7.4	28.0	3.4	13.6	7.3	0.56	{ 12—11 13—12

10. CEPHALORHYNCHUS Gray.

Cephalorhynchus, Gray, Cat. Cetacea, Brit. Mus., 1850, p. 106.

? *Cephalorhynques*, F. Cuvier, Hist. Nat. des Cetacées, 1836, p. 156.

Entropia, Gray, P. Z. S., London, 1862, p. 145.

Entropia, Gray, Synopsis of Whales and Dolphins, 1868, p. 7.

Although Gray credits the name *Cephalorhynchus* to F. Cuvier, it was the former naturalist who first made a formal separation of the species. Cuvier states, at the place cited:

Nous les aurions séparées des dauphins proprement dits sous le nom de céphalorhynques, si ces différences extérieures [previously pointed out] eussent entraîné des différences intérieures plus marquées. Un examen de ces espèces plus approfondi que celui que nous en avons pu faire déterminera peut-être plus tard cette séparation.*

This aoristical genus includes representatives of four genera, the first mentioned being *D. rostratus*, a species now referred to the genus *Steno*. If *Cephalorhynchus* were to be accepted upon the authority of Cuvier, it would have to be applied, under the rules, to the species included in *Steno*.

Gray's distinctions are quite vague, and he has included *D. obscurus* in his subgenus, which is now referred to *Lagenorhynchus*. His first-mentioned species, however, is *D. Heavisidei*. Furthermore, his definition of *Cephalorhynchus* is, as already stated, a formal one, and the name itself is Latinized.

Professor Flower has left but little to be said regarding this genus and the species included under it. More facts must be forthcoming before the species can be placed upon a satisfactory basis.

The principal cranial characters of the genus seem to me to lie in (1) the separation of the pterygoids, (2) the great height of the nasal region, and (3) the expansion of the beak at the middle of its length. The expansion of the beak causes the rami of the mandible to bow out. As they are also bent downward toward the symphysis, the shape of the jaw is quite peculiar and characteristic.

CEPHALORHYNCHUS HEAVISIDEI Gray.

Delphinus (Grampus) Heavisidei, Gray, Spic. Zool., 1828, p. 2, pl. II, fig. 6.

Delphinus (Cephalorhynchus) Heavisidei, Gray, Cat. Cetacea Brit. Mus., 1850, p. 107.

Delphinus capensis, F. Cuvier, Hist. Nat. des Mammifères, liv. 58, 1829.

Delphinus cephalorhynchus, F. Cuvier, Hist. Nat. der Cetacées, 1836, p. 158.

D. hastatus, F. Cuvier, Hist. Nat. des Cetacées, 1836, p. 161.

Orca capensis, Van Beneden (nec Gray), Bull. Acad. R. Belg., 2d ser., xxxvi, 1873, p. 32, 1 fig.

Professor Flower has summed up the facts relative to this species in such a manner as to leave little for me to add. I append measurements

* This is a good example of what may be called gratuitous nomenclature. The author does not erect a name upon differences which he has discovered, but suggests that in case valid distinctions are found in the future such and such an appellation would be appropriate. Similar examples are frequent in zoological literature.

of the skulls which I examined in the Oxford, Paris, and Leyden Museums, and also of the type skin of the species which is in the British Museum. The dimensions of this latter specimen are as follows:

Measurements of a mounted skin of Cephalorhynchus heavisidei (type), from the Cape of Good Hope.

	Meters.
Total length	1.092
Extremity of beak to corner of mouth	0.155
Extremity of beak to eye	0.157
Extremity of beak to blowhole	0.158
Extremity of beak to anterior base of pectoral	0.267
Extremity of beak to anterior base of dorsal	0.516
Length of base of dorsal	0.178
Vertical height of dorsal	0.082
Length of pectoral from the anterior base	0.145
Breadth of flukes	0.247
Greatest width of pectoral	0.056

The beak is not sharply defined. The teeth are small and round. At 5.1^{cm} from the extremity of the mandible the distance between the teeth of opposite sides is 4.6^{cm}.

A cast of the head of this specimen was recently received by the National Museum through the liberality of Professor Flower.

Another stuffed skin is in the museum of Leyden. The form is very similar to that of *Phocæna*. The dorsal, however, is more sharply triangular. The forehead is somewhat concave (this may be due to drying). The color is black throughout, except a rather broad band of white, which starts about 8^{cm} posterior to the dorsal fin and somewhat below the middle of the side and runs obliquely downward, becoming merged in a second white area which occupies the center of the belly. Another similar but smaller band appears below and behind the first and is also confluent with the white of the belly. This specimen is presumably one of the "mehrere vollständige Häute" mentioned by Schlegel in the *Abhandlungen* (p. 31) as received from the Cape of Good Hope.

In one of the young skeletons at Leyden I find the vertebrae two more than the number given by Professor Flower. The formula, according to my notes, is as follows: C. 7, D. 13, L. and Ca. 47 = 67. This skeleton, as mounted, is 125^{cm} in length. The atlas and axis only are united. The seventh cervical vertebra has a superior transverse process like the transverse process of a dorsal. A superior transverse process is present also in the sixth cervical, but it is not so large. The transverse processes become obsolete at the forty-seventh vertebra, the neural arches at the fiftieth vertebra. The lumbar neural spines are sickle-shaped. The scapula is high, with a short, broad, and incurved acromion; the coracoid about equals the acromion in length and is broadened distally. The scapula is 8.9^{cm} high, 11.2^{cm} long. The first six

pairs of ribs possess heads. The skull of this specimen shows that the animal was quite young; the boundaries of the occipital elements are plainly discernible.

The skull "b" is also young and shows the outlines of the occipital element. The intermaxillæ are very thick and high proximally and remind me of those of *Sagmatias ambiodon*. The hinder margins of the temporal fossæ are but faintly marked out in this and the preceding skull.

The skeleton No. 1670a, at Oxford, is also young. The palate is very flat, the rami of the mandible are strongly bent outward, and the symphysis is very short. I counted the following vertebræ: C. 7, D. 13, L. and Ca. 45 = 65. The first six pairs of ribs are furnished with heads and five pairs join the sternum. The scapula is 9^{cm} high, 11.9^{cm} long. The humerus and radius together measures 9.7^{cm}. The sternum is 11.7^{cm} long and 6.3^{cm} wide in front. The atlas 11.9^{cm} wide, 7.6^{cm} deep. The carpels are five. The neural spines are narrow antero-posteriorly and bend slightly forward in the lumbar region, in this respect somewhat resembling those of *Lagenorhynchus*. Only the atlas and axis are united.

Table of measurements.

CEPHALORHYNCHIUS HEAVISIDEI.

Catalogue number.	Collection.	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
						At base of maxillary notches.	At its middle.		
X.	Mus. Pays-Bas.*	Cape G. Hope.....		Cm. 30.0	Cm. 13.9	Cm. 17.2	Cm. 5.2	Cm. 3.1	Cm. 5.12
B.	..do	.....		30.0	13.7	17.3	5.2	2.9	5.5
1670a	Oxford Mus.	.....	Jr	30.5	14.5	6.7	4.6	.....	.....
3062a	Mus. d'Hist. nat.†	.....		29.7	14.7	7.1	5.1	2.5	5.1
3063a	..do	Cape G. Hope.....		28.7	13.2	6.9	4.8	2.8	5.3
3061a	..do	.....		29.2	14.0	7.1	5.1	2.8	5.1
3061a	..do	Seas of N. Zealand.....		27.5	13.5	6.3	4.6	2.0	4.8

* From V. Horstok.

† Least.

‡ From the N. Zealand Inst.

Table of measurements—Continued.

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.					
X.	Cm. 12.1?	Cm. 2.6	Cm. 17.1	Cm. 18.5	Cm. 13.1	Cm. 14.6	Cm. 6.7	Cm. 4.6	.....	.....	.....	.....
B.	12.2	2.8	16.8	.....	12.8	14.6	7.0	5.0	.....	2.2	.....	.....	{ 24—26 27—26
1670a	12.7	2.4	17.0	.....	12.6	13.9	6.3	4.8	23.4	2.3	.....	5.3	{ 26—26 26—26
3062a	13.0	2.5	17.3	18.6	13.0	13.7	6.3	5.3	23.1	2.5	.....	5.1	{ 29—28 29—29
3063a	11.4	2.3	15.8	.....	12.2	13.7	6.1	4.3	22.9	2.5	.....	5.3	{ 26—26 26—25
3061a	12.7	2.3	16.5	.....	13.0	12.7	6.6	4.8	22.1	1.8	.....	5.6	.....
3064a	11.9	2.0	16.0	17.3	12.2	12.7	.....	.....	21.1	2.3	.....	4.8	{ 28—28 —26

CEPHALORHYNCHUS ALBIFRONS True.

Electra clancula Hector, Trans., New Zealand Inst., v, 1873, p. 160-162, pls. 1 and 3 (skull and exterior); Hutton, Trans. New Zealand Inst., ix, 1877, p. 350.

It is evident from the figures given by Hector that this species is not allied to the section of the genus *Lagenorhynchus* which Gray called *Electra*, but rather to the genus *Cephalorhynchus*. It also appears to me equally plain that it is not identical with the preceding species, *C. heavisidei*. Hector's account is full and clear, and the essential statements in it are repeated by Hutton, who appears to have written from his own knowledge. The latter writer states that it is "abundant all around the coasts of New Zealand," while Hector affirms that the different individuals observed were very uniform in color.

The species differs from *C. heavisidei* chiefly in having the whole head white, and in having a dorsal fin ovate rather than triangular in outline. The cervical vertebrae are represented to be anchylosed together into a single mass, but this is probably an error.

The skull apparently very closely resembles that of *C. heavisidei*, but is larger, with wider nares. The pterygoids, according to Hector's figure, are large and constricted at the base somewhat as in *C. eutropia*.

The entire animal would appear to be larger than *C. heavisidei*. Hutton gives its length as from 4 to 5 feet. The latter dimensions are not reached by any of the specimens of *C. heavisidei* thus far acquired, so far as I am aware.

The skulls of *Cephalorhynchus* from New Zealand in the Paris Museum are larger than those from the Cape of Good Hope. The rostrum in the former occupies one-half the total length, but in the latter only about 46 per cent. It is possible that the New Zealand skulls belong to the species under discussion.

The relations of these two species to a third recently discovered will now be considered. This species is

CEPHALORHYNCHUS HECTORI (Van Beneden).

Electra hectori, Van Beneden, Bull. Acad. R. Belgique, 3d ser., 1, 1881, pp. 877-887, Pl. II.

The specimen figured and described by Professor Van Beneden was captured in New Zealand waters. His admirable figures and description leave no room for doubt as to its generic position, but its specific relationships are not so readily made out.

Externally the specimen differs from the figures of *C. hearisidei* in having an ovate dorsal fin, and in that the throat and lower jaw are white rather than black. On the other hand, it lacks the white forehead of *C. albifrons*, but agrees with that species in the shape of the dorsal fin. The skull, according to Professor Van Beneden, agrees perfectly with that figured in the *Ostéographie*, Pl. XXXVI, fig. 1, which seems undoubtedly to belong to *C. hearisidei*. The vertebral formula, however, does not agree exactly with that of *C. hearisidei*. In the latter species the normal formula is probably as follows: C. 7, D 13, L. 15, Ca. 30=65. Van Beneden's specimen gives the following formula: C. 7, D. 14, L. 15, Ca. 27=63.

Regarding the differences, it may perhaps be said that the last-mentioned is due to individual variation. The color of the head and the shape of the dorsal fin on the contrary can scarcely be so regarded. But the color of the head is most like that of *C. hearisidei*, while the shape of the dorsal fin resembles that of *C. albifrons*. To put it in either of these species, therefore, we must disregard one or the other of the distinctions. For the present, it appears to me, it must stand as an independent species, and I have ranked it as such in the *Synopsis*, though with some misgivings, arising from geographical considerations.

CEPHALORHYNCHUS EUTROPIA (Gray).

Delphinus eutropia, Gray, Proc. Zool. Soc. London, 1849, p. 1.

Eutropia dickiei, Gray, Proc. Zool. Soc. London, 1866, p. 215.

Tursio eutropia, Gray, Cat. Seals and Whales, 1866, p. 262.

Cephalorhynchus eutropia, Dall, in Scammon's Marine Mamm., 1874, p. 289.

The only specimens of this species hitherto recorded are the two skulls in the British Museum reported to have come from the coast of Chili. Of these the type (No. 936a) is somewhat the smaller, but

otherwise is practically identical with the second specimen (No. 936*b*). While in London I purchased of Mr. E. Gerrard another specimen of the species, also said to have been received from the coast of Chili. This skull (No. 21167) is intermediate in size between the two in the British Museum and resembles them very exactly, although the tooth-line is a trifle longer. The number of teeth is the same, viz, ³¹⁻³²/₃₂₋₃₁. The type specimen (936*a*) appears to have somewhat smaller temporal fossae than the other two; it may be a female.

In cranial characters this species appears to differ from *C. heavisidei* principally in having the pterygoids longer and more closely approximated at the base. The brain-case also appears to be considerably narrower and the teeth slightly more numerous. The skull is larger than that of *C. heavisidei*.

We know nothing of the skeleton or external form of this species.

Table of measurements.

CEPHALORHYNCHUS EUTROPIA.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxilla at middle of beak.	Greatest breadth between outer margins of intermaxilla proximally.
							At base of maxillary notches.	At its middle.		
936 <i>a</i>	Brit. Mus.	<i>D. eutropia</i> ...	Chili. ....	.....	<i>Cm.</i> 36.7	<i>Cm.</i> 19.7	<i>Cm.</i> 8.6	<i>Cm.</i> 6.7	<i>Cm.</i> 3.2	<i>Cm.</i> 6.6
936 <i>b</i>	do	.....	do	.....	<i>Cm.</i> 32.8	<i>Cm.</i> 17.3	<i>Cm.</i> 7.2	<i>Cm.</i> 5.3	<i>Cm.</i> 3.3	<i>Cm.</i> 5.3
21167	U. S. Nat. Mus. ....	.....	(?) Chili	.....	<i>Cm.</i> 34.3	<i>Cm.</i> 18.7	<i>Cm.</i> 7.6	<i>Cm.</i> 6.1	<i>Cm.</i> 5	<i>Cm.</i> 5.8

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notches.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
936 <i>a</i>	<i>Cm.</i> 16.9	<i>Cm.</i> 3.8	<i>Cm.</i> 22.6	<i>Cm.</i>	<i>Cm.</i> 15.2	<i>Cm.</i> 14.2	<i>Cm.</i> 6.8	<i>Cm.</i> 6.0	<i>Cm.</i> 30.0	<i>Cm.</i> 3.0	<i>Cm.</i>	<i>Cm.</i> 6.6	<i>Cm.</i> 0.25	{ 30-30 30-31
936 <i>b</i>	<i>Cm.</i> 14.4	<i>Cm.</i> 3.5	<i>Cm.</i> 19.1	<i>Cm.</i> 21.0	<i>Cm.</i> 13.1	<i>Cm.</i> 13.2	<i>Cm.</i> 6.7	<i>Cm.</i> 6.0	<i>Cm.</i> 26.7	<i>Cm.</i> 2.7	<i>Cm.</i> 15.2	<i>Cm.</i> 5.5	<i>Cm.</i> 0.25	{ 31-30 28-30
21167	<i>Cm.</i> 16.2	<i>Cm.</i> 2.5	<i>Cm.</i> 21.1	<i>Cm.</i> 23.4	<i>Cm.</i> 13.9	<i>Cm.</i> 13.7	<i>Cm.</i> 6.7	<i>Cm.</i> 5.6	<i>Cm.</i> 27.7	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i> 5.6	<i>Cm.</i>	{ 31-32 32-31

11. NEOMERIS Gray.

Neomeris, Gray, Zool. Erebus & Terror, 1846, p. 30.

This genus appears to have but one character to distinguish it from *Phocæna*, namely, the absence of a dorsal fin. I was unable to discover any peculiarities in the skull or the remainder of the skeleton which could be regarded as sufficient to warrant a separation from the latter genus. Is the absence of a dorsal fin a sufficient generic character? I believe that it is, or at least must be so regarded until we know more of the anatomy of *Neomeris*. The case is somewhat different from that of *Leucorhamphus*, because in that genus we find the absence of a dorsal fin correlated with certain characters in the skeleton. In *Neomeris* no similar correlation has been pointed out. On the other hand, the dorsal fins of the three species of *Phocæna* show no signs of degeneration and furnish us no steps by which to descend to *Neomeris*. It may be, however, that when the anatomy of *Neomeris* is known many new distinctions will be discovered. In the present state of knowledge I would adopt Professor Flower's conservative course, and leave the genus to be sustained or set aside by later investigations.

Only a single species is recognized in the following pages, viz, *N. phocænoïdes* (Cuvier).

NEOMERIS PHOCÆNOIDES (Cuvier).

Delphinus phocænoïdes, Cuvier, Règne Anim., 2d ed., I, 1829, p. 291.

Delphinus melas, Temminck, Fauna Japon., Mammif. marin., 1850, p. 14, pls. 25-26.

Delphinapterus molagan, Owen, Trans. Zool. Soc. London, VI, 1869, p. 24.

Neomeris phocænoïdes, Gray, Zool. Erebus & Terror, 1846, p. 30, Malin, Sven. Akad. Handl., n. f., IX, 1, 1870, p. 77.

Neomeris kurrachiensis, Murray, Ann. & Mag. Nat. Hist., 5th series, XIII, 1884, p. 351.

The three specimens of this animal which fell under my notice are as follows:

MUSEUM D'HIST. NAT., PARIS.

No. A. 3087. Skull. Coast of Malabar. Dussumier. Type of *D. phocænoïdes* Cuvier.

No. A. 3086. Skull. Cape of Good Hope.

LEYDEN MUSEUM.

Skeleton. Japan. Brüger. Type of *D. melas* Temminck.

These three skulls agree well together, but in Temminck's specimen the beak is somewhat the longest, while the breadth of the brain-case is least. In this skull the thickened portion of the intermaxillæ in front of the nostrils rises very high. Distally the intermaxillæ are flat. The foramen magnum is large, lozenge-shaped, and a little higher than broad. The condyles are widely separated.

The total length of this skeleton is 128^{cm}. I counted the following vertebræ: C. 7, D. 13, L. & Ca., 43 = 63. The atlas and axis are united,

The transverse processes of the former are much less developed than in *Phocæna*. The inferior transverse processes of all the cervical vertebrae are rudimentary. In the seventh cervical the superior transverse process ends in a facet to which is attached a short rudimentary cervical rib. The superior transverse process of the sixth cervical is short and tubercular. The first seven ribs have heads which touch the centra of the vertebrae. The neural spines, which are broad and low in the dorsal region, are obsolete in the neck. The sternum is very short and broad, and has four pairs of ribs articulated with it. The transverse processes become obsolete at the forty-third vertebra and the neural at the forty-seventh vertebra. Seventeen chevron bones are present. The skeleton is described by Temminck at some length, and I am therefore spared the necessity of giving a complete account of it.

In 1884 Mr. F. A. Murray described an animal of this genus from the Sind coast, which he made the type of a new species, *N. kurrachensis*. Such of his measurements of the skull as may be compared with those which I have recorded indicate a correspondence in proportions between his specimens and the type of *N. phocænoïdes*, and I find nothing in the description to show that his specimen was specifically distinct from the latter species. The small rudimentary teeth at the extremity of the alveolus are indicated in Temminck's figure. The dorsal area of spiny tubercles is also indicated in Temminck's figure of the exterior. The purplish-red patch on the throat is not mentioned by Temminck, but even if the two specimens differ in this respect, they could scarcely, on that account alone, be regarded as specifically distinct. I believe that we may regard Mr. Murray's description as applying to *N. phocænoïdes*.

Mr. Murray's measurements are as follows:

EXTERIOR:	Inches.
Length along curves from tip of snout to notch between caudal flukes	52
Length straight.....	45
Tip of snout to pectoral fin.....	1.0
Caudal flukes	9 × 3.
Distance of blowhole from tip of snout along curve	6.5
Distance from angle of mouth to eye.....	1.62
Vent from root of caudal fin.....	14.0
 SKULL:	
Length of skull over curves to upper edge of foramen magnum.....	10.
Length straight from below	8.
Height of skull (vertex of superoccipital) ..	4.25
Tip of snout to blowhole	4.25
Tip of snout to interparietal	6.25
Interparietal to upper edge of foramen magnum.....	3.75
Across maxillaries.....	4.75
Across blowhole	1.5
Length of malar.....	2.0
Length of brain cavity.....	4.0
Across paroccipitals.....	3.37
Greatest space between occipital condyles (upper)	1.5

SKULL—Continued.

Smallest space between occipital condyles at lower third.....	1.0
Vertical diameter of foramen magnum.....	1.75
Breadth across last teeth on each side of upper jaw.....	2.5
Breadth across last tooth on each side of lower jaw.....	2.5
Teeth line in upper and lower jaws.....	2.5
Length of lower jaw at coronoid process.....	5.62
Greatest vertical depth of ramus.....	2.62
Palate.....	4.0

Owen's *Delphinapterus molagan*, from the vicinity of the Cape of Good Hope, belongs apparently to this species.

N. phocenooides appears to have a wide range, extending at least from the Cape of Good Hope to Japan.

Table of measurements.

NEOMERIS PHOCENOIDES.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak,			Breadth of intermaxillae at middle of beak.	Greatest breadth between outer margins of intermaxillae proximally.
						At base of maxillae notches.	At its middle.	Breadth of beak—		
n. n. a3086	Mus. Pays-Bas. Mus. d'Hist. nat.	<i>D. melas</i> <i>N. phocenooides</i> ..	Japan..... Cape G. Hope.....		<i>Cm.</i> 22.8 18.8	<i>Cm.</i> 8.4 6.2	<i>Cm.</i> 16.7 6.6	<i>Cm.</i> 4.7 4.3	<i>Cm.</i> 19.7 19.5	<i>Cm.</i> 4.0 3.4
a3087 (*)	do.....	<i>N. kurrachiensis</i> .	Malabar..... Sind coast.....		18.8 20.3	6.3	6.3	4.4	2.5	3.0

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossae.		Length of mandible.	Length of symphysis mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Breadth of anterior nares.	Number of teeth.
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossae.	Length.	Depth.						
n. n.	<i>Cm.</i> 7.2	<i>Cm.</i> 2.0	<i>Cm.</i> 12.1	<i>Cm.</i> 12.7	<i>Cm.</i> 12.0	<i>Cm.</i> 11.8	<i>Cm.</i> 5.9	<i>Cm.</i> †3.8	<i>Cm.</i> 17.0	<i>Cm.</i> 1.5	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	{ 18—18 { 15—15;
a3086	5.6	1.8	9.7	.....	10.4	.....	5.6	3.1	13.2	1.5	.....	3.8	2.5	{ 18—19 { 17—19
a3087	5.7	1.6	9.4	9.4	10.4	10.7	4.6	2.8	13.5	1.5	.....	3.8	2.5	{ 0—17 { 17—18
(*)	6.3	.....	6.2	.....	12.1	.....	.....	.....	.....	.....	6.3	16.7	.....	.....

* From Murray.

† Least.

‡ Or { 18—18
{ 17—17

12. PHOCÆNA Cuvier.

Phocæna, Cuvier, Règne Animal, 1, 1817, p. 279.

The genus *Phocæna* is readily distinguishable from all the remaining genera of the family, except *Neomeris*, by the shape of the teeth. From the latter genus it differs in having a dorsal fin.

Professor Flower's admirable diagnosis holds good for all the species, except, as I have already pointed out elsewhere,* for one observed in the North Pacific by Mr. Dall, which I have named *P. Dallii*. In this species the number of vertebræ rises to ninety-seven or ninety-eight, and the dorsal fin is falcate. In these characters the species shows affinity to *Lagenorhynchus*, but, on the other hand, the skull (the only portion of the skeleton preserved) is that of a *Phocæna*.

Putting aside the number of vertebræ and the form of the dorsal fin, we still have in the form of the teeth, the shape and position of the pterygoids, the form of the premaxilla, and the presence of a dorsal fin, sufficient characters for the differentiation of the genus.

I have elsewhere stated my opinion that the number of valid existing species of this genus is probably reducible to four, viz, *Phocæna communis* Lesson; *Phocæna lineata* Cope; *Phocæna spinipinnis* Burmeister; *Phocæna dallii* True. *P. pectoralis* Peale, I have shown in another part of this work to be probably identical with *Lagenorhynchus electra* Gray (p. 101). *P. tuberculifera*, Gray, was finally admitted by that author to be the same as *P. communis* Lesson. *P. brachycion*, Cope, and *P. vomerina*, Gill, have never been proven identical with *P. communis*, Lesson, but Professor Flower, in 1883, expressed the opinion that such was probably the truth, and I have myself reached that conclusion. As regards the identity of *P. lineata*, however, the material at command is scarcely sufficient to warrant any very positive assertions. The type-skeleton is missing and nothing but the painted cast remains, and it is evident that to base any conclusions upon the color of a painted cast alone is hazardous. Special difficulty attends the discrimination of species in this genus, because both the body as a whole and the skeleton are subject to great variations in proportions and details of form.

The characters drawn from the relation of the vomer to the palatines, which are employed by Professor Cope and Dr. Gill in the separation of the different nominal species, are valueless.† To find other characters is a task to which I have devoted my attention, but thus far without success. I am constrained for the present to look upon *P. communis*, *brachycion*, *lineata*, and *vomerina* as identical.

The species here recognized are, therefore, *Phocæna communis* Lesson, 1827; *Phocænas pinipinnis* Burmeister, 1865; *Phocæna dallii* True, 1885.

* Proc. U. S. Nat. Mus., VIII, 1885, pp. 95-98.

† Cope, Proc. Acad. Nat. Sci. Philadelphia, 1876, p. 134. Gill, l. c., 1865, p. 178. I should state, however, that Dr. Gill has informed me that he no longer places any confidence in these characters.

PHOCÆNA COMMUNIS Lesson.

Delphinus phocæna, Linné, Syst. Nat., 10th ed., 1758, p. 77.

Phocæna communis, Lesson, Man. de Mammalogie, 1827, p. 413. (Fide Flower.)

Phocæna brachycænum, Cope, Proc. Acad. Nat. Sci. Phila., 1865, p. 279.

Phocæna vomerina, Gill, Proc. Acad. Nat. Sci. Phila., 1865, p. 178.

? *Phocæna lineata*, Cope, Proc. Acad. Nat. Sci. Phila., 1876, p. 135.

Of Phocænas from the east coast of America there are in the national collection three complete skeletons, two of young individuals and one of an adult; four additional skulls; and three casts from fresh specimens. Of *P. vomerina* there is one young skeleton and three skulls. There are also in this collection the type-cast of *P. lineata* and a skeleton and two skulls of *P. communis*.

All the specimens from the east coast, except No. 16610, Cape May, N. J., adult ♀, are from Eastport, Me., and are not adult. The number of vertebrae in the three skeletons is as follows:

(a) No. 13301, Eastport, Me., C. 7; D. 13; L. & Ca. 44=64.

(b) No. 13305, Eastport, Me., C. 7; D. 12; L. & Ca. 22 + * = 64.

(c) Unnumbered, Eastport, Me., C. 7; D. 13; L. & Ca. 46=66.

(d) No. 16610, ♀, Cape May, N. J., C. 7; D. 13; L. & Ca. 47=67.

In the skeleton of *P. vomerina* the formula is as follows:

(e) No. 14331, California, C. 7; D. 12; L. & Ca. 45 (+1)† = 65 (or 66).

Three skeletons from the European coast, mentioned by Fischer, have the vertebrae as follows:

(f) C. 7; D. 13-14; L. & Ca. 45-48=65-69.

It is evident that no character can be derived from differences in the number of vertebrae.

In all the American skeletons the caudal artery first perforates the thirty-ninth vertebra counting from the last vertebra. This is, however, a character of no value in differentiating *P. communis*, since in the skeleton figured by Van Beneden and Gervais (Ostéog., Pl. LV) the first perforation is in the thirty-eighth vertebra.

In his paper in the Proceedings of the Philadelphia Academy, 1876, Professor Cope brings forward the shape of the portion of the vomer visible behind the palatines as a specific character. In two of the four skulls from Eastport the vomer appears behind the posterior margin of the palatines, while in the remaining two it does not. The same is the case as regards the four skulls from the Pacific coast: in two it appears, in the others, not. In one of the skulls of *P. communis* figured by Van Beneden and Gervais, the vomer is visible, in another it is not. It is certain, therefore, that this character, as already stated, is valueless.

As regards the other characters given by Professor Cope for his *P. brachycænum*,—the shape of the muzzle, the preauricular triangular area,

* Most of the caudal vertebrae are lacking.

† The last rudimentary vertebra is evidently lacking.

the proximal ends of the premaxilla, the nasals, and the portion of the vomer visible on the palatine surface,—I find that no two of the Eastport skulls agree. They can therefore scarcely be regarded as of importance in distinguishing the species.

In the List of the Cetacea in the British Museum,* Professor Flower intimates that the skull of *P. vomerina* is larger than any other Phocæna skull in that collection. In looking over our own series, I was at first struck by the size of two of the skulls of *P. vomerina*, but on comparing M. Fischer's measurements I find that neither of these is as large as that of his specimen "*D. Femelle très adulte*,"† nor are they as large as Malm's specimen "t."‡ The largest skull of *P. vomerina*, No. 9078, from Puget Sound, is 29.3^{cm} long, but it does not show any considerable occipital crest nor other signs of age; while, on the other hand, No. 16610, an adult female of *P. brachyeium* from Cape May, N. J., though only 26.6^{cm} long, has the crest strongly developed. That this fact is without significance, however, appears from the consideration of two other skulls, both of which are 26.6^{cm} long. One of them, No. 9164, is from Eastport, Me., and should represent *P. brachyeium*; the other, No. 9077, is from Puget Sound, and represents *P. vomerina*. The latter has the sutures between the elements of the occipital closed, while in the former they are still open. The crest also is rather more pronounced in *P. vomerina*. We have here, therefore, a fact exactly opposed to that just presented, namely, in two skulls of equal size that of *P. vomerina* appears to be the older, and might be presumed, therefore, to be the smaller species. It appears, therefore, that the absolute size of the different skulls gives us no grounds for the distinction of species.

As regards proportions, there can be no question that the girth of the body of the specimen which Professor Cope called *P. lineata*, as compared with its length, is much less than in the specimen from Eastport, with which he compared. But it should be held in mind that the latter is only 43½ inches long, while the type of *P. lineata* is 70 inches long. The former is evidently very young, since a skeleton (No. 13301, from Eastport), which measures fully 46 inches, has the sutures defining the limits of the elements of the occipital still open.

The large size of the head and the thickness of the body I look upon as fetal characteristics not yet outgrown.

It is manifestly unwise to compare the type of *P. lineata*, which shows evidence of being adult, with so young an individual as the Eastport specimen. Fortunately we have two other casts nearly equaling the type of *P. lineata* in length. Of the larger of these, No. ¹³³⁵⁹/₁₆₆₁₀ an adult female, we have the entire skeleton. In the following table are compared the

* List of the Cetacea in the Brit. Mus., 1835, p. 16.

† Fischer, Actes Linn. Soc. Bordeaux, xxxv, 1831, p. 165.

‡ K. Svenska Vetensk. Akad. Handling., new ser., ix, i, 1871, p. 75.

proportions of this specimen and the type of *P. lineata*, the measurements in both cases being from the casts:

Measurements.	13339. Adult ♀. Cape May, N. J.	12481. ♀. New York Harbor. (Type of <i>P.</i> <i>lineata</i> .)
	Inches.	Inches.
Total length	68.0	70.0
Extremity of snout to eye	6.5	7.0
Extremity of snout to blowhole	7.0	7.0
Extremity of snout to corner of month	4.75	4.75
Extremity of snout to anterior base of pectoral	13.0	14.5
Extremity of snout to anterior base of dorsal	29.0	30.0
Vertical height of dorsal	4.0	3.75
Length of pectoral	7.0	7.25
Greatest width of pectoral	3.5	.....
Width between points of flukes	12.5	15.5

Considering the variation in proportions occurring in this genus, I think it will be admitted that the proportions in these two individuals are remarkably similar, and that No. 13339 must be identified as *P. lineata*, if such a species exists. But the skeleton of this individual (osteological No. 16610) is at command and it exhibits no characters by which it may be distinguished from a skeleton of *P. communis* from European waters. It is therefore strongly probable that the missing skeleton of the type of *P. lineata* was likewise identical with that of *P. communis*.

The measurements of *P. vomerina* given by Seammon are taken from two individuals, one 4 feet 8 inches long, the other but 4 feet.* In a skeleton from California, which is 4 feet long, the suture between the atlas and axis is plainly visible, the epiphyses of the centra are free, and the elements of the occipital are distinct. It is proper, therefore, to hold that Seammon's specimens were both young, and to compare them only with young specimens from the Atlantic. When we come to examine Seammon's measurements, however, we find the differences in the proportions of the two individuals so great that we can not hope for any satisfaction in comparing them with Atlantic specimens. It is true that Seammon's two specimens belonged to opposite sexes, but the differences are too great to be ascribed to difference of sex. For example, in the female, which was 48 inches long, the width of the pectoral fins was as great, the height of the dorsal greater, and its length along the back as great as in the male, which was 56 inches long. In the small female, also, the distance from the extremity of the snout to the eye was as great as, and to the blowhole greater than, in the larger male. In comparing these specimens with others from the Atlantic, therefore, we shall be at a loss to determine whether the differences observable are to be regarded as indicating specific distinctness or as being due to individual variation. As the Atlantic *Phocænas*

* Marine Mammalia, p. 96.

also vary greatly in proportions, we shall gain nothing by comparison. On this point we must await the result of future investigations.

We turn finally to the question of color. The color of *P. lineata* is accurately described by Professor Cope (l. c.). The back upper half of the head, posterior part of the tail, flukes, and pectoral fins are black. The sides are pinkish and the belly is white. A black line passes from the base of the pectoral fin to the corner of the mouth. The edges of the lower lip are black. The Cape May female and another female specimen, 5 feet 1 inch long, have nearly the same coloration, except that the sides are yellowish instead of pink and the light color of the belly extends nearly to the flukes and leaves only a slight band of dark color around the lower lip. The Cape May specimen also has no dark band from the pectoral fin to the mouth, but it exists in the second female. Are these differences in color sufficient to warrant the separation of *P. lineata*?

M. Fischer's figure of an old female (Pl. VII, fig. 1) agrees in coloration and form with the cast of *P. lineata*, except that the sides are gray instead of pink and that the band of color from the pectoral fin to the mouth is broad and gray instead of narrow and black.

In point of color, Scammon's description of *P. vomerina* is applicable to M. Fischer's specimens of *P. communis*. I subjoin Scammon's description of the female of *P. vomerina* and the description by Lafont of a female of *P. communis*:

P. vomerina (female).

The female is of the same color above (black); it is lighter on the sides, with a narrow black streak running from the corner of the mouth to the pectorals, and the lower portion of the animal is of a milky whiteness; yet the pectoral and caudal fins are black underneath or of a dark gray. [Scammon, Marine Mam., p. 95.]

P. communis (female).

Dos noir; flanes d'un gris de fer jaspé de blanc; abdomen d'un blanc un peu grisâtre; pectorals noires; une ligne noire, très étroite, part de leur attache et se dirige vers la commissure labiale; rostre noir. (Lafont.) [Fischer, l. c., p. 165.]

It will be observed that Lafont's specimen only differs in having the white of the belly "un peu grisâtre." In another specimen this region was white, as in Scammon's *P. vomerina*.

Summing up the available evidence I find no reason to regard *P. brachyeion* or *P. vomerina* as distinct from *P. communis*. *P. lineata*, if distinct, differs only in color, a character which in this genus must be looked upon with distrust.

Table of measurements.
PHOCÆNA COMMUNIS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.		Length of beak.		Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
					Cm.	Cm.	Cm.	Cm.	Cm.	Cm.		
9164	U. S. Nat. Mus	.....	Eastport, Me.	Jr.	26.5	11.6	7.5	4.7	2.2	2.2	3.5
13305	.. do .....	.....	.. do	Jr.	24.4	10.0	7.3	4.1	2.0	2.0	3.7
13301	.. do .....	.....	.. do	Jr.	23.7	10.0	7.1	4.0	1.9	1.9	4.0
9157	.. do .....	.....	.. do	Jr.	24.7	9.8	6.8	4.1	2.0	2.0	4.1
9078	.. do .....	.....	Puget Sound	Ad.	29.3	13.7	7.5	5.5	2.5	2.5	4.2
9077	.. do .....	.....	.. do .....	..	26.5	11.7	7.7	4.7	2.0	2.0	3.6
2965	Roy. Col. Surg	<i>P. tuberculifera</i>	Brighton, Eng.	♀	26.4	10.7	7.8	5.0	2.5	2.5	3.6	
2970	.. do .....	.....	.....	..	26.2	10.9	7.5	4.8	2.4	2.4	3.4

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Breadth of crown of largest tooth.	Number of teeth.
			Anterior margin of superior nates.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossæ.	Length.	Depth.						
9164	10.0	2.1	14.7	.....	11.9	.....	6.6	4.1	.....	.....	.....	.....	.....	{ 26—26 1—1
13305	8.9	1.8	12.8	14.8	12.1	.....	3.5	18.4	2.5	.....	5.0	2.6	.....	{ 27—25 26—25
13301	8.6	2.0	12.6	14.5	11.3	.....	4.2	3.5	18.1	2.0	.....	4.7	3.5	{ 26—25 27—24
9157	8.2	2.0	12.8	.....	11.4	.....	4.6	3.6	.....	.....	.....	.....	.....	{ 28—27 25—26
9078	11.8	2.2	18.1	19.4	13.7	13.9	6.0	4.3	23.1	2.9	.....	6.4	3.5	{ 27—26 26—25
9077	9.9	2.4	14.8	16.4	12.3	.....	5.9	4.0	20.1	2.8	.....	5.4	.....	{ 27—26 26—25
2965	9.4	2.1	14.7	16.2	12.7	12.8	6.3	3.8	21.6	2.9	9.4	5.7	.....	{ 21—20 23—22
2970	9.8	2.0	14.2	15.9	11.6	.....	.....	.....	20.1	2.4	9.4	5.3	.....	{ 7—26 24—25

PHOCÆNA SPINIPINNIS Burmeister.

Phocæna spinipinnis, Burmeister, Proc. Zool. Soc. London, 1865, p. 228; An. Mus. Pub. Buenos Aires, I, 1864-69, pp. 350-388, Pls. XXIII-XXIV.

No one who has read Dr. Burmeister's description of this species and compared his measurements and figures with those of *P. communis* can doubt its distinctness. The black color, the peculiar form of the dorsal fin and its position, the large size of the pectoral fins, and the small number of teeth, are all characters which it is impossible to set aside.

The type-specimen, though very young, measured 162^{cm} in length, which would indicate that the species is larger than *P. communis*.

In the following table a part of Dr. Burmeister's measurements of the skull and exterior are placed in juxtaposition with the measurements of a male specimen of *P. communis* given by M. Fischer, and of a skull of *P. communis* from Puget Sound, in the national collection.

Measurements of the exterior.

Measurements.	<i>P. spinipinnis</i> , ♂, type (from Burmeister).	<i>P. communis</i> , male (from Fischer).
	<i>Cm.</i>	<i>Cm.</i>
Total length	162.0	164.0
Length of the mouth	8.5	13.0
Distance from extremity of snout to blowhole	16.0	17.0
Distance from extremity of snout to dorsal fin	90.0	72.0
Height of dorsal fin	12.5	13.0
Distance from extremity of snout to pectoral	32.0	30.0
Length of pectoral fin	26.0	19.0
Breadth of flukes	39.0	42.0

Measurements of the skull.

Measurements.	<i>P. spinipinnis</i> , ♂, type (from Burmeister).	<i>P. communis</i> , Puget Sound U. S. Nat. Mus.
	<i>Cm.</i>	<i>Cm.</i>
Length of the skull, from the surface of the occipital condyles to the extremity of the beak	29.0	29.3
Length from the condyles to the posterior wall of the nares	12.0	11.0
Length of the beak from its extremity to the root of the malar	12.2	13.9
Breadth of the skull between the postorbital processes of the frontal	16.2	16.6
Breadth of the foramen magnum	3.5	2.9
Height of the foramen magnum	3.7	2.7
Height of the skull, from the lower edge of the occipital condyles to the crest	11.0	11.2
Breadth of the beak at the base	8.0	8.6
Breadth of beak at middle	5.5	5.4
Breadth of the nares	3.6	3.4
Distance from the lower border of the foramen magnum to the pterygoids	11.0	9.9
Length of the alveolar border	7.0	11.8
Length of the lower jaw	21.2	23.0
Length of its symphysis	2.0	2.9
Height between the angle and coronoid process	6.0	6.3

It is probable that the skeleton of this species when known will be found to differ considerably from that of *P. communis*.

PHOCÆNA DALLII True.

Phocæna dallii, True, Proc. U. S. Nat. Mus., VIII, 1885, pp. 95-98, Pls. II-VI.

Since the publication of my description of this species the National Museum has received a second skull from Lieut. Commander H. E. Nichols, who obtained it at Hoonyah Sound, Alaska.* This specimen and the

* There is also a skull of this species (No. 3961) in the Berlin Anatomical Museum. It was obtained by Chamisso, but the exact locality is not given.

type-skull, when compared with a skull of *P. communis*, present a number of characters by which the two species are readily distinguishable. The skulls of *P. Dallii* are remarkable for their short, flat beaks and great breadth between the orbits. The intermaxillæ are higher in front of the nares than in *P. communis*, and nearly flat superiorly. The triangular area in front of the nares is raised above the level of the surrounding surface and the foramina on either side do not open into deep, narrow grooves as they do in *P. communis*. The intermaxillæ are separated at their inner margins by a wide space, and at the bottom of the trough the vomer is plainly visible. The region of the skull between the nares and the occipital crest is nearly at right angles with the plane of the beak. The nasal bones have the form of two transverse, prominent bosses. The occipital bone is exceedingly large and broad, as compared with that of *P. communis*; the temporal fossæ are small, and the squamosal are short and thick. The nares, both superior and inferior, are very large.

These differences in the skull—and they are but a few of those which are discernible—together with the differences in external appearance, separate this species very clearly from *P. communis*, and there can be no doubt that it is distinct and valid.

I repeat in this connection the measurements of the exterior given in my previous paper on this species:

Measurements of the exterior of a specimen of Phocæna dallii captured off Adakh Island, August 13, 1873.

[These measurements are in straight lines, the curves of the body being excluded.]

	Inches.
Total length.....	72.0
Tip of lower jaw to corner of mouth.....	3.5
Tip of lower jaw to center of eye.....	7.0
Tip of lower jaw to ear.....	9.5
Tip of lower jaw to front edge of pectoral at its insertion.....	11.0
Tip of lower jaw to back edge of pectoral at its insertion.....	14.0
Tip of lower jaw to anterior edge of blowhole.....	9.0
Eye to spouthole (vertical).....	4.0
Across base of pectoral.....	5.5
Anterior base of pectoral to tip.....	8.0
Posterior base of pectoral to tip.....	5.75
Tip of lower jaw to anterior boundary of the white area.....	27.3
Spouthole to anterior edge of dorsal.....	18.5
Height of dorsal.....	6.0
Length of base of dorsal.....	10.5
Length posterior margin of dorsal.....	7.5
Tip of lower jaw to genital slit.....	43.0
Length of genital slit.....	3.0
Genital slit to anus.....	4.25
Anus to notch of the flukes.....	22.75
Breadth of flukes (transverse).....	18.5
Length of flukes (antero-posterior).....	5.25
Breadth of narrowest part of tail before the flukes.....	1.75

	Inches.
Height of body at same point.....	3.5
Length of eye.....	.75
Width of spouthole.....	1.87
Extension of white area posterior to the anus.....	6.5
Length of white area along the belly.....	18.0
Width of head at corner of the mouth.....	5.5
Depth of body 24 inches anterior to the flukes (at which point the keels are widest).....	10.0
Depth 8 inches anterior to flukes.....	7.5
Navel to anterior end of genital slit.....	7.5

Measurements of two skulls of Phocœna dallii.

Measurements.	No. 21762 <i>P. dallii</i> ; Adakh Id., Alaska. Type.	No. 22566 <i>P. dallii</i> ; Hoonyah Sound, Alaska.
	Cm.	Cm.
Total length.....	33.3	31.4
Length of beak.....	14.0	12.6
Breadth of beak at base of notches.....	9.5	9.8
Breadth of beak at its middle.....	5.7	6.1
Breadth of intermaxillaries at same point.....	3.5	3.2
Greatest breadth between outer margins of intermaxillaries proximally.....	5.1	6.0
Length of tooth-line.....	12.7	11.9
Last tooth to base of maxillary notch.....	2.2	1.7
Tip of beak to anterior margin superior nasal opening.....	17.8	17.2
Tip of beak to end of crest of pterygoid.....	21.3	?19.3
Breadth between orbital processes of frontal.....	16.5	16.5
Breadth between hinder margins of temporal fossæ.....	16.2	17.2
Length of temporal fossa.....	5.6	4.9
Depth of temporal fossa.....	2.6	3.0
Total length of mandible.....	25.5	24.0
Length of symphysis of mandible.....	3.8	3.8
Length of tooth row of mandible.....	12.2	11.2
Depth between angle and coronoid process.....	5.7	6.3
Number of teeth.....	23-23 27-27	28-27 24-25

14. GRAMPUS Gray.

Grampus, Gray, Spic. Zool., 1828, p. 2; Zool. Erebus & Terror, 1846, p. 30.

GRAMPUS GRISEUS (Cuvier).

Delphinus griseus, Cuvier, Ann. Mus., XIX, 1812, p. 14, pl. 1, fig. 1.

Delphinus Rissoanus, Desmarest, Mammalogie, 1822, p. 519.

Grampus Cuvieri, Gray, Ann. Nat. Hist., 17, 1846, p. 85.

Grampus Souverbianus, Fischer, Act. Linn. Soc. Bordeaux, xxxv, 1851, p. 210.

Grampus sakamata, Gray, Zool. Erebus & Terror, 1846, p. 31.

Grampus Stearusii, Dall, Proc. California Acad. Sci., v, 1813, p. 13.

Globiocephalus Rissii, Anon., Chinese Repos., vi, 1838, p. 411-414.

Globiocephalus Chiuensis, Gray, Cat. Seals and Whales, 1866, p. 323.

M. Fischer* and Professor Flower† having discussed at length the question of the identity of *G. griseus* and *G. Rissoanus*, and having reached the conclusion that no distinction is to be made between the two nominal species, it is unnecessary for me to repeat the arguments, since

* Fischer, Act. Linn. Soc., Bordeaux, xxxv, 1851, p. 195, et seq.

† Flower, Trans. Zool. Soc., London, viii, 1872, pp. 1-21, pls. 1, 2.

I find no reason to dissent from the opinion of these two eminent naturalists. I shall give attention, instead, to the question of the relationship of the specimens in our collection from the east coast of the United States, and to that of the identity of *G. Souverbianus* Fischer, *G. richardsoni* Gray, and *G. Stearnsii* Dall.

The material in the national collection comprises four adult skeletons, ten skulls, a cast of an adult about 12 feet long, casts of two young individuals about 6 feet long, and of three adult heads. All these specimens are from Cape Cod, Massachusetts, whence they were received in the fall of 1875. Professor Cope has figured two of the heads and also an entire young individual (of which the cast is not at present to be found) in the Proceedings of the Philadelphia Academy (1876, Pl. III).

The large cast (No. 12839) is from a female, about 12 feet long. Its dimensions are as follows:

	Inches.
Total length (straight line).....	130
Extremity of snout to eye.....	15
Extremity of snout to blowhole.....	17
Extremity of snout to corner of mouth.....	13
Extremity of snout to anterior base of pectoral fin.....	22
Extremity of snout to anterior base of dorsal fin.....	50
Length of pectoral fin along center.....	21½
Greatest width of pectoral fin.....	8½
Vertical height of dorsal fin.....	13½
Length of base of dorsal fin.....	22

The cast represents one side only of the body. The general color, covering the body and all the fins, resembles that of the portion of Professor Flower's figures between the dorsal and pectoral fins, viz, a steel-gray of medium depth and everywhere uniform. The lower lip and chin, the margin of the upper lip, and an area on the belly beneath the dorsal fin are of a light gray color, approaching white. The whole body and the fins are traversed by irregular lines of a light gray color and of varying width and length.

This individual, therefore, differs from that figured by Professor Flower in being more uniform in color, the light areas being more limited and the pectorals not mottled.

The outlines of the body are practically the same in the two specimens, but in ours the dorsal fin is less high and wider.

One of the casts of the two young individuals (No. 1), which is 68 inches long (on the curves), is exactly like the young specimen figured by Professor Flower, except in the following particulars: The upper parts are rather lighter, and the light color of the belly extends back of the anus half way to the flukes. The diagonal stripes are represented in our specimen by three vertical lines between the dorsal fin and the flukes. In the specimen figured by Professor Cope,* which was ob-

* Proc. Acad. Nat. Sci. Phila., 1876, pl. 3.

tained in the same locality, the diagonal lines are much like those represented in Professor Flower's figure.

The second young individual (No. 2), which is 73 inches long (along the curves), departs in color both from that figured by Professor Flower and that just described. The whole head, including the eyes and mouth, and to the blowhole, the belly, lower half of the tail and under side of the flukes, and pectoral fins are light yellowish, approaching white. On the upper part of the head and on the lower lip the tint approaches lemon yellow. The back and upper side of the flukes and pectoral fins are dark gray. On the lips and over the base of the pectoral fin are irregular areas of light brown.

The contour of the body in this specimen, however, is exactly that of the specimen previously described, and in spite of the difference in color I do not hesitate to assign them to the same species. The dimensions of the two specimens are as follows:

Measurements.	No. 1.	No. 2.
	<i>Inches.</i>	<i>Inches.</i>
Tip of snout to notch of flukes (on the curves).....	68.0	73.0
Tip of snout to eye.....	8.5	10.0
Tip of snout to corner of mouth.....	8.0	8.75
Tip of snout to base of pectoral fin.....	13.0	16.0
Tip of snout to blow-hole.....	10.5	11.5
Tip of snout to dorsal fin.....	30.5	32.5
Length of pectoral along the center.....	9.75	10.0
Width of pectoral (greatest).....	4.0	4.0
Width of flukes.....	14.75	14.50
Height of dorsal fin (vertical).....	7.25	6.25
Length of base of dorsal fin.....	12.00	11.00

Both these specimens show the slight extension of the upper jaw over the lower jaw, which is characteristic of this genus as well as of *Globicephalus* and *Delphinapterus*.

One of the heads referred to is entirely of a lightish-gray color, except the throat, which is yellowish white. The two remaining heads are not at present accessible.

Of the four skeletons none, unfortunately, are absolutely complete, nor is the sex noted; they lack from one to three of the last caudal vertebrae. Their formulæ, with the additions which seem to be necessary to restore the original number of vertebrae, are as follows:

n. n. C. 7; D. 12; L. & Ca. 49 (? + 1) = 68 (or ? 69). Length as mounted, 9 feet 10 $\frac{3}{4}$ inches.

n. n. C. 7; D. 12; L. & Ca. 46 (? + 3) = 65 (or ? 68). Length as mounted, 10 feet 3 $\frac{1}{2}$ inches.

15771. C. 7; D. 12; L. & Ca. 48 (? + 1) = 67 (or ? 68). Unmounted.

15772. C. 7; D. 12; L. & Ca. 48 (? + 1) = 67 (or ? 68). Unmounted.

The two mounted skeletons agree very closely with that described by M. Fischer. There are some slight differences in the point at which

the chevron bones commence, etc., which are shown in the following table:

Characters.	M. Fischer's skeleton.	No. — U. S. N. M.	No. — U. S. N. M.	Professor Flower's skeleton.
Total number of vertebrae	68	65 (2+3)	67 (2+2)	68
Chevrons begin at vertebra number	43	38	39	39
Chevrons end at vertebra number	58	58	61	59
Neural spines become obsolete at number	60	59	60	57
Transverse processes become obsolete at number	54	54	54	53
Perforations for caudal artery begin at number	47	45	46	44
Phalanges:				
First finger	21	1	.....	1
Second finger	17	9	.....	9
Third finger	15	7	.....	7
Fourth finger	21	?	.....	2
Fifth finger	20	?	.....	0

As regards the shape of the sternum, the number and shape of the sternal ribs, the shape of the acromion and coracoid and of the hyoid bones, our two skeletons agree exactly with that described by M. Fischer.

The skulls are of all ages, the younger having the elements of the occipital bone, and likewise all the other bones of the skull separate, while in the older the sutures between the palatine and maxillary bones and the maxilla and intermaxilla have disappeared.

In five cases the mandible is present, and there are also in the collection two additional complete jaws. In these the number of teeth is as follows: 4-1; 4-4; 4-4; 5-4; 5-4; 5-5; 6-6; which goes to confirm the truth of the remark of M. Fischer, viz:

Il est difficile de ne pas admettre une seule espèce, dont la dentition varie entre 3-4 et 6-6.*

The proportions of the adult skull described by Professor Flower agree very closely with those of one of equal size in our Museum, as is shown in the following table (Professor Flower's measurements being for convenience reduced to centimeters):

Measurements.	Professor Flower's specimen ♀.	No. 21047. Cape Cod, Mass.
	<i>Cm.</i>	<i>Cm.</i>
Entire length	48.8	48.7
Length of rostrum	23.6	24.6
Breadth of occipital foramen	3.8	4.7
Greatest height of occipital foramen	4.8	5.1
Breadth of occipital condyles	11.4	11.8
Greatest breadth of cranium (at parietal region in temporal fossa)	23.1	24.0
Greatest breadth of skull (at zygomatic process of squamosals)	32.8	34.2
Breadth at anteorbital processes of frontal	30.0	31.0
Breadth of anterior nares	7.1	7.6
Breadth of rostrum at base (bottom of anteorbital notch) ..	19.6	20.4
Breadth of rostrum at middle	11.2	11.4

To sum up the facts presented, it may be said that our specimens agree exactly with the European ones in size, and closely in color (in a

* Fischer, l. c., p. 209.

species in which the color is very variable), in osteological details and proportions, and in the number of teeth (which number is also variable). I believe, therefor, that there can be no reasonable doubt but that the grampuses of American and European waters are identical.

Grampus souverbianus Fischer.

On page 209, M. Fischer brings together the measurements of the length of ten skulls of European specimens. The largest of these is 515^{mm} long, and as this is presumably from a full-grown male, he questions whether another skull 530^{mm} long (and having indications of teeth in the upper jaw) may not be that of a distinct and larger species. He gives this skull provisionally the name of *G. Souverbianus*. But an examination of the tables of measurements on p. 132, shows that six of thirteen American skulls measured exceed 515^{mm}, while the remaining seven stand in a practically evenly-graded series below that length. I do not think, therefore, that the skull called *G. Souverbianus* can be set apart on account of its size. Its proportions are as follows :

Measurements.	G. Souverbianus. From Fischer.	Cape Cod. G. griseus. n. n.
	<i>Mm.</i>	<i>Mm.</i>
Total length	530	*540
From extremity of beak to anterior wall of nasal fossa ...	370	390
From extremity of beak to maxillary notches	295	299
Breadth of head between the postorbital process of the frontal	375	378
Breadth of the beak at its base	235	224
Breadth of the beak at its middle	150	138

* This is measured from the inferior margin of the foramen magnum, as seems to be the case in all of M. Fischer's measurements, and not from the surface of the condyles as in mine.

The teeth in *G. Souverbianus* are 3-2 ; in the Cape Cod specimen, 5-4. As regards the teeth in the upper jaw Fischer remarks :

On voit des alvéoles au maxillaire supérieur, mais leur fond est partie comblé.

In all the largest skulls in the national collection there are signs of these rudimentary alveoli, but it is my opinion that they are made by the pressure of the mandibular teeth against the margin of maxillæ, and that they do not indicate the previous presence of teeth. Indeed, in skull No. 16486, in which the mandible is present, it is demonstrable that these pits are made by the mandibular teeth.

The only character, therefore, brought forward by Fischer as distinguishing the type of *G. Souverbianus* is the breadth of the beak, and no one, I think, who examines the comparative measurements on p. 132, will regard this of sufficient importance to entitle the skull to a distinct specific name. I believe it to be only an oldish individual of *G. griseus*.

Grampus Richardsoni Gray.

At first sight the measurements appear to show that this skull is separable in that it has a narrow beak and narrow intermaxillæ, but in

No. 21048 of the American series (p. 132) we find a skull which has the beak relatively as narrow and the intermaxillæ both relatively and absolutely narrower. The teeth are of the same number (4-4), and as large as in the American series.

Apparently no characters of genuine importance have been brought forward to prove the distinctness of the grampus of the Cape of Good Hope, and until such are forthcoming it seems reasonable to regard it as identical with the *G. griseus* of northern waters.

Grampus Stearnsii Dall.

A mandible and two teeth are the only specimens of the west-coast grampus in the national collection. The mandible is apparently neither the No. 1 nor the No. 2 of Mr. Dall's description;* at least I can not make my measurements agree with his. The mandible is from the same locality, however, as that from which Mr. Dall's specimens were obtained, and the teeth are of the same number (3-3) as in his No. 1. It may be that I do not interpret his measurements correctly, and that this is his No. 1. The proportions of the jaw are as follows:

Measurements.	13021, Monterey, Cal. (C. M. Scammon.)	
	Inches.	Centi- meters.
Total length.....	17.6	44.7
Length of the symphysis.....	1.95	4.9
Greatest depth at the symphysis.....	1.7	4.3
Distance from the anterior extremity of the jaw to the end of the tooth line.....	2.6	6.5
Vertical depth at the coronoid process.....	4.75	12.0

Upon examination, it appears that the coronoid process of this jaw is a little higher than is common in *G. griseus*, and the posterior portion of the ramus is somewhat less convex, but I make this statement with all reserve, however, since I have examined only about ten jaws of *G. griseus*, and in no two of these is the form identical. I know no reason why the slight differences observable in the mandible from Monterey may not be set down as indicative of individual variation merely. The teeth are of the same size and form as in *G. griseus*. The formula for the mandible under consideration is $\frac{0-0}{3-3}$; but in Mr. Dall's No. 2 there were four teeth on each side—the average number in *G. griseus*.

From the remarks of Scammon on p. 103 of the *Marine Mammalia* it would appear that the Pacific grampus has a higher dorsal fin than *G. griseus*; but neither these remarks nor the figure on page 102 merit the serious consideration of the classifier, since Scammon's observations were made not on specimens under his hand but at liberty in the sea.

We have, therefore, only the presumption that dolphins of the same genus inhabiting different seas are likely to be specifically distinct, as the basis for the separation of *G. Stearnsii* from *G. griseus*.

* Scammon, *Marine Mammalia*, p. 300.

Grampus sakamata Gervais.

This name was first formally used by Gray in the Zoology of the Voyage of the *Erebus* and *Terror*, page 31. It was given to a whale described by Schlegel from Japanese drawings and natural histories. Schlegel did not see any specimens of the species described, and Gray did not examine the original accounts from which Schlegel drew his description. Certainly we are getting far away from nature in this matter. Fortunately, however, Gervais applied the name to a skull of a grampus received from Japan, and thus for the first time placed the new species, if new species it be, within the reach of investigation.

In considering this skull we ought not to be influenced by Schlegel's remarks on the color, etc., of the animal represented in the Japanese drawings, because that author believed that the cetacean was a species of Killer. Gray's opinion to the contrary notwithstanding, it does not appear probable to me that the author of the concise and well-illustrated description of the Killer in the *Abhandlungen* would mistake a *Grampus* for a Killer. I consider the skull figured by Gervais in the *Ostéographie* (pl. LXIV, fig. 5, p. 568) as the type of the so called *Grampus sakamata*.

Upon examining this figure, however, we are at once made aware of the inadvisability of basing species in this genus on the proportions of the skull alone, on account of the great amount of individual variation in cranial characters. Figures 4 and 5 on plate LXIV of the *Ostéographie* apparently represent skulls distinguishable specifically at a glance. But in the national collection there are two skulls which might almost have served for the basis of these two figures, yet were both obtained from Cape Cod, Massachusetts (together with many others), at the same time, and are almost unquestionably specifically identical.

We will consider a few of the proportions common to Gervais' skull of *G. sakamata* from Japan, and No. 22446 of our collection, from Cape Cod, Massachusetts, and some which are common to the skull of *G. griseus* from Concarneau, figured on the same plate, and No. 22447 of our collection, from Cape Cod. It should be remarked first, however, that both our skulls and those figured in the *Ostéographie* are from young individuals.

Proportions common to *G. sakamata* and
No. 22446 U. S. N. M., from Cape
Cod, Massachusetts.

1. Distance from left maxillary notch to extremity of rostrum equals distance from same notch to margin of maxilla, over post-orbital process of frontal.
2. Length of beak equals width from base of maxillary notch to ante-orbital enlargement of opposite frontal.
3. The width of the widest part of the maxilla anterior to the notch is contained one and one-half times in the length of the beak.
4. The greatest width of the internaxillæ anterior to the notch is contained a little less than three times in the length from the anterior margin of the nares to the extremity of the rostrum.

Proportions common to *G. griseus* from Con-
carneau and No. 22447 U. S. N. M., from
Cape Cod, Massachusetts.

1. Distance from left maxillary notch to extremity of rostrum equals distance from same notch to ante-orbital enlargement of frontal.
2. Length of beak is less than the same width.
3. The same width is contained one and one-fourth times in the length of the beak.
4. The same width is contained but two and one-half times in distance from the nares to the extremity of the rostrum.

Unlike as these two skulls figured in the *Ostéographie* are in proportions therefore, they find their counterpart in two skulls presumably of the same species and from a single locality. It would seem that something besides proportion of the skulls must be brought forward whereby to distinguish the supposedly distinct Japanese Grampus.

I did not have an opportunity of examining the skull of *G. sakamata* when in Paris and can not affirm that it may not exhibit characters which are not represented in Gervais' figure. Until such characters are discovered, however, I do not see any reason why *G. sakamata* should be regarded as distinct from *G. griseus*.*

Globocephalus Rissi and *G. Chinensis* Gray.

This animal, which was described by an anonymous writer in the Chinese Repository, Vol. VI, pp. 411-414, appears to be unquestionably a grampus, as is indicated by the size, the number, and the position of the teeth, and the color and markings of the skin. Gray, following Blyth, regarded it as a Blackfish, and founded his *Globocephalus Chinensis* upon it. That it was a grampus, and probably *G. griseus*, will, I believe, be the opinion of any person who reads carefully the original description in the work mentioned.

Table of measurements.

GRAMPUS GRISEUS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
							At base of maxillary notches.	At its middle.		
16486	U. S. Nat. Mus.	.....	Cape Cod	Ad..	Cm. 54.0	Cm. 26.6	Cm. *22.0	Cm. 13.7	Cm. 10.4	Cm. 13.3
15890	..do	.....	..do	Ad..	53.1	26 0	*20.5	12.8	9.0	14.3
15891	..do	.....	..do	Ad?†	51.5	25.9	*20.0	11.8	8.1	13.1
21048	..do	.....	..do	Ad?†	51.0	25.1	*19.7	10.9	7.5	12.8
21047	..do	.....	..do	Ad.++	48.6	24.5	*18.9	11.4	8.3	12.2
15894	..do	.....	..do	Jr. §	46.3	22.0	*17.1	10.3	6.8	11.4
15772	..do	.....	..do	Jr. §	44.5	21.0	*16.8	9.6	7.7	11.1
15773	..do	.....	..do	Jr ..	33.1	13.8	*12.5	5.9	4.2	10.4
364a	Brit. Mus.	.....	Isle of Wight. ....	.....	43.6	20.0	18.4	9.7	7.0	12.2
364c	..do	.....	.....	.....	48.3	24.9	21.3	11.9	8.9	14.2
1626a	..do	<i>G. Richardsoni</i>	.....	.....	.....	.....	.....	.....	.....	.....
1626b	..do	.....	Table Bay, S. Africa.	.....	47.0	24 5	19.9	9.9	7.9	11.2

* In the foot-note (*Ostéographie*, p. 563) Gervais states that there is a mandible of a grampus from Japan in the British Museum, but none is included in Professor Flower's recent list of specimens of Cetacea in that collection.

Table of measurements—Continued.

Catalogue number.	Length of tooth-line.		Last tooth to base of maxillary notch.		Extremity of beak to—		Breadth between—		Temporal fossa.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of mandibular teeth.	Number of teeth.
	Cm.	Cm.	Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossae.	Length.	Depth.								
16486	35.3	34.0	34.7	23.0	12.2	9.2	.....	.....	.....	.....	.....	.....	.....	.....
15890	35.0	33.2	34.2	24.5	13.3	6.9	.....	.....	.....	.....	.....	.....	.....	.....
15891	35.3	33.6	30.8	22.3	12.3	6.5	.....	.....	.....	.....	.....	.....	.....	.....
21048	33.2	.....	31.8	22.5	12.4	6.9	.....	.....	.....	.....	.....	.....	.....	.....
21047	32.0	30.4	31.0	20.7	13.5	8.0	.....	.....	.....	.....	.....	.....	.....	.....
15894	29.8	.....	27.0	22.1	11.4	6.7	.....	.....	.....	.....	.....	.....	.....	.....
15772	28.4	28.6	26.0	18.7	10.7	6.2	36.2	4.7	5.5	9.0	.....	.....	.....	{ 0-0 4-0
15773	19.1	20.5	20.1	17.1	9.5	5.1	29.0	3.1	4.6	6.7	.....	.....	.....	{ 0-0 4-4
364a	27.4	.....	27.4	20.1	11.3	4.7	33.3	2.5?	5.8	9.4	.....	.....	.....	{ 0-0 4-4
364c	33.0	31.5	32.4	17.8	14.6	7.8	.....	.....	.....	.....	.....	.....	.....	.....
1626a	40.0	5.3	7.0	9.9	0.76	.....	.....	{ 0-0 4-4
1626b	31.1	31.5	28.4	20.1	10.9	5.7	38.5	4.7	6.6	9.5	0.76	.....	.....	{ 0-0 4-4

* Least. † Rudimentary alveoli closed. ‡ Rudimentary alveoli open. § Occipital sutures distinct.

15. GLOBICEPHALUS Lesson.

(*Globicephala* Lesson, Mamm. découverts depuis 1788, 1828, p. 441.)

GLOBICEPHALUS MELAS (Traill).

Delphinus melas, Traill, Nicholson's Journal, XXII, 1809, p. 81, pl. 3.

Delphinus globiceps, Cuvier, Ann. Mus. d'Hist. nat., XIX, 1812, p. 14, Pl. I, 2 figs.

Globicephalus Srineval, Gray, Zool. Erebus & Terror, 1846, p. 32.

Delphinus intermedius, Harlan, Journ. Acad. Nat. Sci. Phila., VI, 1829, p. 51, Pl. 1, fig. 3.

? *Globicephalus affinis*, Gray, Zool. Erebus & Terror, 1846, p. 32.

Globicephalus Edwardsii, A. Smith, African Zoology.

Globicephalus inerassatus, Gray, Proc. Zool. Soc. London, 1861, p. 309, 1 fig.

Spharoccephalus inerassatus, Gray, Proc. Zool. Soc. London, 1864, p. 244; Catalogue, 1866, p. 324.

Traill's concise description and generally accurate figure leave no doubt whatever as to the identity of his *Delphinus melas*. Gray was surely at fault in employing Lacépède's name, *Catodon Srineval*, since the only part of the latter's description which is diagnostic in no way applies to the blackfish.

The generally accepted opinion that the blackfish of the northeastern coast of North America, the *Delphinus intermedius* of Harlan, is identical with the *Globicephalus melas* of European waters, seems to rest upon an excellent basis. Harlan's species was described from a specimen from

Salem, Mass. There are in the Museum collections some six or eight skulls, three skeletons, and two casts of specimens from Cape Cod, Massachusetts, and also some ten photographs of different schools which have stranded from time to time near Provincetown, at the extremity of the Cape. In external appearance the specimens photographed correspond to Harlan's description and very crude figure, and on the other hand they correspond exactly to the individuals from European waters figured by Murie, Couch, and Cuvier. All the individuals of which the under surface of the body is shown in the photographs (some twenty or more), without exception, have the peculiar white mark on the throat and median line of the belly, represented in Cuvier's figure. Harlan's statement, that the length of the dorsal fin is only one-thirteenth of the total length, seems to be based on a measurement of the figure, which is certainly incorrect as regards the dorsal. In the skeleton the vertebral formula is the same as that given by Flower for *G. melas*.* In two complete skeletons the formula is as follows: No. 14417: C. 7, D. 11, L. 14, Ca. 27=59. No. 20958: C. 7, D. 11, L. 13, Ca. 29=60.

The teeth in six skulls are as follows: $\frac{9-9}{? - ?}$ $\frac{? - ?}{10-10}$ $\frac{10-9}{? - ?}$ $\frac{? - 11}{? - ?}$ $\frac{9-9}{9-9}$ $\frac{10-10}{10-10}$.

The number $\frac{9}{9}$ to $\frac{10}{10}$ would therefore appear to be the average, which is also the number commonly found in European specimens. A skull from Cape Cod presents the following proportions as compared with the specimen from Paimpol, of which measurements are given by Fischer, p. 188:

Measurements.	Skull from Cape Cod.	Specimen from Paimpol.
Total length	61.0	61.0
Extremity of beak to anterior margin superior nares	42.3	41.0
Extremity of beak to maxillary notches	34.1	32.0
Breadth of cranium between post-orbital processes of frontal	43.0	43.0
Breadth of beak at base	23.6	24.0
Breadth of beak at middle	18.0	19.0

Measurements of other specimens from Cape Cod will be found in the table on p. 136.

There seems to be on the whole no good reason for considering the blackfish of New England as specifically distinct from that of European waters.

Globicephalus affinis Gray.

This species is founded on a single skull, No. 2999, in the College of Surgeons. The locality from whence it was derived is unknown. The skull, which is 62.5^{cm} long and has the teeth $\frac{11-11}{12-12}$, seems to differ from the ordinary *G. melas* simply in having the intermaxillæ somewhat

* P. Z. S., 1883, p. 508.

broader^d than is common in that species and in being a little narrower across the orbits. It is doubtful whether these differences entitle it to rank as a distinct species. The proportions of the skull are given in the table on p. 136.

Phocena Edwardsii A. Smith.

Sir Andrew Smith described this species from a drawing and description of E. Verreaux.* The description is partially made up of generic characters, and is also in part contradictory. For example, the sides are said to be black in one sentence, and in the next, white. The teeth are stated to be $\frac{12-12}{12-12}$, the entire length of the body $12\frac{1}{6}$ feet, the circumference in front of the dorsal $6\frac{3}{4}$ feet, and the breadth of the flukes $2\frac{2}{3}$ feet. The breadth of the flukes, according to these measurements, equals 21.9 per cent. of the total length. In D. Murie's specimen† the same breadth is 20.8 per cent. of the total length, and in the Paimpol specimen cited by Fischer (l. c., p. 187) 22.4 per cent. Since Smith's specimen is intermediate between the other two, and the percentage of the breadth of the flukes to the total length is intermediate between the percentages furnished by the other two specimens, it is evident that this measurement, which is practically the only tangible character given, is of no significance as distinguishing the supposed species from *G. melas*.

Furthermore, M. Fischer has shown (l. c., p. 193) that a blackfish identical with the *G. melas* of European waters occurs about the Cape of Good Hope, and finally Gray, who had Verreaux's original drawing, states that "it is very like *Globiocephalus Srinival* of the European seas" (*Catalogue*, p. 325). M. Fischer is therefore perfectly justified in his assertion:

Il est donc probable que le *G. melas* se montre sur toute la côte ouest d'Afrique jusqu'au Cap, et que le nom de *G. Edwardsi* doit passer en synonymie.‡

The Globicephalus of New Zealand waters.

In his *Notes on New Zealand Whales*, in Vol. VII of the Transactions of the New Zealand Institute, p. 261, Dr. Hector describes, under the name of *G. macrorhynchus*, Gray, the blackfish common of New Zealand seas. But it is evident from the description and figures (l. c., Pl. XVI, figs. 3 and 3a) that this is not *G. macrorhynchus*, but rather a species closely resembling, or identical with, *G. melas*. Professor Flower, who has examined skeletons of the New Zealand form, finds nothing whereby to distinguish it from *G. melas* (*Characters and Divisions*, p. 509).

Sphacrocephalus incrassatus Gray.

There is apparently no reason to doubt the generally accepted opinion that this species, founded on a water-worn skull, is identical with *G. melas*.

* African Zoology. † Trans. Zool. Soc. London, VIII, pp. 240, 241. ‡ L. c., p. 194.

Globicephalus propinquus Malm.

This species was founded on a fœtus 315^{mm} long, which had been in alcohol twenty-one years at the time it was described by Malm.* That writer states that it is distinguished from *G. melas* by the possession of a slightly greater number of vertebræ and phalanges. The number given in each case, however, is within the limit of variation of *G. melas*, and no importance, therefore, attaches to these supposed characters.

Furthermore, the present writer is of the opinion that the classifier is under no obligation to seriously consider species founded upon fœtal specimens.

The remarks of Commander Natt och Dag upon the adult from which the fœtus in question was taken are based merely on his remembrance of the appearance of the specimen and are of no value in identifying the species.

Table of measurements.

GLOBICEPHALUS MELAS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.		Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
						At base of maxillary notches.	At its middle.	At base of maxillary notches.	At its middle.		
12098	U. S. Nat. Mus.	.....	Cape Cod	Ad.	<i>Cm.</i> 62.6	<i>Cm.</i> 31.8	<i>Cm.</i> 23.5	<i>Cm.</i> 17.8	<i>Cm.</i> 15.7	<i>Cm.</i> 14.5
14361	do	.....	do	Ad?	61.8	30.9	23.7	18.3	15.5	15.5
12097	do	.....	do	Ad.	62.4	31.3	23.0	17.6	15.4	15.8
12100	do	.....	do	Ad.	65.5	33.4	24.0	19.4	15.4	16.3
20950	do	.....	do	Jr.	54.1	25.5	18.3	13.8	11.9	13.7
20957	do	.....	do	Jr.	49.4	23.1	16.1	11.3	10.4	12.5
2999	Roy. Coll. Surg.	<i>G. affinis</i> .....	.....	.....	62.5	31.8	23.1	19.1	15.5	14.7

* K. Svenska Vetens. Akad. Handl., ny följd, IX, i, 1871, Art. 2, p. 85.

Table of measurements—Continued.

Catalogue number.	Length of tooth-line.		Last tooth to base of maxillary notch.		Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Number of teeth.
	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	<i>Cm.</i>	Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Inner margins of temporal fossæ.	Length.	Depth.					
12098	15.6	18.8	42.8	41.0	40.0	31.4	12.2	9.1	.....	.....	.....	.....	.....	.....	{ 9—9 ?—?
14361	.....	.....	41.7	42.3	39.2	26.9	15.1	9.4	.....	.....	.....	.....	.....	.....	{ ?—? 10—10
12097	15.1	19.2	.....	42.5	39.3	28.9	12.9	7.2	.....	.....	.....	.....	.....	.....	{ 10—9 ?—?
12100	18.4	17.2	45.3	45.7	42.3	29.7	17.3	9.6	.....	.....	.....	.....	.....	.....	{ ?—11 ?—?
20950	13.8	13.5	34.9	35.6	32.3	24.9	12.1	7.1	21.8	5.8	12.2	12.4	.....	.....	{ 10—10; 10—10
20957	11.5	14.0	31.9	31.7	28.4	23.9	12.0	6.5	.....	.....	10.6	10.8	.....	.....	{ 9—9; 9—9
2999	17.0	15.5	41.9	42.5	37.7	26.7	14.0	7.2	49.3	6.1	14.9	13.9	.....	.....	{ 11—11 12—12

* Least.

† Posterior to the notch.

‡ Artificially set (?).

We pass now from the species which have a whitish band along the belly to those which are entirely black. In three instances (*G. scammoni* Cope, *indicus* Blyth, and *brachypterus* Cope) it has been shown that individuals entirely black had the intermaxillæ expanded distally so as to cover the anterior half of the beak. Two other nominal species (*G. macrorhynchus* Gray and *G. guadaloupensis* Gray) are known only from skulls, but as these have the premaxillæ expanded we may presume that the individuals from which they were derived were also entirely black.

GLOBICEPHALUS INDICUS Blyth.

Globicephalus indicus, Blyth, Journ. Asiat. Soc. Bengal, XXI, p. 358. (Fide Blyth); Journ. Asiat. Soc. Bengal, XXVIII, 1859, p. 490.

This species is only known to me from the account in Vol. XXVIII of the Journal of the Asiatic Society of Bengal. The color is stated to be "uniform leaden-black, slightly paler underneath." The intermaxillæ are expanded. The dorsal and lumbar vertebræ taken together number one more than is usual in *G. brachypterus* and one less than in *G. melas*, but this is a character of no value.

The measurements of the exterior are few in number and do not indicate specific distinctness.

Until the type-skeletons in the Calcutta Museum have been more fully described it will be impossible to determine the validity of this species.

GLOBICEPHALUS MACRORHYNCHUS Gray.

Globiocephalus macrorhynchus, Gray, Zool. Erebus and Terror, 1846, p. 33; Cat. Seals and Whales, 1866, p. 320.

This species is founded on a single skull, No. 3000, in the Royal College of Surgeons, London, to which institution it was presented by F. D. Bennett. The locality from which it was derived is unknown.

I regret to find that I made no notes upon this skull and have only my measurements for comparison. As the skull is a youngish one I do not trust myself to draw any conclusions from the consideration of the measurements alone.

In his paper on the *Delphinida*, Professor Flower is inclined to believe, though with some hesitation, that the blackfish skulls with broad intermaxillæ all belong to the same species. I have since satisfied myself, however, that two forms, *G. brachypterus* Cope and *G. scammoni* Cope are perfectly distinct, and the question now arises whether either of these species is identical with *G. macrorhynchus*. As I neglected to take notes upon the type-skull, I am, unfortunately, unable to throw any light on this question. The measurements which I took are subjoined:

Table of measurements.

GLOBICEPHALUS MACRORHYNCHUS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—			Greatest breadth between outer margins of intermaxillæ proximally.			
							At base of maxillary notches.	At its middle.	Breadth of intermaxillæ at middle of beak.				
3000	Roy. Coll. Surg.	<i>G. macrorhynchus</i> .	South Seas.....	Jr.	Cm. 58.5	Cm. 30.5	Cm. 24.9	Cm. 20.6	Cm. 19.8	Cm. *16.0			
Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.	Anterior margin of superior nates.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.	Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process of.	Number of teeth.
3000	Cm. 10.4†	Cm. 19.8	Cm. 40.0	Cm. 41.9	Cm. 41.8	Cm. 26.2	Cm. 14.2	Cm. 10.7	Cm. 49.6	Cm. 6.9	Cm. 13.5	Cm. 14.7	{ 6—6 or 7—7 8—8 or 8—8

* Posterior to the notch.

† Actual length; not from end of beak.

GLOBICEPHALUS SCAMMONI Cope.

Globiocephalus Scammoni, Cope, Proc. Acad. Nat. Sci. Phila., 1839, p. 21.

This species was made known by Professor Cope from the description, measurements, and drawings of Scammon.

There is in the national collection a skull presented by Scammon which is presumably the type of the species. This skull I have compared with those of *G. brachypterus*, and, as already stated, have reached the conclusion that the differences observable indicate specific distinctions between the blackfish of the east and west coasts.

Scammon's measurements of the exterior also differ from those obtained from specimens from the east coast. These differences will be pointed out when treating of *G. brachypterus*.

GLOBICEPHALUS BRACHYPTERUS Cope.

G. ? sp. nov., Cope, Proc. Acad. Nat. Sci. Phila. 1866, p. 8.

Globiocephalus brachypterus, Cope, Proc. Acad. Nat. Sci. Phila., 1876, p. 129.

As early as 1866 Professor Cope entertained the opinion that two distinct species of blackfish occurred on the east coast of the United States, and in 1876 he was enabled to demonstrate the validity of his opinion by the acquisition of a complete female specimen from Delaware Bay. This specimen, with the skull formerly referred to as "*Globiocephalus* ? n. sp.," became the basis of his *Globiocephalus brachypterus*.

Recently, as already stated on a previous page, the Smithsonian Institution has received three skeletons and an additional skull, which in the opinion of the writer may undoubtedly be referred to the species under consideration. Two of these skeletons and the extra skull were obtained by Mr. Joseph Willcox in Osprey, Fla., and the third skeleton came from the U. S. Life-Saving station at Dam Neck Mills, near Cape Henry, Virginia. The Florida skeletons were respectively about 17 and 18 feet long, and the Virginia specimen (a male) measured 15 feet 3 inches in the flesh. The following external measurements were taken from the Virginia specimen while fresh, by Mr. T. W. Scoilick :

Measurements of blackfish, G. brachypterus, No. 22561, male, from Dam Neck Mills, Virginia.

	Ft.	In.
Tip of snout to notch of flukes.....	15	3
Tip of snout to blowhole	1	9 $\frac{1}{4}$
Tip of snout to eye	1	9 $\frac{1}{2}$
Tip of snout to anterior base of pectoral	3	
Tip of snout to anterior base of dorsal	3	11 $\frac{1}{2}$
Tip of snout to anus	10	5
Tip of snout to penis	9	2
Length of pectoral, straight, from middle of base to tip	2	6
Greatest breadth of pectoral	10	
Length of base of dorsal	2	7
Vertical height of dorsal	1	2

	Ft.	In.
Flukes from tip to tip.....	3	10
Length of mouth.....	1	3½
Length of eye.....		1½
Length of caudal ridge extending upward from notch of flukes.....	4	4
Vertical height.....		3
Greatest width of caudal region at a distance of 3 feet 1 inch from notch of flukes.....	2	3

The vertebral formula in this specimen and in the 18-foot skeleton from Florida is as follows:

Male. Dam Neck Mills, Va. C. 7; D. 11; L. 11; Ca. 28 = 57.

Sex? Osprey, Fla. C. 7; D. 10; L. 12; Ca. 26 (?+2) = 55 or 57.

Measurements of the skulls of all the specimens will be found in the table on page 142.

The color in every case was entirely black, and the premaxillæ cover the maxillæ in the distal half of the beak.

On comparing the skulls of these specimens with that of *G. scammoni* (No. 9074) numerous differences were found which made it apparent that *G. brachypterus* and *G. scammoni* could not be regarded as specifically identical. In *G. brachypterus* the intermaxillæ project beyond the free margin of the maxillæ, which margin is quite deeply grooved. In *G. scammoni*, on the contrary, the intermaxillæ do not extend quite to the margin of the maxillæ. This difference in the disposition of parts can not be regarded as an age character, since the skull of *G. scammoni* is the older.

In *G. scammoni*, again, the greatest enlargement of the intermaxillæ occurs at the junction of the proximal and second fourths of the distance from the maxillary notch to the extremity of the beak, while in *G. brachypterus* the length from the maxillary notch to the point of greatest enlargement of the premaxillæ is contained only about two and a half times in the length of the beak.

The rugosities near the distal extremity of the premaxillæ are very strongly marked in the skull of *G. scammoni*, but only slightly in any of the skulls of *G. brachypterus*. As the largest skull of the latter species is certainly from an adult animal it is improbable that this difference is entirely due to age.

In both the older and younger skulls of *G. brachypterus* the nasal septum is ossified so as to stand above the plane of the adjacent intermaxillæ, which is not the case in *G. scammoni*.

The skulls of *G. brachypterus* are also distinguished from that of *G. scammoni* in having the beak longer and narrower, the blowhole narrower and placed further back, the width at the orbits greater and the temporal fossæ considerably larger.

The external characters considered by Professor Cope to be diagnostic of *G. brachypterus* are (1) the length of the pectoral fin, and (2) the anterior position of the dorsal fin.

As regards the length of the pectoral fin, I find by comparing the

measurements of the type specimen and the Dam Neck Mills specimen of *G. brachypterus* with those given by Seammon for *G. scammoni* (Marine Mammalia, p. 86), that the pectoral fin was relatively shorter in the two former individuals than in Seammon's specimen. In the latter the length of the pectoral fin is 18.3 per cent. the total length, while in the type of *G. brachypterus* it is 16.4 per cent., and in the Virginia specimen of the same species, 16.9 per cent.

The distance from the extremity of the head to the anterior base of the dorsal fin in the type of *G. brachypterus* as given by Professor Cope, is relatively less than in any other blackfish of which I have examined the record. It equals 24.6 per cent. of the total length. In the Virginia specimen the distance to the dorsal is 25.9 per cent. of the total length; in *G. scammoni* it is 29.0 per cent. Here again, therefore, the two specimens of *G. brachypterus* agree with one another and contrast with *G. scammoni*, the dorsal fin being nearer the head in the two former specimens than in the latter.

In the breadth of the flukes we find the same relationship retained. The flukes are broader relatively in both specimens of *G. brachypterus* than in *G. scammoni*. In the latter they equal 22.6 per cent. of the total length, in the type of *G. brachypterus* 25.1 per cent., and in the Virginia specimen of the same species, 28.6 per cent.

Though I am convinced that there is very considerable variation in the proportions of parts in individuals of the same species, I nevertheless think that the differences shown in the percentages given above, may be taken as supplementing the differences observable in the skull, in distinguishing the east-coast blackfish from the west-coast blackfish.

No specimens of *G. brachypterus*, so far as I am aware, have been taken north of Delaware Bay, while on the other hand there are no records indicating that *G. melas* ranges farther south than Long Island, New York. The southern limit of the range of *G. brachypterus* is not determinable at present. It is probable that the species is found throughout the Gulf of Mexico and also the West Indies, if we may take into consideration a skull in the Paris Museum from Guadaloupe Island, and which is the basis of

Globiocephalus guadaloupensis Gray.

This skull is figured in the *Ostéographie* (p. 556, pl. 52, fig. 3), under the name of *G. intermedius*. It appears, however (to judge by the figure cited), to be identical with *G. brachypterus*. If there are specific differences they are yet to be pointed out. Gray, as already stated, made this skull the type of a new species or rather subspecies, *G. guadaloupensis* (Suppl. Cat. Seals and Whales, 1871, p. 84). He, however, gave no description of it, but merely cited Gervais' figure.

Measurements of four skulls of *Globicephalus brachypterus* and one skull of *G. scammoni* (probably the type).

Measurements.	G. brachypterus.				G. scammoni.
	Dam Neck Mills. ♂ 22561.	Osprey, Fla.			
		22571.	22570.	22572.		9074.
	Cm.	Cm.	Cm.	Cm.	Cm.
Total length.....	66.2	61.2	68.6	69.0	69.0
Length of the beak.....	33.3	31.6	34.0	35.3	31.0
Width of beak at its base.....	28.8	26.2	31.5	31.7	30.8
Width of beak at its center.....	23.5	23.1	24.0	26.9	25.2
Width of intermaxilla at same point.....	22.9	23.0	24.0	27.4	23.6
Extremity of beak to blowhole.....	46.0	41.5	48.1	47.7	44.8
Extremity of beak to pterygoid.....	45.2	42.2	46.4	47.9	45.5
Length of tooth line.....	18.3	15.1	17.4	18.3	20.2
Width of skull at the orbits.....	45.0	42.2	49.0	50.2	48.7
Width of blowhole.....	9.0	8.5	10.0	9.6	10.8
Length of temporal fossa.....	16.3	14.6	17.2	19.0	14.8
Depth of temporal fossa.....	10.2	9.7	11.0	12.3	9.0
Number of teeth.....	7-8	8-8	9-8	8-8	8-8
				8-8	

GLOBICEPHALUS SIEBOLDII Gray.

Delphinus globiceps, Schlegel, Fauna Japon., Mammalia, 1844 (?), p. 17, p. 27, figs. 1-4.

Globicephalus Sieboldii, Gray, Zool. Erebus and Terror, 1846, p. 32.

I should be inclined to pass over this species as founded upon too young a specimen to be seriously considered, were it not that in Schlegel's figure of the exterior at least one peculiar character is indicated. This character relates to the shape of the pectoral fin. In other species the pectoral fins come gradually to an acute termination, but in Schlegel's animal they are represented as being fully one-half as broad immediately behind the extremity as across the middle. This gives the fins an entirely different appearance from those of the other species. If the figure is correct, and if the character proves constant, Schlegel's specimen must be regarded as belonging to a distinct species. The animal was so young that the characters of the skull are not of great importance. The extremity of the vomer has the appearance of being bifurcated, one-half being applied to the wall of either intermaxillary bone. This disposition of parts is found in the species of some genera, but not in other species of *Globicephalus*.

Resting upon so insufficient a basis, the species must be looked upon as of doubtful value, until more specimens from the waters of Japan have been acquired and studied. It will very probably prove to be identical with *G. scammoni*, to which its uniformly black coloration and expanded intermaxillæ show it to be allied.

Globicephalus australis and *sibo*, Gray.

Globicephalus australis is merely a name inserted by Gray in the Supplement to the Catalogue of Seals and Whales (p. 85). It was never described.

Globiocephalus sibo, which appears in the same work (l. c.), is a name attached by Gray to an unrecognizable cetacean, stated by Schlegel in the *Fauna Japonica* to be considered by Japanese writers a variety of the blackfish. It should be expunged.

16. PSEUDORCA Reinhardt.

Pseudorca, Reinhardt, K. Dansk. Videns. Selsk. Forhandl., 1862, p. 151.

This genus is sufficiently well distinguished from *Orca*, its nearest ally, by its small dorsal fin, pointed pectorals, short alveoli, closely approximated pterygoids and other characters, pointed out by Reinhardt and Professor Flower, to merit a separate generic appellation.

PSEUDORCA CRASSIDENS (Owen).

Phocæna crassidens, Owen, British Fossil Mammals and Birds, 1846, p. 516.

Orca crassidens, Gray, Zool. Erebus & Terror, 1846, p. 33; Catalogue of Cetacea, 1st ed., 1850, p. 94.

Pseudorca crassidens, Reinhardt, K. Dansk. Videns. Selsk. Forhandl., 1862, p. 151.

Orca meridionalis, Flower, Proc. Zool. Soc. London, 1864, p. 420.

Orca destructor, Cope, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 293.

Globiocephalus Grayi, Burmeister, Anales Museo Pub. Buenos Aires, I, 1864-'69, p. 367, Pl. XXI.

According to Professor Flower, the subfossil specimen which formed the type of this species, from the Lincolnshire fens, is lost.* We have, therefore, only Sir Richard Owen's description and figures to guide us in identifying other specimens with the type. An examination of these leaves little room for doubt that Reinhardt's specimens were specifically identical with Sir Richard Owen's type. Professor Flower has also recently stated his opinion that the form previously described by him under the name of *Orca meridionalis* is identical with that described by Reinhardt. The former writer has had greater opportunities than myself for the comparison of specimens of this species, but my own more limited studies lead me to concur in his opinion regarding the specific identity of all the specimens of the genus thus far acquired.

Of four skulls in the Royal College of Surgeons, Nos. 2984, 2985, 2986, 2987 (respectively, 58.04^{cm}, 59.4^{cm}, 58.4^{cm}, 51.05^{cm}), No. 2985, which is the largest, is much the heaviest, having a rounded broad snout and strong ridges about the temporal fossæ. The maxillary and malar bones at the notch are especially thickened. The triangular preareal region is concave in No. 2987, the youngest specimen, but is flatter in different degrees in the other skulls. The strength of the ridge forming the posterior margin of the temporal fossa increases greatly from its condition in No. 2987, the youngest specimen, to No. 2985, the oldest, so that the distance between the margins of the fossæ is absolutely greater in the smaller skull. The pterygoids in these skulls are slightly separated

* Flower, Cat. Osteol. Specimens in R. Coll. Surg. London, Part II, Mammalia, 1884, p. 573.

by the palatines, as is also the case in the skull figured by Messrs. Van Beneden and Gervais (*Ostéog.*, Pl. I, fig. 1a). In a skull in the national collection, now to be described, they are practically in contact.

In examining the skulls of killer-whales in the National Museum, I have found a complete cranium, a mandible, and a beak with the teeth in position, which belong to this species. The cranium was obtained from the Athenæum Museum, Nantucket, Mass., and is stated to have come from the "northeast coast." Very probably it was originally obtained in Davis' Strait. It closely resembles the skull of *P. crassidens* figured by Reinhardt, both in proportions and details of structure, and differs only in having a somewhat shorter tooth-row.

In the four skulls in the Royal College of Surgeons the proportional length of the tooth-row varies somewhat, being 33.9 per cent. of the total length in one instance, and 36.7 per cent. in another, so that I do not regard the shorter tooth row of the skull under discussion as worthy of special consideration.

In the following table are given measurements of this skull, together with Reinhardt's measurements (reduced to English inches) of the Refsnes specimen, and as many of Burmeister's measurements of *Globocephalus Grayi* (presently to be considered) as may be compared with the former:

Measurements.	U. S. Nat. Mus., No. 10320. "Northeast coast."	Skull from Refsnes (from Reinhardt).	<i>G. Grayi</i> (= <i>P. crassidens</i>), from Burmeister.
	Inches.	Inches.	Inches.
Length of the head, measured from the occipital condyles to the tip of beak.....	24.5	24.7	24.8
Length of head, measured to the middle of the inferior margin of the occipital foramen.....	23.9	23.9	.....
Length of the cranial portion, measured from the occipital condyles to the posterior wall of the nasal canal.....	9.75	9.0	8.4
Length of the beak, measured from its origin on a level with the anterior extremities of the zygomatic bones.....	11.0	11.3	? 12.8
Greatest breadth of the head (across the zygomatic processes of the temporal bones).....	15.0	15.3	.....
Breadth of the head across the postorbital processes of the frontals.....	14.75	14.7	15.6
Breadth across the occipital ridge at its union with the temporal ridges.....	8.5	9.3	.....
Breadth across the prominences formed by the frontals, the superior maxillaries and the zygomatic bones in front of the orbit.....	13.1	13.4	.....
Breadth of the beak at its origin.....	8.2	8.5	9.2
Breadth of the beak towards the middle, just before the most posterior tooth but two.....	7.7	8.0	7.6
Height of the occipital foramen.....	2.5	2.3	2.2
Breadth of the occipital foramen.....	2.55	2.2	2.0
Distance from the inferior margin of the occipital foramen to the posterior margin of the pterygoid bones.....	8.2	8.4	8.4
Length of the dental row in the upper jaw.....	8.85	10.5	10.0

Orca destructor Cope.

The beak and mandible referred to (No. 3679) are from off Paita, Peru, and form the basis of Professor Cope's *Orca destructor*. He states that it differs from *P. meridionalis* "in the greater breadth and obtuseness of the muzzle of its cranium and mandible—all we possess of it—

and in the smaller number of teeth; the premaxillary bones are relatively narrower throughout the greater part of their length.* As regards the breadth of the beak anteriorly, it should be stated that the skulls of *P. meridionalis* described prior to the date of Professor Cope's writing were young, while the beak under consideration is from an old individual, as is shown by the partial ankylosis of the premaxillæ with the maxillæ, and the worn condition of the teeth. The teeth in this specimen are $\frac{8-8}{9-9}$, and exceed, therefore, the number in one of the specimens of *P. meridionalis* (No. 2984) in the Royal College of Surgeons, in which the number is $\frac{8-8}{8-8}$. As regards the posterior tooth "being the last of the maxillaries, instead of the mandibulars, as in *meridionalis*," I do not think any cetologist would insist upon this as a specific character. The last maxillary tooth was evidently the furthest back in the skull from the northeast coast in the National Museum, and is so in the skull figured by Van Beneden and Gervais (*Ostéog.*, Pl. I, figs. 8 and 8a). I can not regard the specimen as other than *P. crassidens*. The proportions of the mandible and beak are as follows:

Measurements of No. 3679. Off Paita, Peru.

	<i>Inches.</i>
Greatest length of mandible.....	20.75
Length of symphysis.....	3.8
Length of tooth row.....	9.0
Depth between angle and coronoid process.....	6.1
Breadth of beak in front of third tooth (counting from posterior end of row).....	8.25
Breadth of intermaxillæ at same point.....	5.6
Length of tooth row.....	8.4

Globiocephalus Grayi Burmeister.

Gervais† and Reinhardt‡ have already expressed their belief in the identity of this species with *P. crassidens*, and there is apparently no reason for dissent from their opinion. It has one tooth more above on each side than is common, and all the teeth are very much worn, though the skull differs in length from No. 10320 in the national collection by only three-tenths of an inch. In the characters pointed out by Burmeister in his monograph as peculiar to this skull, it agrees with the specimens of *P. crassidens* which I have examined.

Pseudorca? mediterranea Giglioli.

Professor Giglioli describes in the *Zoologischer Anzeiger* (v, 1882, p. 289) under this name a species found in the Mediterranean.

He gives, however, no characters by which its relationships can be determined. The teeth are $\frac{9}{9}$ or $\frac{10}{10}$. The total length of the skull in the Royal Zoological Museum in Florence is 64^{cm} long; its greatest breadth is 46^{cm}.

* Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 293.

† Gervais, Journ. de Zoologie, I, p. 68; Journ. de Zoologie, II, p. 36. *Ostéographie des Cétacés*, p. 548.

‡ Reinhardt, Videns. Meddel. Natur. Förening.

Table of measurements.

PSEUDORCA CRASSIDENS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.			Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
						At base of maxillary notches.	At its middle.	Breadth of beak.		
2986	R. Col. Surg.	<i>O. meridionalis</i>	Tasmania.....	.....	<i>Cm.</i> 58.5	<i>Cm.</i> 29.2	<i>Cm.</i> 18.6*	<i>Cm.</i> 14.6	<i>Cm.</i> 11.2	<i>Cm.</i> 11.9†
2985	do	.....	do.....	Old	59.5‡	28.7	20.8	18.8	13.2	13.2†
2987	do	.....	do.‡	Jr.	51.1	24.2	16.0	13.0	8.3	10.4†
2984	do	.....	Adventure Bay, Tasmania.	Jr.	58.1	27.2	18.6	15.0	10.9	12.2†

Catalogue number.	Length of tooth line.	Last tooth to base of maxillary notches.	Extremity of beak to—		Breadth between—		Temporal fosse.		Length of symphysis of mandible.	Length of tooth row of mandible.	Depth between angle and coronoid process.	Number of teeth.		
			Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fosse.	Length.	Depth.						
2986	<i>Cm.</i> 19.8||	<i>Cm.</i> 7.9	<i>Cm.</i> 36.2*	<i>Cm.</i> 40.0	<i>Cm.</i> 29.5	<i>Cm.</i> 20.2	<i>Cm.</i> 17.0	<i>Cm.</i> 11.2	<i>Cm.</i> 47.6	<i>Cm.</i> 9.5	<i>Cm.</i> 23.4||	13.1	.....	{ 8-8 10-10
2985	21.8||	6.7	35.6*	41.3	33.3	22.6	19.1	14.7	50.8	7.0	23.9||	14.8	.....	{ 9-9 10-10
2987	18.3||	5.8	29.7	34.8	26.7	21.6	15.0	9.7	41.3	7.6	20.1||	10.9	.....	{ 8-8 10-10
2984	20.3||	6.9	33.7	37.5	29.6	20.6	17.8	12.7	46.0	8.1	19.3||	13.2	.....	{ 8-8 8-8

* Least. † This is back of the notch; the intermaxillæ are wider in front of it. ‡ A little sawed off.
§ *O. meridionalis*. || Actual; not from tip of beak.

SUBFAMILY II. DELPHINAPTERINÆ.

17. DELPHINAPTERUS Lacépède.

Delphinapterus Lacépède, Hist. nat. des Cétacés, 1804, p. xli.

Beluga Rafinesque, Anal. Nat., 1815, 60.

DELPHINAPTERUS LEUCAS (Pallas).

Delphinus leucas, Pallas, Reise in Russischen Reiches, 1776, III, p. 92, pl. 79.

Delphinapterus beluga, Lacépède, Hist. nat. des Cétacés, 1804, p. 243.

Delphinapterus leucas, Gerard, Dict. Sci. nat., VI, p. 65.

Delphinus canadensis, Desmarest, Mammalogie, 2d pt., 1822, p. 516.

? *Delphinus (Delphinapterus) Kingii*, Gray, Ann. Philos., 1827, p. 375.

Beluga rhinodon, Cope, Proc. Acad. Nat. Sci. Phila., 1865, p. 278.

Beluga declivis, Cope, Proc. Acad. Nat. Sci. Phila., 1865, p. 278.

Beluga conereta, Cope, Proc. Acad. Nat. Sci. Phila., 1865, p. 278.

Prior to the year 1865 naturalists seemed to have been pretty well agreed that there existed but one species of white whale, the "beluga," "wittfisch," or "weissfisch." We must except Gray and Desmarest, however, the former having erected *D. Kingii* on a specimen supposed to have come from New Holland, and the latter having made a distinct species of Duhamel's Dauphin blanc du Canada (*D. canadensis*). Of these species more will be said subsequently.

In 1865 Professor Cope, having studied the material brought back by Drs. Hayes and Kane, divided the genus into three sections from osteological characters, and assigned *B. rhinodon* and *catodon* to the first, *declivis* to the second, and *concreta* to the third.

Upon examination of the diagnosis it appears that the same characters, thirty-six in number, are, with eight exceptions, repeated in two or more species in different combinations. Thus *rhinodon* and *declivis* have the vomer well developed between the palatines, while *concreta* has not. On the other hand *declivis* and *concreta* have the beak one-half the total length of the skull, but *rhinodon* not. Of five skeletons in the British Museum and at Oxford none exhibit the same combination of characters exhibited by any of Professor Cope's species, nor did any two agree together. Thus No. 367a (British Museum) has the palatines barely in contact, a character peculiar to *rhinodon*, but it has also the beak equally one-half the length of the skull, and the teeth 9-9, which is not the case in *rhinodon*. No. 268a has three characters of *catodon*, but has the muzzle less than one-half the length of the skull, and the vomer well developed between the palatines, which is not the case in *catodon*.

It therefore appears that each of these five specimens must be regarded as the type of a new species, or the divisions of the original species, *D. leucas*, must be broken down; for the former course there is apparently no warrant.

Let us examine the characters themselves. The first character of Professor Cope's sections relates to the cervical vertebræ. In section *a* and *aa* those vertebræ are separated, in *aaa* the axis and third vertebra are anchylosed together. It is doubtful whether this is anything more than an individual variation. In a skeleton in the national collection the third cervical is anchylosed to the axis on the left side, but not on the right side; the area of attachment is small. In one of two skeletons of *L. acutus* now on my tables, the first three cervicals are united by the centra, and the first four by the spines, the remaining cervicals being free; in the second skeleton the first three cervicals are united by the centra, and the first five by the spines, while the sixth and seventh cervicals are also united together by their neural arches and spines.

Such variations in the amount of anchylosis of the cervicals are of frequent occurrence in this and other species of the *Delphinida*, and certainly do not indicate specific diversity. The presence or absence of a

vertebrarterial canal is likewise an individual character. The variation of one in the number of pairs of ribs is not considered of specific importance. The shortness of the muzzle in *rhinodon* is doubtless due to the immaturity of the specimen. The amount of expansion of the vomer and palatines in the median line is a character which varies greatly with age. The question of the number of teeth presents some difficulties. I have never seen a white whale skull with so few as four or six teeth. The number in twelve skulls in the Museum varies from eight to eleven.

As regards the relative positions of the anterior extremity of the exposed preareal portion of the maxilla and the maxillary notch it may be said that in the twelve skulls mentioned above this part of the maxilla appears at different points from almost exactly opposite the notch to a point about midway between the line of the notches and the superior nares.

On the whole I am inclined to reunite all of Professor Cope's species under the original name and to hold that in the Arctic seas, at least, but one species of white whale has been discovered.

As regards Gray's *D. Kingii*, reported to have come from New Holland, it can only be said that considering that no white whale has been observed in the South seas, and that the type skull agrees with others from northern waters, there is strong probability that the locality given by Gray is erroneous. There is a skull in the national collection from Pastolik, Alaska, near the mouth of the Yukon, which agrees almost exactly with the type of *D. Kingii*. In both the length of the beak is about 40 per cent. of that of the skull, the breadth at the notch is a third of the total length, and the breadth of the intermaxillæ at the middle of the beak equals the distance from the last tooth to the maxillary notch.

Of Desmarest's *Delphinus canadensis*, founded on Duhamel's *Marsouin blanc*, little need be said. Duhamel states that he never has himself seen this animal nor any of the other porpoises which he figures. His words are:

Enfin on m'a envoyé de Canada, sous le nom de *Marsouin blanc*, de douze pieds de longueur, le dessin (fig. 4), qui avait le museau très petit et le front fort élevé.*

In the explanation of the plates he says:

Celui, fig. 4, est nommé *Marsouin blanc*, à cause de la couleur de sa peau; il a le front très-gros.†

All of Duhamel's figures of porpoises are very incorrect, and his representation of the white whale resembles that animal perhaps as much as those of the killer and the bottle-nose resemble those species. It is unwise to give such obviously inaccurate figures serious consideration, and it is certain that in the light of present knowledge, Desmarest would not have erected a species on the *Marsonin blanc*.

* Duhamel, *Traité des Peseches*, vol. iv, pt. 2, sect. x, Chap. II, 1782, p. 41 (Pl. x, fig. 4).

† L. c., p. 64.

Table of measurements.

DELPHINAPTERUS LEUCAS.

Catalogue number.	Collection.	Type of—	Locality.	Sex and age.	Total length.	Length of beak.	Breadth of beak—		Breadth of intermaxillæ at middle of beak.	Greatest breadth between outer margins of intermaxillæ proximally.
							At base of maxillary notch.	At its middle.		
7535	U. S. Nat. Mus.	.....	Pastolik, Alaska	...	<i>Cm.</i> 40.0	16.4	13.3	7.3	4.7	9.8
2958	R. Col. Surg.	.....	.....	.....	55.3	26.4	18.3	9.9	5.6	11.7
2962	do	.....	.....	.....	59.2	30.2	18.5	12.2	5.3	11.8†
2960	do	.....	.....	.....	54.4	25.4	16.5	9.5	75.0	11.3†
2961	do	.....	.....	.....	53.1	24.8	16.8	9.4	4.5	10.9†
367c	Brit. Mus.	.....	Eschscholtz Bay	.....	50.8	25.4	16.3	8.6	4.7	10.7
367d	do	.....	Greenland	Jr.	37.1	13.2	10.5	6.1	3.6	9.0
367a	do	.....	do	.....	63.5	32.4	20.6	14.8	6.0	12.5
368a	Brit. Mus.	<i>D. Kingii</i>	New Holland	.....	36.0	14.0	11.9	7.1	4.1	8.9

Catalogue number.	Length of tooth-line.	Last tooth to base of maxillary notch.		Extremity of beak to—		Breadth between—		Temporal fossæ.		Length of mandible.	Length of symphysis of mandible.	Length of tooth-row of mandible.	Depth between angle and coronoid process.	Diameter of largest tooth.	Number of teeth.
		Anterior margin of superior nares.	End of crest of pterygoid.	Orbits.	Hinder margins of temporal fossæ.	Length.	Depth.								
7535	<i>Cm.</i> 13.0	<i>Cm.</i> 4.6	<i>Cm.</i> 24.0	<i>Cm.</i> 23.7	<i>Cm.</i> 20.1	.....	.....	<i>Cm.</i> 6.0	.....	.....	.....	.....	.....	.....	.....
2958	18.7	7.9	38.5	36.5	27.2	18.5	15.2	6.6	41.9	7.4	17.0	10.4	.....	.....	{ 10—10 9—9
2962	24.4	7.1	40.8	40.8	29.0	20.0‡	18.2	9.9	.....	.....	.....	.....	.....	.....	{ 9—9 ?—?
2960	20.0	6.5	36.0	35.3	25.4	20.1‡	15.7	8.4	.....	.....	.....	.....	.....	.....	{ 9—9 ?—?
2961	18.3	7.6	35.6	34.0	25.7	19.4‡	15.4	7.1	40.0	6.5	18.7	9.9	.....	.....	{ 7—8 9—9
367c	19.3	5.8	33.7	34.3	23.6	21.3§	14.0	7.4	.....	.....	.....	.....	.....	.....	{ 9—9 ?—?
367d	10.2	4.6	20.1	19.8	18.0	20.0§	.....	6.1	24.9	4.1	9.2	7.8	.....	.....	{ 9—9 10—9
367a	26.2	8.5	46.3	43.7	31.2	23.4§	17.8	8.5	47.2	8.3	19.1	11.7	1.4	.....	{ 9—9 8—9
368a	11.2	4.1	21.1	.....	18.8	19.2§	.....	6.1	26.1	3.8	9.4	7.5	0.28	.....	{ 9—9 9—9

* Brooke's collection.

† On line with anterior margin of nares.
‡ Between walls of the fossæ.

§ Least.

SYNOPSIS OF THE SPECIES OF DOLPHINS.

I. ARTIFICIAL KEY TO THE GENERA, BASED ON EXTERNAL CHARACTERS.

Head with a beak which is usually distinctly marked off from the forehead by a constriction.

Dorsal fin absent6. *Tursio*.

Dorsal fin present; triangular or ovate.

Beak not distinctly marked off from the forehead.10. *Cephalorhynchus*.

Dorsal fin present; falcate.

Beak distinct, short and rim-like }
 { 7. *Lagenorhynchus*.
 { ? 8. *Sagmatias*.*
 { ? 9. *Feresa*.*

Beak distinct, elongated.

Symphysis of mandible long.

Crowns of teeth rugose2. *Steno*.

Crowns of teeth smooth1. *Sotalia* sps.

Symphysis of mandible short.

Sides without longitudinal bands of color }
 { 3. *Tursiops*.
 { 1. *Sotalia* sps.
 { 5. *Prodelphinus* sps.
 Sides with longitudinal bands of color }
 { 4. *Delphinus*.
 { 5. *Prodelphinus* sps.

Head without a beak, or with merely an obtuse ridge margining the upper jaw.

Crowns of teeth compressed, spade-shaped.

Dorsal fin absent11. *Neomeris*.

Dorsal fin present, triangular or slightly falcate12. *Phocena*.

Teeth conical, nearly or quite upright in the jaws.

Teeth in upper jaw deciduous; mandibular teeth few, confined to the region of the symphysis14. *Grampus*.

Teeth persistent in both jaws.

Pectoral fins very long and narrow; teeth confined to the anterior half of the rostrum15. *Globicephalus*.

Pectoral fins broad, ovate; dorsal fin very high and prominent (especially in the male), size large17. *Orca*.

Pectoral fins moderate, falcate.

Teeth few and large; color black; size large. Pelagic16. *Pseudorca*.

Teeth small; color bluish-gray. Fluvial13. *Orcella*.

Teeth irregular and implanted obliquely in the jaws.

Pectoral fins broad, dorsal fin rudimentary; color white...18. *Delphinapterus*.

Teeth wanting (*i. e.*, tusks concealed in the female), or present in the form of a single, very long, straight, spirally grooved tusk (*i. e.*, right tusk concealed in male; rarely both right and left developed). 19. *Monodon*.

* Known only from skulls.

2. ARTIFICIAL KEY TO THE GENERA, BASED ON CRANIAL CHARACTERS.

- Pterygoid bones not extending backward across the optic canal to articulate with the squamosal.
- Maxillary teeth deciduous, absent in adult skulls. Mandibular teeth few, confined to the region of the symphysis. Triangular area in front of the superior nares convex14. *Grampus*.
- Maxillary and mandibular teeth both present.
- Teeth with compressed, spade-shaped crowns.
- Rostrum one-third the total length of the skull.....11. *Neomeris*.
- Rostrum exceeding one-third the total length of the skull..... 12. *Phocaena*.
- Teeth conical, rugose.
- Mandibular symphysis long; rostrum very long and narrow. Pterygoid bones in contact2. *Steno*.
- Teeth conical, smooth.
- Palate with two distinct lateral grooves..4. *Delphinus*.
- Palate without lateral grooves.
- Rostral portion of intermaxillæ convex.
- Pterygoid bones separate.....1. *Sotalia*.
- Pterygoid bones in contact.
- Teeth small and numerous (37 to 52).....5. *Prodelphinus*.
- Teeth larger (22 to 26)3. *Tursiops*.
- Rostral portion of intermaxillæ flat.
- Triangular area in front of superior nares raised, forming a prominent table.....8. *Sagmatias*.
- Triangular area in front of superior nares not raised above the plane of the surrounding surfaces.
- Maxillæ not thickened about the maxillary notch.
- Outer border of the proximal end of the intermaxillæ overhanging the adjacent surface of the maxillæ6. *Tursio*.
- Outer border of the proximal end of the intermaxillæ continuous with the adjacent border of the maxillæ.....10. *Cephalorhynchus*.
- Maxillæ thickened about the maxillary notches.
- Teeth small and numerous7. *Lagenorhynchus*.
- Teeth few, confined to the anterior half or anterior two-thirds of the rostrum. Pterygoid bones in contact.
- Intermaxillæ greatly expanded on the rostrum, covering the greater part of the maxillæ. Teeth confined to the anterior half of the rostrum15. *Globicephalus*.
- Intermaxillæ moderate. Teeth in the anterior two-thirds of the rostrum.....9. *Feresa*.
- Teeth few, small, occupying nearly the whole length of the rostrum. Pterygoid bones widely separated13. *Orcella*.
- Teeth few and large; roots cylindrical. Pterygoid bones in contact. Intermaxillæ of equal breadth throughout16. *Pseudorca*.
- Teeth few and large with compressed roots. Pterygoid bones approximated but not touching. Intermaxillæ expanded proximally.
17. *Orca*.
- Pterygoid bones extending backward across the optic canal and articulating with the squamosal. Expanded proximal end of the maxillæ in the same plane with the distal portion.
- Teeth present, irregular, obliquely implanted in the jaws. No tusks.
18. *Delphinapterus*.
- Teeth only in the form of two straight tusks, concealed in the female. The left (occasionally the right also) greatly developed in the male and spirally grooved19. *Monodon*.

SUBFAMILY I. DELPHININÆ.

1. SOTALIA Gray.

Rostrum long, narrow, and compressed. Symphysis of mandible long or moderate. Pterygoid bones separate, narrow, and divergent posteriorly. Postorbital process of frontal narrow. Teeth moderate, smooth, 26 to 35. Vertebrae 51 to 55.

Head prolonged into a distinct beak. Dorsal fin falcate. Pectoral fins broad at the base, falcate (oval in *S. fluvialtilis*), moderate.

Color white or gray, sometimes spotted; no bands of dark color.

SOTALIA SINENSIS Flower.

(Plate 1, fig. 3.*)

"Milky white, with pinkish fins and black eyes" (Swinhoe.)

Teeth $\frac{32}{32}$. Vertebrae: C. 7; D. 12; L. 10; Ca. 22=51.

Temporal fossæ large, rounded. Rostrum rather broad at the base, long, tapering. Palato-pterygoid region constricted. Inner margins of pterygoids separated, parallel proximally, divergent distally. Crowns of teeth smooth, conical, and incurved.

Measurements of the skull.—Total length, 20.7 inches (52.6^{cm}); length of beak, 12.8 inches (32.5^{cm}); breadth of beak at base, 4.7 inches (11.9^{cm}); breadth of same at its middle, 1.85 inches (4.7^{cm}); length of upper tooth-row, 11.2 inches (28.4^{cm}); greatest breadth at postorbital processes of frontal, 8.8 inches (22.4^{cm}).

Habitat.—Quemoy Island, harbor of Amoy, China. ? Foo-chow River (Swinhoe). Canton River (Osbeck).

SOTALIA PLUMBEA (Cuvier).

(Plate 1, figs. 1 and 2.)

Snout very long; distance from the tip of the snout to the eye one-sixth the total length; dorsal commencing at the end of the first third

* The plates accompanying this synopsis contain, for the most part, reproductions of the best figures of the different species to be found in the literature. For the figures of skulls I have drawn largely upon the admirable illustrations in the atlas of Van Beneden and Gervais' *Osteographie des Cétacés*, and in Gray's *Synopsis of Whales and Dolphins*. Most of the figures of species described by American authors, however, are new, and have been drawn from specimens in the National Museum.

In the diagnoses I have attempted to give the mean number of teeth (on one side of each jaw) for those species of which numerous skulls are to be found in the museums, but in giving the number of vertebrae I have in some cases indicated the extremes of variation as far as known.

of the length; long and but little elevated; caudal ridges prominent. Breadth of flukes equal to one-fourth the total length.

Color uniform plumbeous gray, except on the extremity and under side of the lower jaw, where it is white.

Teeth $\frac{37}{4}$. Rostrum of skull exceeding three-fifths the total length of the skull, very narrow and obtusely pointed; its breadth at the middle one-sixth its length. Vomer not visible on the palate. Temporal fossæ large and rounded, their length about equal to the breadth of the rostrum at its base. Symphysis of the mandible about one-third the length of the mandible.

Measurements of the exterior (Pucheran).—Total length, 92.9 inches (236^{cm}); tip of snout to dorsal fin, 33.7 inches (85.5^{cm}); to pectoral fin, 22.8 inches (58^{cm}); to eye, 14.9 inches (37.8^{cm}); length of anterior margin of dorsal fin, 16.7 inches (42.5^{cm}); its vertical height, 5.9 inches (15^{cm}); length of anterior margin of pectoral fin, 13.8 inches (35^{cm}); breadth of flukes, 21.7 inches (55^{cm}).

Measurements of the skull.—Total length, 55.9^{cm}; length of beak, 34.9^{cm}; breadth of beak at base, 11.3^{cm}; at its middle, 4.3^{cm}; breadth between orbits, 19.2^{cm}; length of temporal fossa, 11.2^{cm}.

Habitat.—Indian Ocean. Malabar coast, India (*Dussumier*).

SOTALIA GADAMU (Owen).

(Plate 2, figs. 1 and 2.)

Body fusiform, gaining its greatest diameter at the fore part of the dorsal fin. Forehead convex. Snout long and compressed. Pectoral and dorsal fins falcate and of about equal size; the former commence at the beginning of the second fourth of the total length of the body.

Color of body "dark plumbeous grey, almost black upon the fins, especially at their fore part, becoming very gradually lighter to the longitudinal parallel of the attachment of the pectorals, below which the body, from beneath the base of the snout and eye to below the base of the tail, is of a pinkish ashy-grey tint, with a few small irregular blotches of light plumbeous grey" (Owen).

Teeth $\frac{26}{26}$. Rostrum of skull less than three-fifths the length of the skull, depressed, and obtusely rounded off in front; its breadth at the middle about one-fifth its length. Vomer visible in the center of the palate. Pterygoids narrow, curved outwards, and sharply keeled. Length of the temporal fossæ only a little less than the breadth of the beak at its base. Length of the symphysis of the mandible somewhat less than one-third the total length of the mandible.

Measurements of the exterior.—♀ adult (Owen): Total length, 82 inches (209.1^{cm}); tip of snout to dorsal fin, 36 inches (91.8^{cm}); length of pectoral fin (along anterior margin), 18 inches (45.9^{cm}); length of base of dorsal fin, 13 inches (33.2^{cm}); breadth of flukes, 22 inches (56.1^{cm}).

Measurements of the skull.—(82, 1, 2, 3, British Museum): Total length,

43.2^{cm}; length of rostrum, 25.3^{cm}; breadth of beak at base, 9.3^{cm}; breadth of same at its middle, 5^{cm}; breadth between orbits, 17.2^{cm}; length of temporal fossa, 8.8^{cm}.

Habitat.—Indian Ocean. Vizagapatam (*Owen*); Karachi; Australia (*Flower*).

SOTALIA LENTIGINOSA (*Owen*).

(Plate 2, fig. 3.)

General form as in *S. gadamu*, but with smaller pectoral and dorsal fins, and broader flukes. Caudal ridges prominent.

The color is pretty uniformly bluish cinereous, or slaty, freckled with irregular small spots or streaks of brown or plumbeous pigment, the streaks longitudinal and flecked with white; the under surface is a shade lighter than the rest of the body. (*Owen*.)

Teeth $\frac{33}{34}$. Skull narrower than in *S. gadamu*. Occipital condyles and temporal fossæ larger. Breadth of the rostrum at the middle one-sixth its length.

Measurements of the exterior.—♀ adult (*Owen*): Total length, 94 inches (239.7^{cm}); length of snout, 6 inches (15.3^{cm}); length of mouth, 12 inches (30.6^{cm}); tip of snout to base of pectoral fin, 24 inches (61.2^{cm}); length of pectoral (along anterior curve), 12 inches (30.6^{cm}); tip of snout to dorsal fin, 40 inches (102^{cm}); breadth of flukes, 21 inches (53.6^{cm}).

Measurements of the skull.—(1476a, British Museum. Type): Total length, 47^{cm}; length of beak, 28.2^{cm}; breadth of beak at base, 10.2^{cm}; at its middle, 4.7^{cm}; breadth between orbits, 17.4^{cm}; length of temporal fossa, 10.2^{cm}.

Habitat.—Vizagapatam, India (*Owen*).

SOTALIA GUIANENSIS (*Van Beneden*).

See *Van Beneden*, *Mém. Couron. Acad. Roy. Belgique*, coll. in 8°, xvi, 1864, Art. 2.

Also page 17.

Habitat.—Cayenne, French Guiana.

SOTALIA BRASILIENSIS *Van Beneden*.

(Plate 3, figs. 1 and 2.)

See page 17.

Habitat.—Bay of Rio de Janeiro.

SOTALIA TUCUXI (*Gray*).

(Plate 5, fig. 2.)

See page 17.

Habitat.—Amazon River; mouth of Tocantins River (*Bates*); ? Florida (*U. S. National Museum*).

SOTALIA PALLIDA (Gervais).

(Plate 4, figs. 1 and 2.)

General form similar to that of *S. fluviatilis*. Beak rather longer and less distinctly marked off from the forehead. Lower jaw extending beyond the upper. Dorsal fin less elevated than in the *S. fluviatilis*, triangular, strongly emarginated behind. Pectoral fins smaller than in *S. fluviatilis*; less pointed and more constricted at the base.

Upper surface of the body, head, dorsal and caudal fins yellowish white. Under surface of body, lower jaw, and pectoral fins, white. (d'Orbigny and Gervais.)

Teeth $\frac{30}{31}$, small and pointed. Temporal fossæ large and square.

Measurements of the exterior.—Total length, 165^{cm}; greatest girth, 98^{cm}.

Measurements of the skull.—Total length, 34^{cm}.

Habitat.—Upper Amazon River; Nauta, Peru (Gervais); ? mouth of Rio Negro (Natterer).

SOTALIA FLUVIATILIS (Gervais).

(Plate 5, fig. 1.)

Head swollen; beak distinct, moderately prolonged. Pectoral fins large, oval in outline and pointed. Dorsal fin falcate, a third longer than high.

Upper parts of the body gray, approaching black; lower jaw and under surface of the body roseate-lilac. The color of the upper parts is extended through the eye in the form of a broad blackish band reaching the pectoral fins, which are likewise blackish. Immediately behind this band the light color of the lower surfaces rises higher than elsewhere on the sides. (d'Orbigny and Gervais).

Teeth, $\frac{28}{28}$.

Measurements of the exterior.—Total length, 101^{cm}; greatest girth, 70^{cm}.

Measurements of the skull.—Length of beak, 20^{cm}; length of mandible, 27^{cm}; length of tooth-row of the same, 16.5^{cm}; length of symphysis, 5^{cm}.

Habitat.—Upper Amazon River.

2. STENO Gray.

Rostrum long, narrow, and compressed. Symphysis of mandible long. Pterygoid bones in contact. Postorbital process of frontal slender. Teeth large, 20 to 27; crowns rugose. Vertebrae, 66.

Beak distinctly marked off from the forehead. Dorsal and pectoral fins falcate. Color black above, white below, with or without dark longitudinal bands.

STENO ROSTRATUS (Desmarest).

(Plate 6, figs. 1 and 2.)

Snout long, separated from the low forehead by a distinct constriction. Dorsal and pectoral fins falcate.

Color of the upper surfaces and fins purplish sooty black; sides marked with rather large stellate yellowish-white spots. Snout and under surfaces of the body white, more or less tinged with purple and rose-color, and marked with prominent purple spots. (Lütken.)

Vetebrae: C. 7; D. 13; L. 15; Ca. 30 = 65.

Teeth, $\frac{20}{20}$ to $\frac{25}{27}$; rugose. Skull massive. Rostrum long and compressed, its breadth at the middle 11.5 per cent. to 18.8 per cent. of its length. Frontal plates of the maxillæ strongly bent; intermaxillæ convex, at wide opening between them opposite the maxillary notch. Temporal fossæ very large and rounded; pterygoid bones meeting in the median line; vomer extending to the middle of the palate and visible in the median line; mandible growing gradually attenuated from behind forwards, not keeled at the symphysis. Symphysis very long.

Measurements of the skull.—(British Museum No. 346a. Type of *S. compressus*): Total length, 51.1^{cm}; length of rostrum, 32.5^{cm}; breadth of rostrum at its base, 9.3^{cm}; at its middle, 4.2^{cm}; breadth of intermaxillæ at same point, 2.9^{cm}; breadth between orbits, 16.4^{cm}; length of temporal fossa, 8.6^{cm}. (British Museum No. 345e. Type of *S. frontatus*): Total length, 51.1^{cm}; length of rostrum, 30^{cm}; breadth of rostrum at its base, 10.7^{cm}; at the middle, 5.2^{cm}; breadth of intermaxillæ at same point, 3.6^{cm}; breadth across orbits, 19.3^{cm}; length of temporal fossa, 10.7^{cm}. (For measurements of the exterior see page 28.)

Habitat.—Indian Ocean. Java. Atlantic Ocean; 1° 14' S. lat., 17° 20' W. long. (Lütken.)

STENO PERSPICILLATUS Peters.

(Plate 7, figs. 1 and 2.)

Form generally like *Tursiops tursio*. Beak distinctly separated off from the forehead. Dorsal and pectoral fins falcate.

Back black, belly white, sides of body and head yellowish white. A milk-white stripe from the pectoral fin to the eye. Eye surrounded by a brown ring, from which a narrow brownish-black line goes forward along the base of the forehead to meet its fellow on the opposite side of the head. A similar line from the corner of the mouth to the base of the pectoral fin. (Peters.)

Teeth, $\frac{23}{23}$; rugose. Vertebrae: C. 7; D. 12; L. 15; Ca. 32 = 66. Skull like that of *S. rostratus*. (See p. 25.)

Measurements of the exterior (From Peters).—Total length, 92.8 inches (185^{cm}); extremity of snout to dorsal fin, 32.3 inches (82^{cm}); to pectoral

fin, 17.3 inches (44^{cm}); length of base of dorsal fin, 7.9 inches (20^{cm}); height of dorsal fin, 6.3 inches (16^{cm}); length of pectoral fin, 11 inches (28^{cm}).

Measurements of the skull.—(Berlin Museum. Type, ♀): Total length, 49.9^{cm}; length of rostrum, 29.3^{cm}; breadth of rostrum at its base, 11.1^{cm}; at its middle, 5.8^{cm}; breadth of intermaxillæ at same point, 3.7^{cm}; breadth between orbits, 20.4^{cm}; length of temporal fossa, 11^{cm}.

Habitat.—South Atlantic Ocean, 32° 29' 7" S. lat., 2° 1' W. long. (Peters.)

3. TURSIOPS Gervais.

Rostrum moderately long, tapering; pterygoid bones normal, in contact; symphysis of mandible short; postorbital process of frontal triangular; teeth large, smooth, 22–26; vertebrae, 61 to 64.

Beak moderate, tapering, distinctly marked off from the forehead; dorsal and pectoral fins falcate; color gray or greenish, lighter below, sometimes with spots.

TURSIOPS TURSIO (Fabricius).

(Plate 8, figs. 1 and 2.)

General form stout. Forehead sloping; beak short and depressed; lower jaw usually longer than the upper jaw. Dorsal fin situated in the middle of the length, high and falcate. Pectoral fins broad at the base, obtusely rounded off at the tip, and not deeply emarginate behind.

Back, dorsal, pectoral, and caudal fins, snout, and sometimes the tip of the lower jaw and lower lip, clear, plumbeous gray, more or less tinged with purple. The gray color becomes lighter on the sides, and passes by insensible gradations into the pure white of the under surfaces. In some individuals all that portion of the body lying back of the anus is gray; in others the body is bicolor as far as the flukes. (Specimens have occasionally been captured which were entirely of a gray color.)

Teeth, $\frac{22}{22}$. Vertebrae: C. 7; D. 13; L. 17; Ca. 27=64. Skull massive. Rostrum rather broad, depressed; its length slightly exceeding one-half the total length of the skull. Intermaxillæ thick and swollen. Vomer appearing in the center of the palate. Pterygoid bones broad and obtusely keeled. Inferior surface of frontal not deeply concave in front of the optic canal. Temporal fossæ large and elliptical in outline. Inferior extremity of the parietal broad. Greatest diameter of the condyle of the mandible contained two and a half times in the greatest depth of the ramus. Teeth large. Second finger longer than the third.

Measurements of the exterior.—♂ adult. (Flower.) Total length, 114 inches (290.7^{cm}); length of mouth, 12.5 inches (31.9^{cm}); tip of snout to dorsal fin, 50 inches (127.5^{cm}); length of pectoral fin, 15.5 inches (39.5^{cm});

vertical height of dorsal fin, 9 inches (22.9^{cm}); breadth of flukes, 24 inches (61.2^{cm}).

Measurements of the skull.—(British Museum, 353g): Total length, 57.8^{cm}; length of rostrum, 32^{cm}; breadth of rostrum at base, 15.8^{cm}; at its middle, 9.7^{cm}; breadth between orbits, 28^{cm}; length of temporal fossa, 13.2^{cm}.

Habitat.—Coast of Europe: North Sea to Bay of Biscay; Mediterranean; Gulf of Lyons. Atlantic coast of North America: * Maine to Florida. Gulf of Mexico: Texas. Uruguay: Uruguay River (*Burmeister*). New Zealand: Dusky Bay (*Hector*); Seychelle Islands (*Flower*). The last three perhaps not this species.

TURSIOPS PARVIMANUS Lütken.

Smaller than *T. tursio*. Head, back, and fins blackish; belly grayish white.

Teeth, $\frac{25}{24}$. Vertebrae, 62. Ribs, 13 pairs. Pectoral fins small, about one-eighth the total length. Third finger longer than the second. (Lütken.)

Habitat.—Adriatic Sea.

TURSIOPS CATALANIA (Gray).

Upper surfaces lead-color, passing gradually on the sides into the white of the lower surfaces; sides, lower surfaces, and pectoral fins covered with longitudinally elongated blotches of dark lead-color. (Gray.)

Teeth, $\frac{25}{25}$. Skull like that of *T. tursio*, but smaller; the rostrum longer [about three-fifths the total length] and narrower.

Measurements of the exterior.—♀ (Gray). Total length, 81 inches (206.55^{cm}); tip of snout to dorsal fin, 36 inches (91.8^{cm}); length of anterior border of dorsal fin, 13 inches (33.2^{cm}); height of dorsal fin, 8 inches (20.4^{cm}); length of pectoral fin, 13 inches (33.2^{cm}); breadth of flukes, 22 inches (56.1^{cm}).

Measurements of skull.—(Same individual—British Museum 1391b). Total length, 41.5^{cm}; length of rostrum, 23.8; breadth of rostrum at base, 10.4^{cm}; at its middle, 6.1^{cm}; breadth between orbits, 19^{cm}; length of temporal fossa 9.4^{cm}.

Habitat.—Northeast coast of Australia.

TURSIOPS ABUSALAM (Rüppell).

(Plate 9, figs. 1 and 2.)

Smaller than *T. tursiops*, which it resembles in general form.

Upper surface of the head and body, the tail and fins, dark sea-green. Margin of the upper lip, and entire under surface of the body to the anus whitish flesh-color; belly with small, irregularly distributed dark green spots. Iris dark green. (Rüppell.)

* The commonest species.

Teeth $\frac{26}{26}$. Vertebrae, C. 7; D. 12; L. 16; Ca. 26=61. Skull as in *T. catalania*, but narrower across the orbits and with the beak narrower at its base.

Measurements of the exterior (from Rüppell).—♀ adult. Total length, 76.4 inches (194.9^{cm}); tip of snout to eye, 11.6 inches (29.7^{cm}); to dorsal fin, 35 inches (89.3^{cm}); vertical height of dorsal fin, 8.5 inches (21.6^{cm}); breadth of flukes, 20.2 inches (51.4^{cm}).

Measurements of the skull.—(Type.) Total length, 46^{cm}; length of rostrum, 27^{cm}; breadth of rostrum at its base, 9.2^{cm}; breadth of intermaxillæ at same point, 3.4^{cm}; breadth between orbits, 18.7^{cm}.

Habitat.—Red Sea.

TURSIOPS GILLII Dall.

(Plate 10, figs. 1 and 2.)

Exterior known only from an outline drawing and record of two "momentary observations" by Seammon.

In general form similar to *T. tursio*. Color "black all over, lightened a little below."

Teeth $\frac{22}{22}$. Skull like that of *T. tursio* in form and size. Condyles of the mandible large, their greatest diameter contained twice in the greatest depth of the ramus. Optic canal not rising to the level of the inferior surface of the frontal bone, which is deeply concave in front of it. Lower end of visible portion of parietal a narrowish band, between the squamosal and a backward prolongation of the frontal.

Measurements of the skull.—Total length, 54^{cm}; length of rostrum, 29.8^{cm}; breadth of rostrum at its base, 14.1^{cm}; at its middle, 8.8^{cm}; breadth between orbits, 24.5^{cm}; length of temporal fossa, 13.5^{cm}.

Habitat.—North Pacific Ocean: Monterey, Cal., and Lower California. (*U. S. National Museum*.)

4. DELPHINUS Linné.

Palate with two deep lateral grooves. Rostrum long and narrow. Pterygoid bones normal, in contact. Symphysis of mandible short. Teeth small, acutely pointed, and numerous, 47 to 65. Vertebrae, 73 to 76.

Head with a distinct long beak. Dorsal and pectoral fins falcate, moderate. Color black above, lighter below, with several conspicuous longitudinal bands.

DELPHINUS DELPHUS Linné.

(Plate 11, figs. 1, 2, and 3.)

Body slender; forehead sloping gradually, forming a wide angle with the beak; beak long and slender (average about one fourteenth the total length); dorsal fin in the middle of the median dorsal line, narrow, and not strongly recurved above, its vertical height about one-ninth

the total length; pectoral fins about three times as long as broad, narrow in the distal half, and obtusely pointed.

Form and disposition of color-markings very variable. Back, upper jaw, tail, and fins black or dark gray; under parts white or greenish-white. The black area extends down upon the sides under the dorsal fin in the form of an angular projection (sometimes indistinct), the apex of which is met by the apex of a similar upward projection of the white of the under parts. Sides occupied by two elongated elliptical areas of light color, the anterior and larger of which is fulvous in some individuals and gray in others; the posterior area is gray. A black, gray, or greenish band extends from the lower jaw to the base of the pectoral fin (sometimes absent). Eye surrounded by a ring of black, from which a narrow black band extends forward to the base of the beak. End and margin of lower jaw usually black. One or two longitudinal bands of gray or greenish-gray traverse the light color of the lower part of the sides.

Teeth $\frac{47}{46}$ to $\frac{50}{51}$. Vertebrae: C. 7; D. 14(-15); L. 21(-22); Ca. 30 (-32)=73(-76). Rostrum depressed and elongated, its length exceeding one-half the total length (58 per cent. to 64 per cent.). Premaxillæ convex, anchylosed together in the median line. Proximal fifth of the palatal ridge with nearly parallel margins, its sides excavated by the lateral grooves. Pterygoid bones sharply keeled. Vomer appearing in the median line of the palate as a linear slip. Temporal fossæ elongated, their length a little more than one-sixth the total length of the skull.

Measurements of the exterior.—♂ (21524 U. S. National Museum. Wood's Holl, Mass.). Total length, 89 inches (226.1^{cm}); end of beak to dorsal fin, 39.3 inches (99.8^{cm}); to pectoral fin, 20.0 inches (50.8^{cm}); vertical height of dorsal fin, 9.0 inches (22.9^{cm}); length of pectoral fin, 14 inches (35.6^{cm}); breadth of flukes, 20.5 inches (52.1^{cm}).

Measurements of the skull.—(20873 U. S. National Museum. Block Island, R. I. See p. 48.) Total length, 46.7^{cm}; length of rostrum, 28.2^{cm}; breadth of rostrum at its base, 9.3^{cm}; at its middle, 5.3^{cm}; breadth between orbits, 17.1^{cm}; length of temporal fossa, 7.2^{cm}.

Habitat.—Pelagic.

DELPHINUS LONGIROSTRIS Cuvier.

(Plate 12, fig. 2.)

External characters unknown.

Teeth $\frac{65}{58}$. Rostrum of skull greatly elongated (67.9 per cent. of the total length); its breadth at the maxillary notches one-fourth its length. Length of the symphysis of the mandible one-fifth the length of the skull. Temporal fossæ large and rounded. Palatal grooves and ridge as in *D. delphis*.

Measurements of the skull.—(Type.) Total length, 49.5^{cm}; length of 18378—Bull. 36—11

rostrum, 33.7^{cm}; breadth of rostrum at base, 8.4^{cm}; at its middle, 3.8^{cm}; breadth between orbits, 14.7^{cm}; length of temporal fossa, 7.4^{cm}.

Habitat.—Malabar coast, India.

DELPHINUS CAPENSIS Gray.

(Plate 12, fig. 1.)

See page 58.

DELPHINUS ROSEIVENTRIS Wagner.

(Plate 13, figs. 1 and 2.)

(Description from Hombroun and Jacquinet's figure and Jacquinet and Pucheran's description.)

Size small. Form stout. Forehead rather abruptly sloping; beak long (one-eleventh the total length). Dorsal fin large, broad, and not strongly recurved above; its vertical height above one-ninth the total length. Pectoral fin narrow, and not deeply emarginate posteriorly; its length equal to that of the mouth.

Back, tail, and fins, beak and margin of lower jaw black or dark gray; under parts pale rose-color; lower half of side white tinged with yellowish. A circle of black surrounds the eye, from which a band extends forward to meet its fellow of the opposite side. A broad pale-gray band from the base of the pectoral fin to the eye.

Teeth ⁴⁸/₄₈. Skull similar to that of *D. longirostris*, but much smaller. Length of rostrum about 65 per cent. of the total length. Intermaxillæ high and convex. Lateral grooves of the palate shallow, disappearing near the distal end. Vomer occupying about one-third of the median line of the palate. Temporal fossæ large and depressed.

Measurements of the exterior (from Jacquinet and Pucheran).—Total length, 46.5 inches (118^{cm}); tip of beak to eye, 8.7 inches (22^{cm}); to base of dorsal fin, 19.9 inches (50.5^{cm}); to base of pectoral fin, 12.2 inches (31^{cm}); length of pectoral fin (along anterior border), 8.9 inches (22.6^{cm}); height of dorsal fin, 4.9 inches (12.5^{cm}).

Measurements of the skull.—(a3026, Paris Museum. Type.) Total length, 37.5^{cm}; length of rostrum, 24.4^{cm}; breadth of rostrum at base, 7.1^{cm}; at its middle, 3.9^{cm}; breadth between orbits, 12.7^{cm}; length of temporal fossa, 6.1^{cm}.

Habitat.—Molucca Sea and Torres Strait.

5. PRODELPHINUS Gervais.

Rostrum long and narrow, or as broad as in *D. delphis*. Rostral portion of intermaxillæ convex. Pterygoid bones in contact. No lateral grooves on the palate. Symphysis of mandible short. Teeth small, acute, numerous, 37 to 52. Vertebrae, 69 to 76.

Head with a distinct elongated beak. Dorsal and pectoral fins falcate (?the former triangular in *P. frenatus*). Color black or gray above, light below, with spots or longitudinal bands.

PRODELPHINUS CÆRULEO-ALBUS (Meyen).

(Plate 14, figs. 1 and 2.)

Head rounded and much arched. Snout very flat, longer than in *D. delphis* and less compressed; lower jaw protruding a little beyond the upper jaw. Pectoral and dorsal fins pointed and not deeply emarginate behind.

Teeth $\frac{50}{50}$, conical, pointed, and curved inward. Vertebrae: C. 7; D. 14; L. and Ca. 52+. Skull similar to that of *P. euphrosyne*, but with small temporal fossæ, which are directed upward.

Back and forehead dark steel blue. A very dark blue stripe starts from the dorsal fin, and, passing forward, ends abruptly in front. A narrow blue stripe on the sides from the eye to the vent, expanded at the posterior end. Pectoral fin blue-gray, connected by a colored band with the ring which surrounds the eye. Belly, snout, and other parts of the body white. (Meyen.)

Habitat.—Coast of South America, near the mouth of the Rio de la Plata.

PRODELPHINUS EUPHROSYNE (Gray).

(Plate 15, figs. 1 and 2.)

Body robust; snout long; dorsal fin high and falcate; pectoral fins small.

Upper parts black; sides blackish; margins of the jaws blackish, their extremity entirely black; throat and belly white; circumference of the eye black. A narrow black band (broadest at the extremities) from the eye to the vent, with a branch given off above the base of the pectoral fins and running a short distance downwards and backward. A band of white, broadest in the middle, separates the lateral black band from the dark color of the sides above; another and broader black band extends from the eye to the base of the pectoral fin and has along its center a white area which communicates with the white of the throat immediately below the eye. Fins black, with a narrow line of white on their anterior margin (sometimes absent).

Teeth $\frac{45}{44}$. Vertebrae: C. 7; D. 15; L. 22; Ca. 32 = 76.

Measurements of the exterior.—Total length (on the curves), 209.7^{cm}; tip of beak to the anterior base of the dorsal fin, 93.2^{cm}; breadth of flukes, 42^{cm}; length of anterior margin of pectoral fin, 30.5^{cm}. (Pucheran: *D. marginatus*.)

Measurements of the skull.—(*Mus. d'Hist. nat.* Type of *D. marginatus*.)

tus ♂.)—Total length, 47.5^{cm}; length of beak, 29.2^{cm}; breadth of same at the middle, 6.3^{cm}.

Habitat.—Atlantic Ocean; South Greenland (*Brown*); Shetland and Orkney Islands (*Bell*); Dieppe; mouth of Orb River; ? Mediterranean (*Mus. d'Hist. nat.*); Jamaica (*Royal Victoria Hosp., Netley*); between St. Paul and Ascension Islands (*Lütken*); South Africa (*Flower*).

PRODELPHINUS (?) LATERALIS (Peale).

(Plate 15, fig. 3.)

Form thick; snout small; body much compressed behind the dorsal fin. Color light purplish-gray; beneath white. A dark lateral line, edged with spots, separates the colors of the upper and under parts of the body; a separate line, paler in color, branches from the lateral line opposite the pectoral fins and passes downwards and backward; another connects the eyes and pectoral fins; snout black; fins black. (Peale.)

Total length, 7 feet 6 inches.

Teeth $\frac{41-41}{41-41}$. (Cranial characters unknown.)

Habitat.—Pacific Ocean, lat., 13° 53' N.; long., 161° 22' W.

PRODELPHINUS (?) PLAGIODON (Cope).

(Plate 18, figs. 1 and 2.)

General form like that of *Delphinus delphis*. Dorsal fin high and strongly recurved; a line joining the center of its base and its extremity makes an angle of 45 degrees with the longitudinal axis of the body; anterior margin straight in the lower three-fourth, then rather strongly curved backward; the concavity of the posterior margin forms an arc of a circle. Pectoral fins broad at the base. Beak stout; the depth of the jaws taken together, at the middle, about one-third greater than their breadth; length of beak about one-seventeenth the total length.

Back, head, margin of lower jaw, fins, and tail dark purplish gray which becomes lighter on the sides and shades into the white of the lower half of the same and of the belly. Dark-colored upper half of the body and the fins spotted with white or light gray; light-colored lower half of the body with prominent oblong spots of dark gray. Largest spots about 18^{mm} long.

Teeth $\frac{37}{34}$. Skull very similar to that of *P. doris*, but larger (total length 45.9^{cm}). (See p. 67.) Vertebrae: C. 7; D. 14; L. 19; Ca. 28-29 = 68-69.

Measurements of the exterior.—(U. S. National Museum, No. 15030, ♂.) Total length, 84.9 inches (215.7^{cm}); length of mouth, 11 inches (28.0^{cm}); extremity of snout to dorsal fin, 13.3 inches (33.7^{cm}); length of pectoral fin, 11.9 inches (30.4^{cm}); vertical height of dorsal fin, 9.5 inches (24.1^{cm}); breadth of flukes, 20.7 inches (52.7^{cm}).

Measurements of the skull.—Total length, 45.9^{cm}; length of rostrum, 27.4^{cm}; breadth of rostrum at its base, 10.9^{cm}; at its middle, 5.8^{cm}; breadth, between orbits, 18.6^{cm}; length of temporal fossa, 8.4^{cm}.

Habitat.—Atlantic coast of United States; Cape Hatteras; Gulf of Mexico (*U. S. National Museum*).

PRODELPHINUS MALAYANUS (Lesson).

(Plate 16, figs. 1 and 2.)

Blowhole placed a little behind the line of the eyes, which are very small. Head large and rounded, very convex on the forehead, which slopes rapidly. A deep furrow at the base of the beak, which is narrow and elongated; lower jaw the longer. (Lesson.)*

Color, uniform ashy.

Skull.—(From Celebes. Identified with this species by Schlegel.) Teeth ³⁹/₃₉. Skull like that of the type of *P. attenuatus* (Gray), but absolutely larger, with relatively longer beak and shorter tooth-row.

Measurements of the exterior.—(From Lesson.) Total length, 192.2^{cm}; height of dorsal fin, 21.6^{cm}; length of pectoral fin, 35.1^{cm}.

Measurements of the skull.—(Mus. Pays-Bas, No. 5. Identified with this species by Schlegel.) Total length, 42.5^{cm}; length of rostrum, 26.7^{cm}; breadth of rostrum at base, 9.2^{cm}; at its middle, 4.4^{cm}; breadth of intermaxillæ at same point, 2.1^{cm}; length of temporal fossa, 6.9^{cm}; depth of temporal fossa, 5.2^{cm}.

Habitat.—East Indies.

PRODELPHINUS ATTENUATUS (Gray).

(Plate 17, figs. 1 and 2.)

Color dark on the back, ashy-gray below. (Lütken).

Teeth, ³⁵/₃₇ to ⁴⁴/₄₃. Skull (*D. attenuatus*, Gray, type) closely resembles that of *P. malayanus*. Vertebrae: C. 7; D. 15; L. 21; Ca. 36-38=79-81. (Lütken.)

Measurements of the exterior, ♀. (Lütken.) Total length, 69.1 inches (175.5^{cm}); length from extremity of snout to dorsal, 32.2 inches (81.9^{cm}); length from extremity of snout to pectoral, 15.9 inches (40.3^{cm}); length of snout, 4.6 inches (11.7^{cm}).

Measurements of the skull.—(347b. British Museum. Type of *P. attenuatus*.) Total length, 38.3^{cm}; length of rostrum, 22.9^{cm}; breadth of rostrum at base, 8.7^{cm}; at its middle, 3.8^{cm}; breadth between orbits, 14.7^{cm}; length of mandible, 32.9^{cm}.

Habitat.—Atlantic Ocean, near St. Paul Island (*Lütken*). Cape of Good Hope (*Gray*).

* One of the characters given by Lesson is as follows: "A strong carina, as in certain scombroid fishes, occupied the lateral and posterior parts of the body." The meaning of this is not clear.

PRODELPHINUS FRÆNATUS (F. Cuvier).

(Plate 19, figs. 1 and 2; plate 20, fig. 1.)

Smaller than *P. plagiodon*, which it resembles in coloration.

Color of the back and fins dark, sides lighter, belly white; sides marked with dark spots, the smaller of which are stellate. Dorsal and pectoral fins with small spots (Lütken).

1. ? Variety. Back dark greenish-gray, sharply separated from the white of the belly. A dark line from the snout to the pectoral fin, below which there are dark streaks and spots on the ground-color (Lütken).

2. ? Variety.—General form like that of *P. plagiodon*. "Dorsal fin high, rather acute at the tip. Black, sides with minute white specks; the sides of the body above the base of the pectoral to the base of the tail blackish gray, which color is obliquely extended as a lunate band from behind the vent to the back near the base of the tail." (Gray, *D. punctata*, Catalogue, p. 399.)

3. ? Young.—Form stout; dorsal fin triangular, in the middle of the back; pectoral fins long and narrow; flukes very broad.

Back black, which color becomes paler on the sides. Belly white as far as the middle of the tail. Head black above, ashy on the sides; a band of deeper tint extends from the corner of the mouth to beyond the eyes. (F. Cuv., *D. frænatus*, Hist. nat. des Cétacés, p. 155.)

Teeth, ³⁸/₃₇. Vertebrae: C. 7; D. 14; L. 16–18; Ca. 31–33=70. Skull like that of *P. plagiodon*, but smaller.

Measurements of the exterior (Lütken), ♂.—Total length, 73.7 inches (187.2^{cm}); extremity of snout to dorsal fin, 33.8 inches (85.8^{cm}); extremity of snout to pectoral fin, 15.4 inches (39^{cm}).

(*D. punctatus*, Gray, Catalogue, p. 299.) ♀. End of snout to tip of tail, 72 inches (182.9^{cm}); to blowhole, 12 $\frac{7}{8}$ inches (32.7^{cm}); to eye, 12 $\frac{7}{8}$ inches (32.7^{cm}); to dorsal fin, 32 $\frac{1}{4}$ inches (81.9^{cm}).

(*D. frænatus*, F. Cuv., Hist. nat. des Cétacés, p. 156.) Total length, 57 inches (146.2^{cm}).

Measurements of the skull.—(No. a3033, Paris Museum. *P. frænatus*, Type.) Total length, 37.6^{cm}; length of rostrum, 21.8^{cm}; breadth of rostrum at its base, 8.9^{cm}; at its middle, 5.2^{cm}; breadth between orbits, 16.4^{cm}; length of temporal fossa, 7.1^{cm}.

Habitat.—Atlantic Ocean; Indian Ocean; Cape Verde; St. Helena; Fernando Po (*Flower*); Madagascar.

PRODELPHINUS LONGIROSTRIS (Gray).

(Plate 20, fig. 2.)

Back and fins dark gray, with very small, irregular blotches of lighter gray. Belly white, with irregular, more or less stellate, spots of dark gray. (U. S. Nat. Mus.)

Vertebrae: C. 7; D. 14; L. 18; Ca. 34=73.

Teeth, ⁵²/₅₂. Skull small. Rostrum very long (two thirds the total length), depressed and broad (at the middle about one third the breadth at the orbits). Triangular area in front of nares short and only slightly depressed. Temporal fossae very small and rounded, their length equal to the distance between the ante- and post-orbital processes of the frontal. Zygomatic process of squamosal short. Palate with traces of lateral grooves; vomer visible in the median line.

Measurements of the skull.—(No. 12, Mus. Pays-Bas. Type of *D. longirostris*, Gray.) Total length, 42^{cm}; length of rostrum, 28^{cm}; breadth of rostrum at base, 7.5^{cm}; at its middle, 4.6^{cm}; breadth between orbits, 14^{cm}; length of temporal fossa, 5^{cm}.

Habitat.—Cape of Good Hope (*type*); between Panama and the Galapagos Islands (*U. S. Nat. Mus.*); Australia (*Copenhagen Mus.*).

6. TURSIO Wagler.

Rostrum long, broad, tapering and flat. Rostral portion of intermaxillae flat. Pterygoid bones separate, the inner margins parallel. Symphysis of mandible short. Teeth small, acute, and numerous, 43 to 44.

Head with a short, but distinct narrow beak (nearly in the same plane with the forehead in *L. peronii*). *No dorsal fin.* Pectoral fins falcate. Caudal ridges prominent. Color black above, white below, with sharply defined borders.

TURSIO PERONII (Lacépède).

(Plate 21, figs. 1 and 2.)

Body thickest about opposite the pectoral fin; from thence it tapers gradually to the flukes and rather abruptly toward the end of the beak. Beak short, and nearly in the same plane with the forehead. Lower jaw slightly longer than the upper. Pectoral fins and flukes shaped like those of *Delphinus delphis*.

Upper part of head, back, and flukes of a uniform black color. Lower half or third of sides, the snout, lower third of forehead and pectoral fins pure white. The two colors meet abruptly on the sides and do not commingle. A broad black spot on the upper posterior margin of the pectoral fins (Bennett); sometimes absent (?).

Teeth, ⁴³/₄₃. Bones of skull thin and light. Rostrum broad and flat, extremity rounded off; the margins beveled in the distal half. Its length slightly exceeds one-half the total length. Its breadth at the middle exceeds one-fourth its length. Prenarial triangular area long and but slightly concave. Intermaxillae not touching in the median line; most widely separated distally. Central part of mandibular symphysis raised above the level of the inferior margin of the mandible;

symphysis keeled. Projection of maxilla inclosing the maxillary notch externally rounded off.

Measurements of the exterior (from Lesson).—Total length, 71.8 inches (184.1^{cm}); length from extremity of snout to pectoral fin, 23.2 inches (59.5^{cm}); length of pectoral fin, 12.1 inches (31.1^{cm}); length of mouth, 10.6 inches (27.1^{cm}); breadth of flukes, 16.9 inches (43.3^{cm}).

Measurements of skull.—(3029, R. Coll. Surg. Tasmania.) Total length, 44^{cm}; length of rostrum, 11.2^{cm}; breadth of rostrum at its base, 6.1^{cm}; at its middle, 3.6^{cm}; length of temporal fossa, 6.9^{cm}; breadth between hinder margins of temporal fossa, 16^{cm}.

Habitat.—Seas about Cape Horn; New Zealand; New Guinea (*Quoy*); Tasmania.

TURSIO BOREALIS (Peale).

(Plate 22, figs. 1 and 2.)

Form slender. Snout short, distinct. Flukes small. Lower jaw longer than the upper and curved upwards at the extremity.

Color black, except in the following regions, where it is white: Extremity of lower jaw; a large lozenge-shaped area between the pectoral fins and a line extending thence to the flukes. Lower side of flukes clouded with white. Eyes dark brown.

Teeth, ⁴⁴/₄₇. Skull like that of *L. peronii*, but the mandible more slender and the symphysis of the same not keeled. The projection of the maxilla which bounds the maxillary notch externally pointed. Super-orbital plate of maxilla and frontal bone very thin. Rostrum tapering distally to a sharp termination, its breadth at the middle somewhat less than one-fourth its length.

Measurements of the exterior.—(From Mr. Dall's MS. notes.) Total length, 97 inches (246.4^{cm}); distance from extremity of snout to pectoral fin, 25 inches (63.5^{cm}); length of pectoral fin (along anterior margin), 12 inches (30.5^{cm}); breadth of flukes, 16 inches (40.6^{cm}).

Measurements of the skull.—(National Museum, 8160. Cape Mendocino, Cal. ♀.) Total length, 43.7^{cm}; length of rostrum, 24^{cm}; breadth of rostrum at its base, 11^{cm}; at its middle, 5.6^{cm}; breadth between orbits, 17.6^{cm}; length of temporal fossa, 7.1^{cm}.

Habitat.—North Pacific Ocean; California (*Dall*); Japan (*Hilgendorf*).

7. LAGENORHYNCHUS Gray.

Rostrum large and broad. Rostral portion of intermaxillæ flat (somewhat convex in *obliquidens* and *electra*). Pterygoid bones in contact or separate. Symphysis of mandible short. Teeth variable in size, 22–45. Vertebrae, 73 to 92.

Head with a short, plowshare-like beak (not distinctly marked off from the forehead in *obseurus*). Dorsal and pectoral fins moderate, falcate. Caudal ridges very prominent. Sides with two areas of light color separated by irregular, oblique dark bands.

LAGENORHYNCHUS ACUTUS Gray.

(Plate 23, figs. 1 and 2.)

Form stout; greatest girth of the body anterior to the middle of its length. Forehead gradually sloping; beak very short, a mere rim; a depression between it and the forehead on either side of the head; dorsal fin high and recurved, and attenuated in the distal half. Pectoral fins broad at the base, pointed. Flukes large; caudal ridges very strongly developed.

Upper jaw, forehead, back, and fins black; sides of head and body gray. On the upper part of the sides of the tail the gray color passes into dusky yellowish; lower down on the sides, below the dorsal fin, an oblong area of white. A narrow black band extends along the sides from the base of the flukes to about the line of the dorsal fin (? sometimes absent); another line of black extends from the base of the pectoral fins to a point between the eye and the corner of the mouth; the eye is surrounded by a circle of black, from which a line extends forward to the beak; the vent is in a small black area. The base of the flukes inferiorly and the adjacent margin of the tail are whitish. The margin of the lower jaw is sometimes black.

Teeth $\frac{35}{37}$. Vertebrae: C. 7, D. 15, L. 19, Ca. 39=80. Skull broad and massive; rostrum broad, its length one-half the total length of the skull. Proximal expanded portion of the maxillæ broad (breadth across post-orbital processes of frontal equal to length of rostrum). Premaxillæ flat, their outer margin sinuate. Temporal fossæ elongate and extending obliquely upward. Pterygoid bones in contact; large, with lateral keels and obtuse crests, the postero-internal free edge transverse and not strongly emarginate; vomer appearing in the center of the palate as a ridge about 5^{cm} long; it is joined by a linear slip of the intermaxillæ, which extends thence along the distal half of the palate to the extremity of the rostrum, becoming broader distally.

Measurements of the exterior (from Duguid).—Total length (along the back), 99 inches (251.5^{cm}); extremity of snout to pectoral fin, 16 inches (40.6^{cm}); to dorsal fin, 37 inches (93.9^{cm}); vertical depth of dorsal fin, 13 inches (33^{cm}); length of pectoral fins, 13 inches (33^{cm}); breadth of flukes, 25 inches (63.5^{cm}).

Measurements of the skull.—(U. S. National Museum, 14244, Cape Cod). Total length, 42.5^{cm}; length of rostrum, 21.6^{cm}; breadth of rostrum at base, 11.4^{cm}; at its middle, 7.6^{cm}; breadth between orbits, 21.6^{cm}; length of temporal fossa, 8.4^{cm};* depth of temporal fossa, 4.5^{cm}.

Habitat.—North Atlantic Ocean; North Sea; Faroe Islands; Greenland; coast of the United States, Cape Cod.

* Rather large; mean 7.9^{cm}.

LAGENORHYNCHUS FITZROYI (Waterhouse).

(Plate 24, fig. 1.)

Body anteriorly somewhat depressed, posteriorly compressed; head conical, arched above; the lower lip projecting beyond the upper; eye placed above and behind, but near the angle of the mouth; breathing-vent situated in the same line as the eyes, supposing a circle to be taken round the head.

Upper parts of the body black, under parts pure white, the two blended into each other by gray; extremity of snout, a ring around the eye, the edge of the under lip, and the tail-fin black; dorsal and pectoral fins dark gray; a broad gray mark extends from the angle of the mouth to the pectoral fin, above which the white runs through the eye and is blended into gray over the eye; two broad deep gray bands are extended in an oblique manner along each side of the body, running from the back downwards and backwards; iris of eye dark brown.

Teeth $\frac{29}{27}$ slightly curved and conical. (Waterhouse.)

Measurements of the exterior.—Total length (along curve of back), 5 feet 4 inches (162.9^{cm}); tip of muzzle to dorsal fin, 2 feet 6 inches 5 lines (77.3^{cm}); length of mouth, 7 inches 9 lines (19.7^{cm}); height of dorsal fin, 6 inches 4 lines (16.1^{cm}); length of pectoral fin (along anterior margin), 1 foot $\frac{23}{8}$ inches (37.3^{cm}); breadth of flukes, 1 foot 4 inches 5 lines (11.2^{cm}).

Habitat.—St. Joseph's Bay, Patagonia, lat. 42° 30' S.

LAGENORHYNCHUS CRUCIGER (d'Orbigny and Gervais).

(Plate 25, figs. 1 and 2.)

Beak short, only slightly marked off from the convexity of the forehead.

Muzzle to the corner of the mouth, forehead, back, dorsal fin, tail and pectoral fins black. On the sides, from the eye and base of the pectoral fins to the tail, a broad black band. This band is broadest above the base of the pectoral fin, and decreases in width posteriorly until a point about opposite the anus is reached, after which it again increases in width and joins the black of the tail. Between the median and lateral black bands and on the belly the color is white, more or less pure. (D'Orbigny and Gervais.)

Teeth $\frac{28}{28}$ skull smaller than that of *L. acutus*, but similar in proportions. Rostral portion of premaxillæ flat, not twisted into a vertical position at the distal extremity; their outer margins straight; triangular area high, flat, and smooth; temporal fossæ moderate, oval, directed backwards; pterygoid bones in contact in the median line, moderate, very short antero-posteriorly, not keeled laterally; the conjoint postero-internal free margin transverse, as in *L. acutus*; vomer extending along three-fourths of the rostrum, appearing on the palate as a narrow ridge.

Measurements of the skull.—(Mus. d'Hist. Nat., Paris. No. a 3045. Type.) Total length, 34.9^{cm}; length of rostrum, 17.8^{cm}; breadth of rostrum at the base, 10.7^{cm}; at its middle, 6.6^{cm}; breadth of intermaxillæ at same point, 4.1^{cm}; breadth between orbits, 17.1^{cm}; length of temporal fossa, 6.9^{cm}; depth of temporal fossa, 4.1^{cm}.

Habitat.—Seas south of Cape Horn; Pacific Ocean.

LAGENORHYNCHUS SUPERCILIOSUS (Schlegel).

(Plate 25, fig. 3.)

Teeth $\frac{29}{30}$. Vertebrae: C. 7, D. 13, L. 20, Ca. 33=73. Skull similar to that of *L. obliquidens*, but smaller. Pterygoid bones (apparently) in contact in the median line. Intermaxillæ not broad proximally, flat in the rostral portion; outer margins wavy. Length of rostrum exceeding one-half the total length of the skull (54.5 per cent). Temporal fossæ moderate, elliptical, directed obliquely upwards.

In the skeleton the neural arches become obsolete at the sixtieth vertebra; the transverse processes become obsolete at the fifty-fifth vertebra.*

Measurements of the skull.—(Mus. Pays-Bas. No. 40.) Total length, 35.6^{cm}; length of rostrum, 19.4^{cm}; breadth of rostrum at base, 8.5^{cm}; at the middle, 5.4^{cm}; breadth of intermaxillæ at same point, 3.2^{cm}; breadth between orbits, 14.0^{cm}; length of temporal fossa, 6.8^{cm}; depth of temporal fossa, 4.5^{cm}.

Habitat.—Cape of Good Hope.

LAGENORHYNCHUS ALBIROSTRIS Gray.

(Plate 26, figs. 1 and 2.)

Form like that of *L. acutus*, but with more swollen forehead, more attenuated and more strongly reclined dorsal fin and larger pectoral fins.

Forehead (except its base), back, and fins, black; sides, grayish black; belly, white. Base of forehead, beak, and mandible white, more or less tinged and shaded with gray. Three irregular areas of white on each side, one of which is above the base of the pectoral fin, the second below the insertion of the anterior margin of the dorsal fin, and the third below the insertion of the posterior margin of the same; all considera-

* As stated on page 92, Schlegel identifies this species with Lesson and Garnot's *D. superciliosus*, but the reasons for so doing are not apparent to the writer. Lesson and Garnot's description of the exterior of their animal is substantially as follows: Length 4 feet 2 inches (French); 30 teeth in the upper pair, 29 in the lower. Back, head, and muzzle black. Dorsal (situated in the middle of the back), pectoral, and caudal brown. Sides and belly white like satin. A white band passes above the eye and extends to the forehead; a white blotch near the tail. (Zool. Voy. Coquille, I, pt. 1, 1826, p. 181.)

bly mottled with black, gray, and brown. A similar light area in the median line of the back behind the blow-hole and another on the tail, near the insertion of the flukes; under side of fluke grayish.

The light areas of the sides are sometimes indistinct, or absent.

Teeth $\frac{26}{26}$; Vertebrae: C. 7, D. 15(-16), L. 23(-24), Ca. 43(-45)=88 (-92). Skull similar to that of *L. acutus*. Rostrum short, broad, and pointed; its breadth at the base two-thirds its length. Intermaxillae broad and flat, their outer margin convex. Temporal fossae moderate, elliptical, not strongly directed upward.

Measurements of the exterior.—(♂, young. From Clark.) Total length, 65½ inches (166.4^{cm}); distance from extremity of snout to base of dorsal fin, 30 inches (76.2^{cm}); vertical height of dorsal fin, 6 inches (15.2^{cm}); length of pectoral fin, 12 inches (30.5^{cm}); breadth of flukes, 15 inches (38.1^{cm}).

Measurements of the skull.—(N. N. Mus. Sci. and Art, Edinburgh.) Total length, 46^{cm}; length of rostrum, 22.9^{cm}; breadth of same at base, 15.2^{cm}; at its middle, 8.7^{cm}; breadth between orbits, 23.5^{cm}; length of temporal fossa, 7.9^{cm}.

Habitat.—North Atlantic Ocean; Baltic Sea, Kiel (*Claudius*); North Sea; Irish Channel; Farøe Islands; Greenland (*Reinhardt*); Davis Strait (*Eschricht*).

LAGENORHYNCHUS OBLIQUIDENS GIL.

(Plate 27, figs. 1 and 2.)

In form, and also probably in coloration, nearly identical with *L. acutus*. "The animal is rather thick in proportion to its length; black above, with a strongly falcate dorsal. Below, white, to the edge of the patch passing from the lower lip below the pectorals and terminating a short distance behind the vent. A broad gray smonch on each side above the line of the black color, and interrupted about the middle of the animal on each side; the edges of the gray are ill-defined. The posterior edges of the pectorals and dorsal are also grayish." (Dall.)

"Greenish black on the upper surface, lightened on the sides with broad longitudinal stripes of white, gray, and dull black, which in most examples run into each other, but below it is of a pearly or snowy white. The posterior edge of the dorsal fin is tipped with dull white or gray, and sometimes the flukes are marked in the same manner." (Scammon.)

Teeth $\frac{31}{31}$. Vertebrae: C. 7, D. 13, L. 24, Ca. 30=74.

Skull similar in general appearance to that of *L. acutus*, but somewhat less broad in proportion to its length (the width between the orbits is less than the length of the rostrum.) Premaxillae more or less rounded, their outer margins not strongly sinuate. Temporal fossae large and rounded. Pterygoid bones not in contact in the median line, widely

divergent posteriorly; their postero-internal free margin sigmoid in outline. Vomer visible in the median line of the palate along almost the entire distal half of the same, being replaced by the interno-inferior edge of the intermaxillæ only at the extremity of the rostrum.

Measurements of the exterior.—(From Dall.) Total length, 87 inches (221^{cm}); breadth of flukes, 24 inches (61^{cm}); extremity of snout to anterior edge of dorsal fin, 36 inches (91.4^{cm}).

Measurements of the skull.—(U. S. National Museum, n. n., adult.) Total length, 41.3^{cm}; length of rostrum 20.9^{cm}; breadth of rostrum at base, 11.8^{cm}; at its middle, 8.1^{cm}; breadth between orbits, 19.2^{cm}; length of temporal fossa, 8.4^{cm}; depth of temporal fossa, 6.8^{cm}.

Habitat.—North Pacific Ocean; Monterey, California; Puget Sound (U. S. Nat. Mus.).

LAGENORHYNCHUS THICOLEA Gray.

(Plate 24, fig. 2.)

Teeth $\frac{45}{42}$. Rostrum long and narrow, its breadth at the middle about one-fourth its length; intermaxillæ flat and narrow; their combined breadth at the middle of the beak contained seven and a half times in the length of the beak. Temporal fossæ small and rounded. Margins of proximal half of rostrum thickened; the superior surface of the maxillæ in this part at a different angle from the plane of the distal half of the rostral part of the maxillæ, which looks downward and forward.

Measurements of the skull.—(British Museum, 934a. Type.) Total length, 37.5^{cm}; length of beak, 21^{cm}; breadth of beak at its base, 9.7^{cm}; at its middle, 5.3^{cm}; breadth of intermaxillæ at same point, 2.8^{cm}; breadth between orbits, 16.3^{cm}; length of temporal fossa, 5.6^{cm}.

Habitat.—? West coast of North America.

LAGENORHYNCHUS ELECTRA Gray.

(Plate 28, figs. 1 and 2.)

For exterior, see p. 102.

Teeth $\frac{29}{23}$. Skull massive; rostrum broad, long, and flat, its length always slightly exceeding one-half the total length of the skull. Intermaxillæ slightly convex on the rostrum, except in the distal third of the latter, where their outer moiety is flat; their outer margins are sinuate. Mesethmoid cartilage ossified in front of the nares to a point anterior to the maxillary notches, forming part of the superior surface of the skull. Temporal fossæ moderate and squarish; upper tooth-row short, about five-sevenths the length of the rostrum. Vomer appearing in the median line of the palate opposite the middle tooth of the upper tooth-row. Outline of combined postero-inferior free margins of pterygoid bones strongly concave. Rami of mandible deep in the proximal half and slender anteriorly; the region of the symphysis obviously deeper than

the part of the ramus which immediately succeeds it; aveolar border flat.

Measurements of the skull.—(British Museum, 359a. *L. electra*, Type.) Total length, 45.7^{cm}; length of rostrum, 24.35^{cm}; breadth of rostrum at base, 13.95^{cm}; at its middle, 9.2^{cm}; breadth of intermaxillæ at same point, 6.1^{cm}; breadth between orbits, 25.2^{cm}; length of temporal fossa, 9.4^{cm}; depth of temporal fossa, 5.5^{cm}.

Habitat.—Indian Ocean; tropical Pacific Ocean; Hawaii.

LAGENORHYNCHUS OBSCURUS (Gray).

(Plate 29, figs. 1 and 2.)

Form apparently like that of *L. acutus*, but the snout longer and narrower and not distinctly divided off from the head.

“Fins moderate and falcate; neck and belly white; a black band from the angle of the mouth to the pectoral fins; lateral oblique streaks of white; otherwise entirely black” (Gray).

Teeth, $\frac{32}{30}$. Skull similar to that of *L. obliquidens*, but smaller. Pterygoid bones in contact in the median line. Intermaxillæ broad proximally, more or less convex distally; outer margins straight. Length of rostrum slightly exceeding one-half the total length of the skull. Temporal fossæ moderate, elliptical; their length always exceeding the width of the beak at the middle.

Measurements of the exterior.—(British Museum, type skin, 41, 1733).* Total length, 65 inches (165.1^{cm}); extremity of snout to corner of mouth, 8.7 inches (22.1^{cm}); to base of pectoral fin, 16.5 inches (41.9^{cm}); to base of dorsal fin, 31.75 inches (80.6^{cm}); vertical height of dorsal fin, 7.5 inches (19^{cm}); length of pectoral fin, 11 inches (27.9^{cm}); breadth of flukes, 15.75 inches (40^{cm}).

Measurements of the skull.—(British Museum, 354 a.) Total length, 36.8^{cm}; length of rostrum, 20.1^{cm}; breadth of rostrum at base, 9.3^{cm}; at its middle, 6.1^{cm}; breadth of intermaxillæ at same point, 3.3^{cm}; breadth between orbits, 15.5^{cm}; length of temporal fossa, 6.7^{cm}; depth of temporal fossa, 4.8^{cm}.

Habitat.—Cape of Good Hope (*Gray*); Chili (*Flower*); New Zealand (*Hector*, ? another species).

8. SAGMATIAS Cope.

Rostrum moderate, broad and tapering. Rostral portion of intermaxillæ flat. Triangular area in front of superior nares elevated above the plane of the surrounding parts. Pterygoid bones short, scarcely or not touching in the median line. Teeth small, 32.

Exterior and skeleton not known.

* This mounted skin is very much warped from its original shape, and the measurements are, therefore, of doubtful value.

SAGMATIAS AMBLODON Cope.

(Plate 30, fig. 1.)

Only the skull known.

Beak one-half the length of the entire cranium, and one-half as broad at the base as long. Temporal fosse large and rounded. Intermaxillæ flat; they occupy rather more than one-half the breadth of the beak at the middle. Pterygoids short, scarcely or not touching in the median line.

Teeth $\frac{32}{32}$ (much worn in the type, but probably originally conical and acutely pointed).

Measurements of the type-skull.—Total length, 37.2^{cm}; length of beak, 18.5^{cm}; breadth of beak at base, 9.7^{cm}; at its middle, 6.2^{cm}; length of tooth line, 15.7^{cm}; breadth between orbits, 16.7^{cm}; temporal fosse, 7.9^{cm} × 6.1^{cm}.

Habitat unknown.

9. FERESA Gray.

Rostrum half the total length; very broad. Rostral portion of intermaxillæ flat; their inner margins separate throughout. Mandible deep between the angle and coronoid process, slender in the center of the rami and obtusely keeled at the symphysis. Teeth few and large, 11 to 12. Tooth-line extending along only the anterior two thirds of the rostrum.

Skeleton and exterior unknown.

FERESA INTERMEDIA Gray.

(Plate 30, fig. 2.)

Exterior unknown.

Teeth $\frac{11}{10}$ to $\frac{12}{13}$. Skull small but massive. Rostrum one-half the total length; very broad. Intermaxillæ moderately expanded proximally; very broad distally (they occupy rather more than two-thirds of the breadth of the rostrum at its middle); rostral portion flat (a wide space between their inner edges, in the median line of the rostrum, in which the vomer is visible nearly to the end of the rostrum). Superior nares small; the transverse diameter less than one-fourth the breadth across the orbits; narrowed antero-posteriorly by the sloping forward of the mesethenoid.

Teeth very large; upper tooth-line occupying only about two-thirds the length of the beak. Orbits short. Temporal fossæ moderate and squared. Mandible deep between the angle and coronoid process, slender opposite the middle of the tooth-line, and obtusely keeled at the symphysis, as in *Lagenorhynchus electra*.

Measurements of the skull.—(British Museum, 362a. Type of *F. inter-*

media.) Total length, 36.2^{cm}; length of rostrum, 17.3^{cm}; breadth of rostrum at base, 12^{cm}; breadth of rostrum at middle, 8.9^{cm}; breadth of intermaxillæ at same point, 6.1^{cm}; breadth between orbits, 21.1^{cm}; length of temporal fossa, 9.2^{cm}; depth of temporal fossa, 7.3^{cm}.

(British Museum, 1672a. Type of *F. attenuata*.) Total length, 35^{cm}; length of rostrum, 16.8^{cm}; breadth of rostrum at base, 10.7^{cm}; breadth of rostrum at middle, 7.5^{cm}; breadth of intermaxillæ at same point, 5.2^{cm}; breadth between orbits, 20.1^{cm}; length of temporal fossa, 8.4^{cm}; depth of temporal fossa, 7.4^{cm}.

Habitat.—South seas.

10. CEPHALORHYNCHUS Gray.

Skull small. Rostrum moderate, broad. Rostral portion of intermaxillæ flat; proximal end beveled off at the sides of the superior nares. Symphysis of mandible short. Frontal plates of maxillæ nearly in one and the same plane. Pterygoid bones separate. Teeth small, acute, 25 to 31. Vertebrae, 63 to 65.

Size small. Head conical. Beak not marked off from the forehead. Dorsal fin triangular or ovate. Pectoral fins elliptical (falcate in *albifrons*). Black above, white below; the white of the belly forms a trident-shaped area posteriorly, the lateral tines of which extend upward obliquely on the sides.

CEPHALORHYNCHUS HEAVISIDEI Gray.

(Plate 31, figs. 1 and 2.)

General form like that of *Phocæna*. Mouth small. Pectoral fins elliptical. Dorsal fin triangular. Back, head, tail, and fins black. A large, sharply-defined area of white or pale yellow on the ventral surface of the body, extending from the breast to the vent; expanding posteriorly to form a trident, the lateral tines of which extend backward obliquely on the sides; expanding also anteriorly on the breast and upward behind the base of the pectoral fins.

Teeth $\frac{25}{25}$ to $\frac{30}{30}$. Vertebrae: C. 7; D. 13; L. 15; Ca. 30 = 65. Skull small. Rostrum rather less than one-half as long as the entire skull; broad and with an obtuse termination. Intermaxillæ only slightly expanded proximally, flat distally. Pterygoid bones short and widely separated. Vomer extending nearly to the extremity of the rostrum. Temporal fossæ moderate, rounded, longer than deep.

Measurements of the exterior.—(British Museum. Type-skin, mounted.) Total length, 109.2^{cm}; extremity of snout to corner of mouth, 15.5^{cm}; to base of pectoral fin, 26.7^{cm}; to base of dorsal fin, 51.6^{cm}; vertical height of dorsal fin, 8.2^{cm}; length of pectoral fin, 14.5^{cm}; breadth of flukes, 24.7^{cm}.

Measurements of the skull.—(Mus. d'Hist. nat., Paris, a3061). Total

length, 29.2^{cm}; length of rostrum, 14^{cm}; breadth of rostrum at its base, 7.1^{cm}; at its middle, 5.1^{cm}; breadth of intermaxillæ at same point, 2.8^{cm}; breadth between orbits, 13^{cm}; length of temporal fossa, 6.6^{cm}; depth of temporal fossa, 4.8^{cm}.

Habitat.—Cape of Good Hope.

CEPHALORHYNCHUS ALBIFRONS True.

(Plate 32, figs. 1 and 2.)

Like *C. heavisidei*, but somewhat larger. Dorsal fin low and ovate. Pectoral fins falcate, equal in length to the base of the dorsal. Caudal lobes narrow and directed backwards; deeply emarginate behind.

Nose and forehead pure white, bounded by a crescent of black behind the blowhole, sharply defined in front, but shading off behind to light gray, which is the uniform color of the upper surface of the body. Fins are all darker than the trunk; there is also pure black round the blowhole, cloaca, and vent. The white of the snout extends behind the eye, but the dusky color extends forward beneath the angle of the mouth. The lower aspect is white as far back as the vent, but is crossed by an isthmus of dark gray beneath the pectorals. The white band is continued by two lateral stripes that ascend on the flanks. (Hector.)

Teeth $\frac{31}{31}$. The skull resembles that of *C. heavisidei*, but the rostrum equals one-half the total length, and the pterygoid bones are long and constricted at the base. Length of adult skull, 14 inches.

Measurements of the exterior. (Hector.)—Total length, 51 inches (129.5^{cm}); extremity of snout to dorsal fin, 24 inches (60.9^{cm}); to pectoral fin, 12 inches (30.5^{cm}); length of base of dorsal fin, 8 inches (20.3^{cm}); breadth of flukes, 15 inches (38.1^{cm}).

Habitat.—New Zealand (Hector).

CEPHALORHYNCHUS HECTORI (Van Beneden).

(Plate 33, fig. 1.)

Head conical, elongated; the snout only indistinctly marked off from the forehead. Pectoral fins linear, obtusely pointed. Dorsal fin low, ovate, strongly reclined. Caudal lobes narrow and strongly directed backwards.

Snout, forehead, back, sides, and fins dark gray or black, the latter color most pronounced on the sides. A broad transverse band of gray between the pectoral fins, which is abruptly joined posteriorly by a broad white longitudinal band which extends along the median line of the belly to the vent, behind which it breaks up into a trident-shaped area, the central tine of which continues along the median line of the belly nearly to the flukes, while the lateral tines pass obliquely upward and backward on the sides.

Teeth $\frac{30}{27}$ Vertebrae, C. 7; D. 14; L. 15; Ca. 27=63. Skull like that of *C. heavisidei*, but the pterygoid region contracted at the base; the palatine and pterygoid bones long.

Habitat.—New Zealand.

CEPHALORHYNCHUS EUTROPIA (Gray).

(Plate 33, fig. 2.)

Exterior unknown.

Teeth, $\frac{30}{31}$ Skull larger than that of *C. heavisidei*, which it closely resembles. Length of rostrum exceeding one-half the total length of the skull. Pterygoid bones long, not widely separated in the median line, their inner free margins parallel in the proximal half. Vomer terminating near the middle of the rostrum. Temporal fossæ moderate, squared, *i. e.*, about as deep as long.

Measurements of the skull.—(U. S. National Museum, No. 21167. ?Chili.) Total length, 34.3^{cm}; length of rostrum, 18.7^{cm}; breadth of rostrum at the base, 7.6^{cm}; at its middle, 6.1^{cm}; breadth of the intermaxillæ at the same point, 2.5^{cm}; breadth between orbits, 13.9^{cm}; length of temporal fossa, 6.7^{cm}; depth of temporal fossa, 5.6^{cm}.

Habitat.—Coast of Chili.

11. NEOMERIS Gray.

External and cranial characters like *Phocæna*, but the dorsal fin absent, being replaced by a number rows of small rounded tubercles. Teeth, $\frac{18}{15}$ to $\frac{19}{19}$. Vertebrae, 63. Color black.

NEOMERIS PHOCÆNOIDES (Cuvier).

(Plate 34, figs. 1 and 2.)

Snout rounded; head very convex, rising posteriorly high to the dorsal surface. Back with a longitudinal band of spinous tubercles on the vertebral area, beginning nearly opposite the root of the pectoral, widening to 1.5 inches about the middle, and again contracting and ending narrowly opposite or in line with the vent. No dorsal fin. Pectoral subfalcate. (Murray.)

Color black throughout, except that there is a purplish-red patch on the upper lip and one on the throat (? sometimes absent).

Teeth, $\frac{18}{17}$. Vertebrae, 63. Skull small. Rostrum very short and broad; its length about one-third the total length of the skull, and its breadth about equal to its length.* Intermaxillæ very broad distally, little, or not at all expanded proximally; very high in front of the nares. Vomer visible on the palate near the extremity of the rostrum.

* The rostrum is longer and narrower in Schlegel's specimen from Japan.

Pterygoid bones very short and widely separated. Temporal fossæ much longer than deep.

Measurements of the exterior (from Murray, *N. kurrachiensis*).—Total length 45 inches (114.3^{cm}) [along the curves, 52 inches]; extremity of snout to pectoral fin, 10 inches (25.4^{cm}); breadth of flukes, 9 inches (22.9^{cm}).

Measurements of the skull.—(Mus. d'Hist. nat., Paris, a3086, type of *N. phocænoides*.) Total length, 18.8^{cm}; length of rostrum, 6.2^{cm}; breadth of rostrum at base, 6.6^{cm}; at the middle, 4.3^{cm}; breadth of intermaxillæ at the same point, 2.5^{cm}; breadth between orbits, 10.4^{cm}; length of temporal fossa, 5.6^{cm}.

Habitat.—Japan; India; Cape of Good Hope.

12. PHOCÆNA Cuvier.

Skull small. Rostrum short and broad. Pterygoid bones small and widely separated. Proximal end of intermaxillæ raised into irregular bosses in front of the nares; rostral portion flat. Symphysis of mandible short. Teeth peculiar; small, compressed, spade-like; the crowns entire or divided into two or three lobes; 16 to 26 in number. Vertebrae, 64 to 98.

Size small. Head conical, not beaked (prolonged into an indistinct beak in *spinipinnis*). Dorsal fin triangular, small (attenuated, strongly reclined in *spinipinnis*); anterior margin sometimes furnished with a number of tubercles or blunt spines. Pectoral fins ovate (falcate in *spinipinnis*). Color never in spots.

PHOCÆNA COMMUNIS Lesson.

(Plate 35, figs. 1 and 2.)

Head sloping; jaws equal in length; mouth longer than one-half the pectoral fin.

Body fusiform, slender. Dorsal fin beginning somewhat in front of the middle of the length, triangular; its anterior margin nearly straight; its posterior margin concave; its vertical height equal to or less than the length of the mouth; the anterior margin sometimes with a row of small tubercles. Pectoral fins irregularly ovate, obtusely pointed. Flukes broad antero-posteriorly.

Head, back, dorsal, pectoral, and caudal fins, and (usually) the margin of the lower jaw dark slate-color or blackish. Sides lighter, the dark color fading gradually and irregularly into the white belly. Sides sometimes tinged with pink or yellowish. The dark color of the margin of the lower jaw often extends backward as an irregular broad band reaching half way to the pectoral. A narrow dark line also extends from the corner of the mouth to the anterior base of the pectoral fin.

Teeth, $\frac{26}{26}$. Vertebrae, C. 7; D. 12 or 13; L. and Ca. 44 to 47; total, 64 to 67.

Rostrum thick, obtusely pointed; its margins shelving; its length between 40 and 47 per cent. of the total length of the skull, and never surpassing the breadth at the orbits. Depth of the temporal fossa contained about two and one-half times in the tooth-line. The latter equal to or more than one-third the length of the skull.

Measurements of the exterior.—(♀ adult.) Total length, 68 inches (172.7^{cm}); length of mouth, 4.75 inches (12.1^{cm}); tip of snout to dorsal fin, 29 inches (73.7^{cm}); length of pectoral fin, 7 inches (17.8^{cm}); vertical height of dorsal fin, 4 inches (10.2^{cm}); breadth of flukes, 12.5 inches (31.7^{cm}).

Measurements of the skull.—Total length, 29.3^{cm}; length of rostrum, 13.7^{cm}; breadth of beak at base, 8.5^{cm}; breadth of the same at its middle, 5.5^{cm}; breadth between orbits, 13.7^{cm}; length of temporal fossa, 6.0^{cm}; height of crown of largest tooth, .

Habitat.—North Atlantic and North Pacific Oceans; North Sea; coast of Europe; Davis Strait to 67° or 69° north latitude (*Brown*); coast of the United States, Maine to New Jersey; Alaska, Glacier Bay; Puget Sound; Mexico, Banderas Bay (*Scammon*). (Ascends rivers.)

PHOCÆNA SPINIPINNIS Burmeister.

(Plate 36, figs. 1 and 2.)

Body fusiform, stout. Head rounded, with a short, not well-defined beak. Lower jaw longer than the upper. Dorsal fin narrow, reclinig, the anterior margin concave and furnished with numerous rugosities, the posterior margin convex. Pectoral fins falcate. Superior and inferior margins of the tail raised into ridges.

Teeth $\frac{16}{17}$ thick. Mouth less than one-third the length of the pectoral fin. Dorsal fin commencing below the middle of the length of the body.

Color black throughout.

Proportions of skull nearly as in *P. communis*, but the tooth-line less than two-thirds the length of the beak.

Measurements of the exterior.—Total length (of the young type; after Burmeister), 64.8 inches (162^{cm}); length of mouth, 3.4 inches (8.5^{cm}); tip of snout to dorsal fin, 36 inches (90^{cm}); length of pectoral fin, 10.4 inches (26^{cm}); height of dorsal fin, 5 inches (12.5^{cm}); breadth of flukes, 15.6 inches (39^{cm}).

Measurements of the skull.—Total length, 29^{cm}; length of beak (to root of malar), 12.2^{cm}; breadth of beak at base, 8.0^{cm}; at the middle, 5.5^{cm}; breadth between postorbital processes of frontal, 16.2^{cm}; length of tooth-line, 7.0^{cm}.

PHOCÆNA DALLII True.

(Plate 37, figs. 1 and 2.)

Head sloping. Lower jaw protruding slightly beyond the upper. Mouth short. Dorsal fin beginning a little behind the juncture of the first and second thirds of the total length; moderately high and falcate, its front edge furnished with faintly-marked tubercles. Pectorals as in *P. communis*. Dorsal and ventral margins of the body, between the vent and the origin of the flukes, raised into prominent thin ridges.

General color black. A cordate area of white occupies the belly and lower half of the sides, from a point in a line with the anterior margin of the dorsal fin to one considerably behind the vent. This area is faintly streaked with very fine dark lines, especially numerous near the median line, but only visible on close inspection. The dorsal fin is tipped with white. Eye blackish.

Teeth $\frac{23}{27}$, very small. Vertebral: C. 7; D. 14 (or 15); L. 27; Ca. 49=97 (or 98).

Skull as in *P. communis*, but the beak relatively shorter and flat, and the temporal fossæ smaller. The maxillaries also shorter proximally, and the mandible less deep between the coronoid process and angle. Nares very large. All the cervicals united, as are also the last four caudals. First thirty caudals with chevron bones. Formula of phalanges as follows: I, 1; II, 6; III, 4; IV, 2. The two distal phalanges of fingers 2 and 3 and the outermost of finger 4 very imperfectly ossified.

Measurements of the exterior.—♂ adult (type). Total length, 72 inches (182.9^{cm}); length of mouth, 3.5 inches (8.8^{cm}); length from tip of snout to beginning of dorsal, 27.5 inches (69.8^{cm}); length of pectoral (anterior margin), 8 inches (20.3^{cm}); vertical height of dorsal, 6 inches (15.2^{cm}); breadth of flukes, 18.5 inches (47^{cm}).

Measurements of the skull.—♂ adult (type). Total length, 33.3^{cm}; length of beak, 14^{cm}; breadth of beak at base, 9.5^{cm}; at middle, 5.7^{cm}; breadth between orbits, 16.5^{cm}; length of tooth-line, 12.7^{cm}; depth of temporal fossa, 2.6^{cm}.

13. ORCELLA Gray.

Rostrum short and broad; rostral portion of intermaxillæ broad.

Pterygoids widely separated from each other. Symphysis of mandible short. Teeth 12 to 14; small, conical, and acute, occupying nearly the whole length of the rostrum. Vertebrae, 62 to 63.

Head globose; beak wanting. Dorsal fin small, falcate. Pectoral fins small, broad at the base, and obtusely pointed. Color slate-gray above, lighter below, with or without irregular streaks.

ORCELLA BREVIROSTRIS Owen.

(Plate 38, figs. 1 and 2.)

Head convex from the blow-hole to the upper lip. Pectoral fins triangular—one-half as broad as long. Dorsal fin rising in the center of the back, comparatively small, falcate, obtusely pointed. "The line of the back is sharp from this fin down to the tail. The ventral line is the same for some inches behind the anus."

"Color dark slaty-blue above, almost black; a little paler below, without any streaks or marks" (Anderson and Sterndale).

Length from snout to caudal notch about 7 feet.

Habitat.—Bay of Bengal; Vizagapatam; Singapore.

ORCELLA FLUMINALIS Anderson.

Like *O. brevirostris*, but with rather smaller, lower, and more falcate dorsal fin. Head less anteriorly bulging. Pectoral fins shorter and broader.

Color pale bluish above, white underneath, with numerous streaks, as in *Grampus griseus* (Anderson and Sterndale).

Length, 7 to 7½ feet.

Habitat.—Irawaddy River, Burmah, 300 to 900 miles from the sea.

14. GRAMPUS Gray.

Rostrum moderate, expanded in front of the maxillary notches, and tapering thence to an obtuse termination. Triangular area in front of the superior nares raised above the level of the surrounding bones, and convex. Rostral portion of the intermaxillæ broad and moderately rounded. Symphysis of mandible short. Pterygoid bones in contact. Teeth 2 to 7, in the mandible only, and confined to the region of the symphysis. Vertebrae, 68.

Head globose, with slightly protuberant lips; beak wanting; mouth oblique. Dorsal fin prominent and falcate. Pectoral fins rather narrow, elongated, and falcate. Color slate-gray, mottled, and very irregularly streaked.

GRAMPUS GRISEUS (Cuvier).

(Plate 39, figs. 1 and 2.)

General form somewhat similar to that of *Globicephalus*. Head globose, with a slight indication of a beak; mouth oblique; lower jaw shorter than the upper. Dorsal fin high and falcate; pectoral fins falcate, elongated. Flukes narrow antero-posteriorly.

Back, dorsal fin and flukes dark gray or blackish, more or less tinged with purple. Pectoral fins blackish and mottled with gray. Head and anterior half of body light gray, varied in hue and tinged with

yellow. Belly grayish white. Body marked with numerous and conspicuous light-colored, irregular, and unsymmetrically-placed striae.

Young.—Dark gray above, grayish white below. Head whitish, strongly tinged with yellow. Side with five or more narrow, vertical, and nearly equidistant lines.

Teeth $\frac{0}{6}$ to $\frac{0}{14}$. Vertebrae: C. 7; D 12; L. 19; Ca. 30 = 68.

Skull massive. Rostrum expanded in front of the maxillary notches, obtusely pointed; its length one-half the entire length of the skull. Intermaxillae moderately convex on the rostrum; the preareal area *elevated*; the spaces between the inner free margin become wider rather suddenly near the extremity of the rostrum. Vomer extending nearly to the extremity of the rostrum, not usually visible on the palate. Pterygoids large and prominent; largely in contact in the median line. Temporal fossae oval, their wall largely covered by the squamosal.

Measurements of the exterior.—Adult ♀. Total length, 126 inches (320^{cm}); length of mouth, 10½ inches (26.7^{cm}); tip of snout to anterior base of dorsal fin, 47 inches; length of pectoral fin, 23¾ inches; vertical height of dorsal fin, 16 inches; breadth of flukes, 29 inches.

Measurements of the skull.—(U. S. National Museum, No. 15890. Adult. Cape Cod, Massachusetts.) Total length, 53^{cm}; length of rostrum, 26^{cm}; breadth of rostrum at base, 20.5^{cm}; breadth of rostrum at its middle, 12.8^{cm}; breadth of intermaxillae at same point, 9^{cm}; breadth between orbits, 34.2^{cm}; length of temporal fossa, 13.3^{cm}.

Habitat.—North Atlantic and North Pacific Oceans; North Sea; Mediterranean; coast of the United States, Cape Cod; Atlantic City, N. J.; Massachusetts; Cape of Good Hope (*G. richardsoni* Gray); California (*G. stearnsii* Dall); Japan (*G. sakamata* Gray).

15. GLOBICEPHALUS Gray.

Rostrum short and very broad. Rostral portion of intermaxillae flat and very broad (sometimes covering the entire anterior half of the rostrum). Symphysis of mandible short. Pterygoid bones large and in contact. Teeth few and large, 7 to 11, confined to the anterior half of the rostrum. Vertebrae, 57 to 60.

Head globular, with a rounded protuberance on the lip; beak wanting; mouth oblique. Dorsal fin very long, low, and thick. Pectoral fins narrow and very long. Color black.

GLOBICEPHALUS MELAS (Traill).

(Plate 40, figs. 1 and 2.)

Size large; form stout. Head globose; forehead protuberant, overhanging the lip in adult individuals; body especially deep opposite the dorsal fin. Pectoral fins very long, slender, and pointed; length about

one-fifth the total length of the body. Dorsal fin on a long base and strongly recumbent, situated anterior to the middle of the length of the body. Caudal ridges prominent, extending respectively to the dorsal fin and to the vent. Flukes large and broad. Mouth oblique.

General color uniform black; a large hastate white area on the breast extending from the line of the corners of the mouth to the base of the pectoral fins; from behind this area a white band, which is much the broadest in the posterior half, extends backwards along the median line to the vent; the whole white area has the general form of an arrow with its head, shaft, and feathers.

Teeth $\frac{10}{10}$. Vertebrae: C. 7; D. 11; L. 13 (-14); Ca. 27(-29) = 58-60. Skull large and massive. Rostrum longer than broad at the base; its breadth at the base slightly less than three-fourths its length. Intermaxillae large and flat; not greatly broader anteriorly than posteriorly; rugose in front; their outer margins not coinciding with the margins of the maxillae except at the extremity of the rostrum; separated in the median line throughout. Superior nares broad transversely and bordered by narrow plates of the intermaxillae. Vomer extending nearly to the extremity of the rostrum. Pterygoid bones large, obtusely keeled, and closely approximated in the median line. Temporal fossae moderate, oval.

Measurements of the exterior (from Bell).—Total length, 182 inches (462.3^{cm}); extremity of snout to corner of mouth, 14.5 inches (36.8^{cm}); to dorsal fin, 55 inches (139.7^{cm}); length of pectoral fin along anterior edge, 50 inches (127^{cm}); greatest breadth of pectoral fin, 11 inches (27.9^{cm}).

Measurements of the skull.—(U. S. National Museum, No. 12100, Cape Cod, Massachusetts.) Total length, 655^{cm}; length of rostrum, 33.4^{cm}; breadth of rostrum at base, 24.1^{cm}; at its middle, 19.4^{cm}; breadth of intermaxillae at same point, 15.4^{cm}; breadth between orbits, 42.3^{cm}; length of temporal fossa, 17.3^{cm}.

Habitat.—Atlantic coast of North America to New Jersey; coast of Europe; Cape of Good Hope; New Zealand.

GLOBICEPHALUS BRACHYPTERUS Cope.

(Plate 41, fig. 1.)

In form and size like *G. melas*. Pectoral fins shorter, their length about one-sixth the total length of the body, or less. Dorsal fin situated far forward, usually at the juncture of the anterior and second fourths of the length of the body.

Color entirely black.

Teeth, $\frac{8}{8}$. Vertebrae: C. 7; D. 11; L. 11; Ca. 28=57. Skull large and massive. Intermaxillae large and flat; greatly expanded anteriorly, covering the anterior half of the rostral part of the maxillae and projecting over their margins. The distance from the maxillary notch

to the point of greatest enlargement of the intermaxillæ is contained about two and a half times in the length of the rostrum. Rostrum broad, its breadth at the base exceeding four-fifths its length. Temporal fossæ large and oval. Superior nares narrow transversely, and bordered laterally by broad plates of the intermaxillæ. Pterygoids as in *G. melas*, not strongly adpressed; the sinus wide as well as deep.

Measurements of the exterior.—(♂. Dam Neck Mills, Va.) Total length, 183 inches (464.8^{cm}); tip of snout to dorsal fin, 47.5 inches (120.6^{cm}); to base of pectoral fin, 36 inches (91.4^{cm}); length of pectoral fin, 30 inches (76.2^{cm}); vertical height of dorsal fin, 14 inches (35.6^{cm}); breadth of flukes, 46 inches (116.8^{cm}).

Measurements of the skull.—(U. S. National Museum. ♂. No. 22561. Dam Neck Mills, Va.) Total length, 66.2^{cm}; length of rostrum, 33.3^{cm}; breadth of rostrum at base, 28.8^{cm}; at its middle, 23.5^{cm}; breadth of intermaxillæ at same point, 22.9^{cm}; breadth between orbits, 45^{cm}; length of temporal fossa, 16.3^{cm}.

Habitat.—Atlantic coast of North America, from New Jersey to the Gulf of Mexico and the West Indies.

GLOBICEPHALUS SCAMMONI Cope.

(Plate 42, figs. 1 and 2.)

Size and form of *G. brachypterus*. Pectoral fins proportionally a little longer.

Color entirely black.

Teeth, $\frac{8}{8}$. Skull large and very massive. Rostrum broad, its breadth at the base about four-fifths its length. Intermaxillæ flat, except in front; greatly expanded distally, covering the anterior half of the rostral portion of the maxillæ, but not projecting over their lateral margins. The greatest expansion of the intermaxillæ is opposite the junction of the proximal and second fourths of the longitudinal axis of the rostrum. Temporal fossæ oval and smaller than in *G. brachypterus*. Superior nares broad and bordered by narrow plates of the intermaxillæ; pterygoid bones closely approximated, short and strongly adpressed; the sinus deep, but narrow antero-posteriorly. Tubercles of the intermaxillæ very strong.

Measurements of the exterior.—(♂. From Scammon.) Total length, 186 inches (472.4^{cm}); tip of snout to dorsal fin, 54 inches (137.2^{cm}); to pectoral fin, 33 inches (83.8^{cm}); length of pectoral fin, 34 inches (86.4^{cm}); breadth of flukes, 42 inches (106.7^{cm}).

Measurements of skull.—(U. S. National Museum, No. 9074.) Total length, 69^{cm}; length of rostrum, 34^{cm}; breadth of rostrum at base, 30.8^{cm}; at its middle, 25.2^{cm}; breadth of intermaxillæ at the same point, 23.6^{cm}; breadth between orbits, 48.7^{cm}; length of temporal fossa, 14.8^{cm}.

Habitat.—North Pacific Ocean.

GLOBICEPHALUS SIEBOLDII Gray.

(Plate 43, figs. 1 and 2.)

Known only from a young individual.

Form and color as in *G. brachypterus*. Pectoral fins broad in the distal half, with irregular sinuate margins.Teeth $\frac{10}{10}$. Vomer bifurcated at the extremity.

See page 142.

Habitat.—Japan.

GLOBICEPHALUS INDICUS Blyth.

See page 137.

Habitat.—India.

GLOBICEPHALUS MACRORHYNCHUS Gray.

See page 138.

Habitat.—South Seas.

16. PSEUDORCA Reinhardt.

Rostrum short and broad. Rostral portion of the intermaxillæ broad, equal to or exceeding the breadth of the proximal end; abruptly truncated at the distal end. Pterygoid bones short, nearly or quite in contact in the median line. Palatine bones prolonged laterally across the optic canal. Teeth few and large, with conical roots, 10. Vertebrae, 50.

Head globose, depressed; beak wanting. Dorsal and pectoral fins rather small, narrow, and falcate. Color uniform black.

PSEUDORCA CRASSIDENS (Owen).

(Plate 44, figs. 1 and 2.)

Size large. Body elongate. Head sloping gradually and gently from the blowhole to the extremity; no appearance of a beak. Dorsal fin in the middle of the length, narrow and upright, not higher (along the center) than the length of the pectoral fin. Pectoral fin small, one-third as broad as long; its length contained eight to nine times in the total length of the body.

Color uniform black.

Teeth $\frac{8}{10}$. Vertebrae: C. 7; D. 10; L. 9; Ca. 24=50.

Skull massive. Rostrum long and broad; its length about one-half the total length of the skull; its breadth at the base about two-thirds its length. Intermaxillæ broad and flat, not expanded proximally; their outer margins on opposite sides forming approximately parallel lines. Vomer extending forward to the junction of the distal and second thirds of the rostrum, not visible on the palate. Intermaxillæ extending back on the palate, nearly to the middle of the rostrum.

Pterygoid bones short and adpressed; not in contact in the median line. Temporal fossæ long and rectangular.

Measurements of the skull.—(Roy. Coll. Surg. London, No. 2935. Old. Tasmania.) Total length, 59.5^{cm}; * length of rostrum, 28.7^{cm}; breadth of rostrum at base, 20.8^{cm}; at its middle, 18.8^{cm}; breadth of intermaxillæ at same point, 13.2^{cm}; breadth between orbits, 33.3^{cm}; length of temporal fossa, 19.1^{cm}.

Habitat.—Pelagic.

17. ORCA Gray.

Size very large. Rostrum broad and moderately elongated. Rostral portion of intermaxillæ narrow and flat. Pterygoid bones separate. Teeth few, 10 to 13; very large, with flattened roots. Vertebrae, 52.

Head conical and depressed; beak wanting. Dorsal fin large and prominent (remarkably so in the male). Pectoral fins large and very broadly ovate. Color black, with a large and sharply contrasted ventral area of white, forming a trident posteriorly, the lateral tines of which extend up on the sides.

ORCA GLADIATOR (Lacépède).

(Plate 45, figs. 1 and 2.)

Cranial characters of the genus.

Size very large. Head broad, conical, and depressed. Dorsal fin erect, extraordinarily high in the male. Pectoral fins short and broad.

Upper half of head, back, and fins black. Lower jaw, breast, and belly whitish. The white area forms a trident posteriorly, the central tine of which extends back to the vent, while the lateral tines extend obliquely upward and backward on the sides. A large white blotch behind the eye. A crescent-shaped area of purple extends across the median line of the back behind the dorsal fin (? sometimes obsolete).

Habitat.—Pelagic.

SUBFAMILY II. DELPHINAPTERINÆ.

18. DELPHINAPTERUS Lacépède.

DELPHINAPTERUS LEUCAS (Pallas).

(Plate 46, figs. 1 and 2.)

Size moderate. Head globose, not prolonged into a snout. Neck marked by a slight constriction. No dorsal fin, the center of the back rising instead into a low, irregular ridge. Pectoral fins short, very broad across the center, and obtusely pointed.

Color white throughout.

* A little sawn off the end of the rostrum.

Teeth $\frac{9}{9}$, obliquely and often very irregularly implanted, and of varying size. Vertebrae: C. 7; D. 11; L. 9; Ca. 23=50.

Rostrum of skull rather less than half the total length; broad at the base, tapering rapidly to the middle, but with the margins of the distal half approximately parallel. Intermaxillae broad and moderately convex, rarely extending backward to the posterior wall of the superior nares. Expanded proximal portion of maxillae not bent upward as in other dolphins, so that the entire upper surface of the skull is nearly in one and the same plane. Pterygoid bones far apart at the base, converging toward the extremity but not meeting; the sinus of very small proportions.

Measurements of the exterior.—Total length, 137.5 inches; tip of snout to pectoral fin, 29 inches; length of pectoral fin, 16.5 inches; greatest breadth of pectoral fin, 10.5 inches; breadth of flukes,

Measurements of the skull.—(No. 2958, R. Coll. of Surgeons, London.) Total length, 55.3^{cm}; length of rostrum, 26.4^{cm}; breadth of rostrum at base, 18.3^{cm}; at its middle, 9.9^{cm}; breadth between orbits, 27.2^{cm}; length of temporal fossa, 15.2^{cm}.

Habitat.—Arctic and sub-Arctic seas; north to 81° 35' (Greenly), straggling southward to Firth of Forth, Scotland, and Cape Cod, Massachusetts.

19. MONODON Linné.

MONODON MONOCERAS Linné.

(Plate 47, figs. 1 and 2.)

Head short and rounded. Pectoral fins short and broad. Dorsal fin rudimentary; a low ridge.

Color above dark gray or dusky; below, white; sides and back mottled with gray.

Teeth in the form of two spirally-twisted tusks, which are usually concealed in the female; in the male the left tusk (rarely the right, or both) is greatly developed. Vertebrae: C. 7; D. 11; L. 6; Ca. 26=50. Cranial characters as in *Delphinapterus*.

Measurements of the exterior.—(From Fleming.) Total length, 144 inches; tip of snout to pectoral fin, 30 inches; length of pectoral fin, 15 inches; greatest breadth of pectoral fin, 6 inches.

Measurements of the skull.—(23455, U. S. Nat. Mus. ♀, with 2 tusks.) Total length, 54^{cm}; length of rostrum, 23.7^{cm}; breadth of rostrum at base, 22^{cm}; at its middle, 13.7^{cm}; breadth between orbits, 34.4^{cm}; length of temporal fossa, 15.2^{cm}.

Habitat.—Arctic seas.

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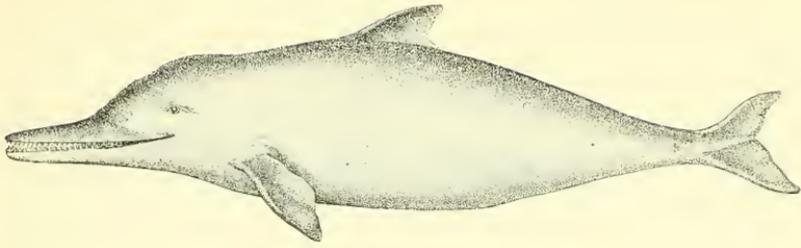


FIG. 1. *Sotalia plumbea* (Cuvier).

(After F. Cuvier.)

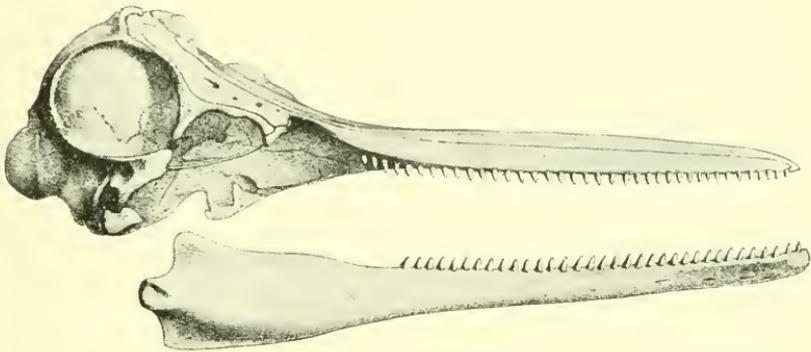


FIG. 2. *Sotalia plumbea* (Cuvier).

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, pl. 37, figs. 1 and 2.)

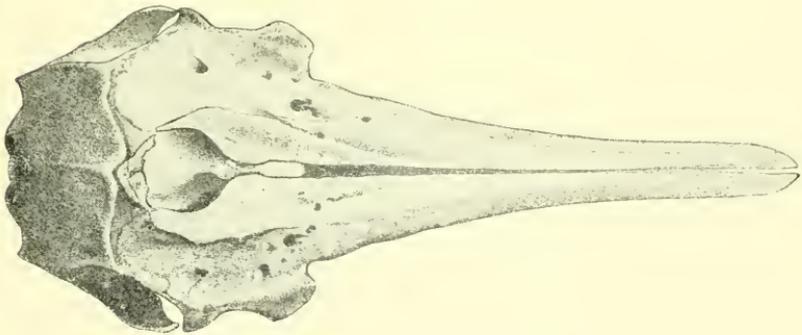


FIG. 3. CHINESE WHITE DOLPHIN.

Sotalia sinensis Flower.

(From Flower, *Transactions of the Zoological Society of London*, vii, pl. 17, fig. 2.)

GENUS SOTALIA.

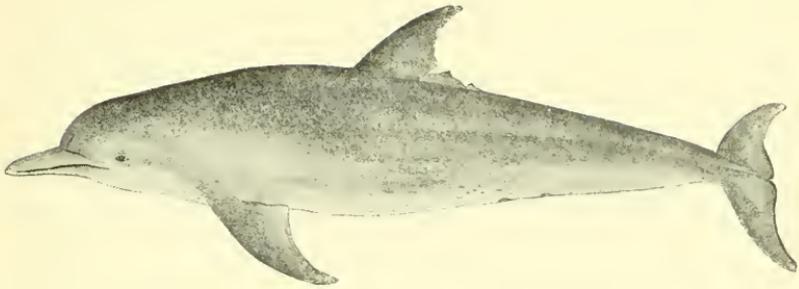


FIG. 1. *Sotalia gadamu* (Owen).

(From Owen, Transactions of the Zoological Society of London, vi, 1869, pl. 3, fig. 1.)

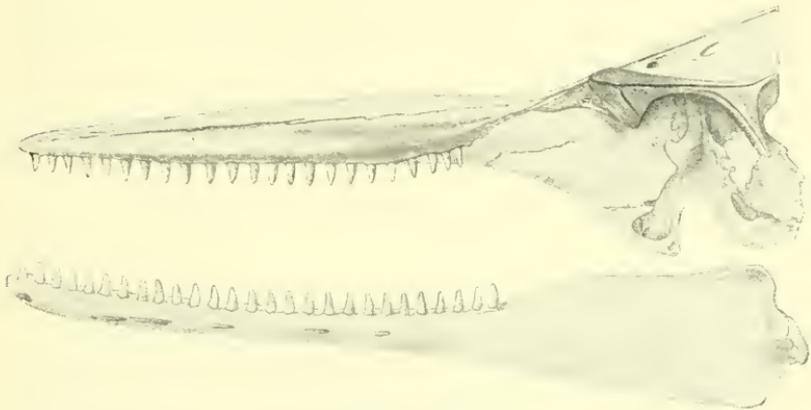


FIG. 2. *Sotalia gadamu* (Owen).

(From Owen, Transactions of the Zoological Society of London, vi, pl. 4, figs. 1-2.)

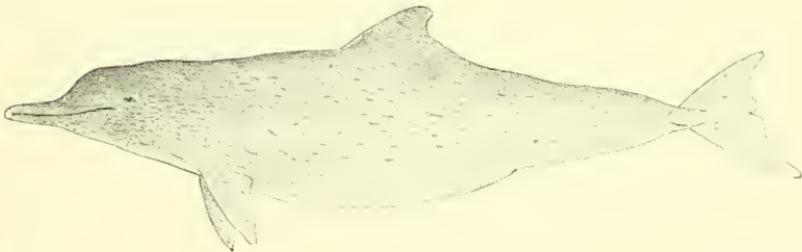


FIG. 3. *Sotalia lentiginosa* (Owen).

(From Owen, Transactions of the Zoological Society of London, vi, 1869, pl. 5, fig. 2.)

GENUS SOTALIA.



FIG. 1. *Sotalia brasiliensis* E. Van Beneden. Young.

(From E. Van Beneden, Mémoires de l'Académie Royale de Belgique, xli, 1874.)

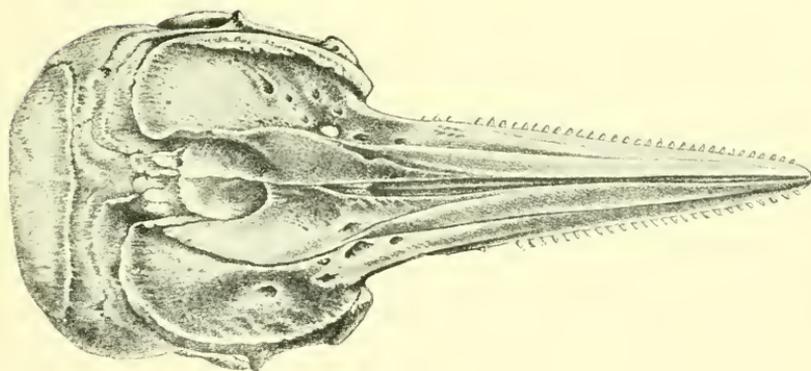


FIG. 2. *Sotalia brasiliensis* E. Van Beneden. Young.

(From E. Van Beneden, Mémoires de l'Académie Royale de Belgique, xli, 1874.)

GENUS SOTALIA.

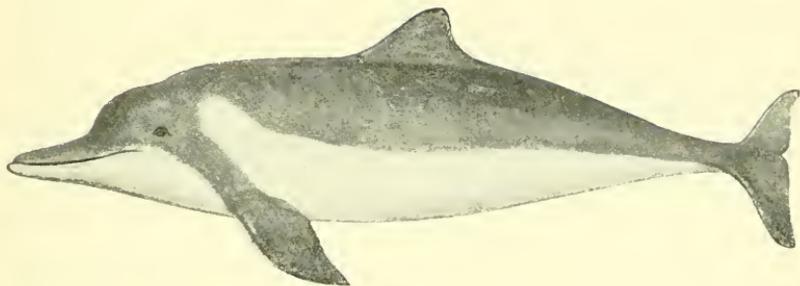


FIG. 1. *Sotalia fluviatilis* (Gervais).

(From Castelnau, Expédition dans l'Amérique du Sud, pl. 7, Zoologie, 1855, pl. 9, fig. 1.)

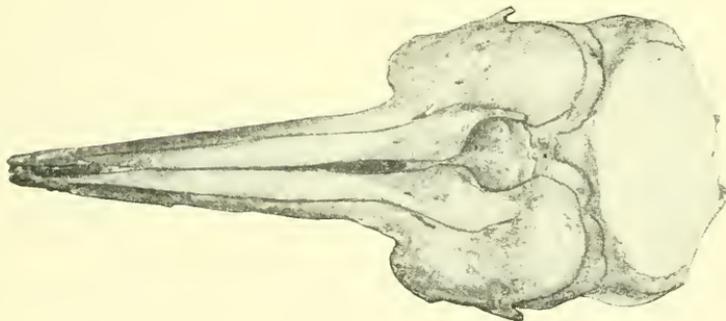


FIG. 2. *Sotalia tucuxi* Gray.

(From a photograph of the type-skull, No. 1189a, ♂, in the British Museum.)

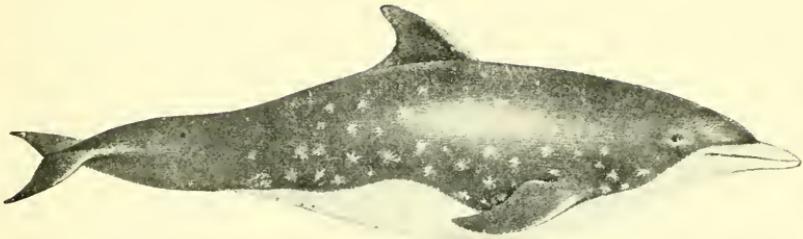


FIG. 1 *Steno rostratus* (Desmarest).

(From Lütken, K. Danske Videnskabs Selskabs Skrifter. 6^{te} Række, v, 1889, p. 1.)

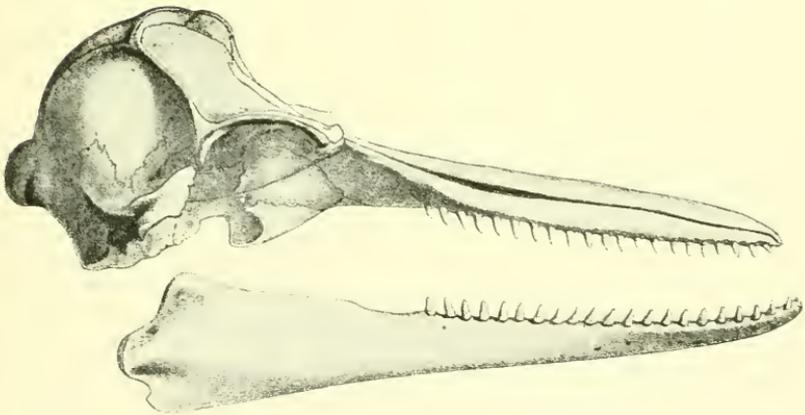


FIG. 2 *Steno rostratus* (Desmarest).

(From Van Beneden and Gervais. Ostéographie des Cétacés, 1868-'79, pl. 37, fig. 10.)

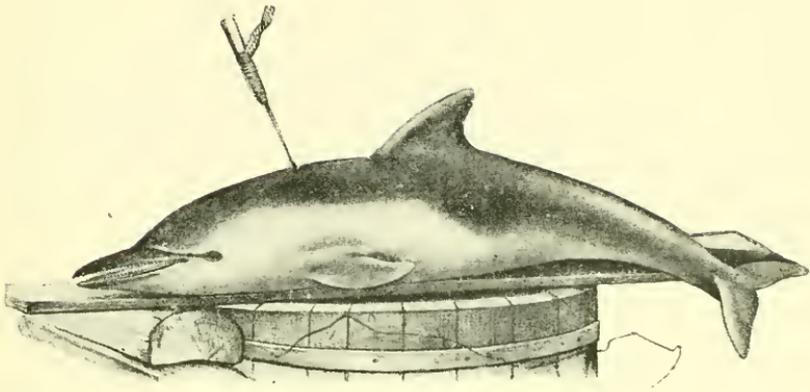


FIG. 1. *Steno perspicillatus* Peters.

(From Peters, Monatsbericht der k. Akademie der Wissenschaften. Berlin, 1876, pl. 2.)

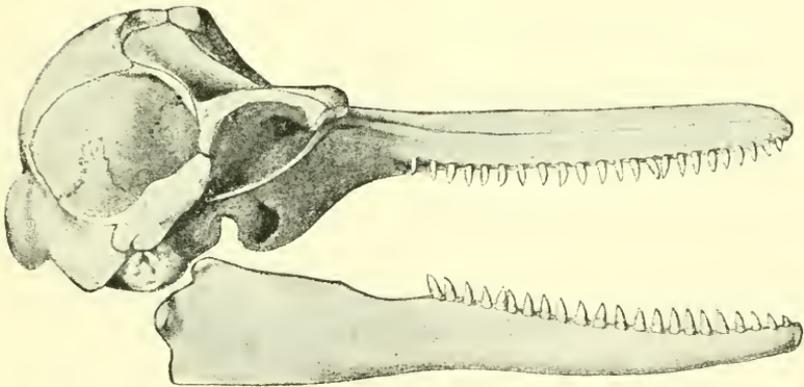


FIG. 2. *Steno perspicillatus* Peters.

(From Peters, Monatsbericht der k. Akademie der Wissenschaften, Berlin, 1876, pl. 13, fig. 1. Type-skull.)

GENUS STENO.

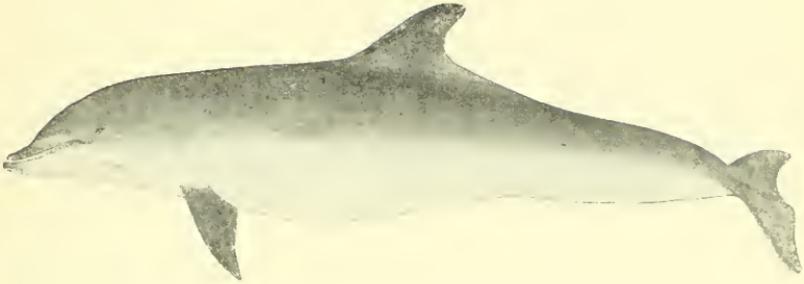


FIG. 1. COMMON PORPOISE; BOTTLENOSED DOLPHIN.

Tursiops tursio (Fabricius).

(From a photograph in the U. S. National Museum.)

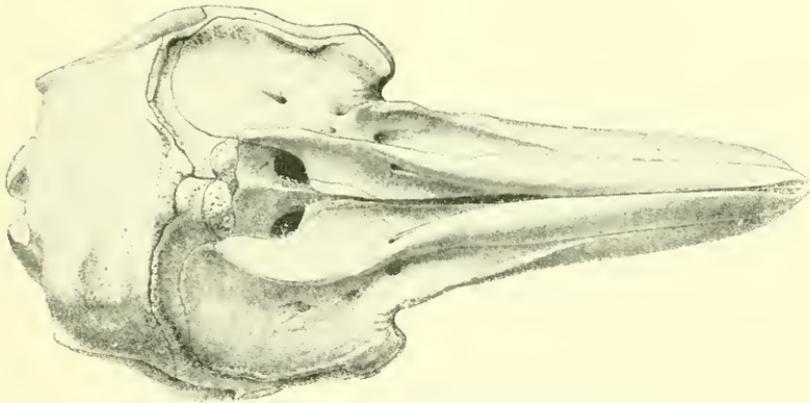


FIG. 2. COMMON PORPOISE; BOTTLENOSED DOLPHIN.

Tursiops tursio (Fabricius).

(From Van Beneden and Gevais, *Ostéographie des Cétacés*, 1868-79, p. 34 fig. 3.)

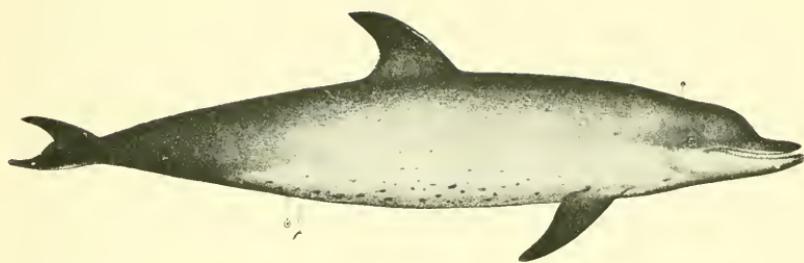


FIG. 1. *Tursiops abusalam* (Rüppell).
(From Rüppell, Museum Senckenburgianum, iii, 1845, pl 12 fig 1.)

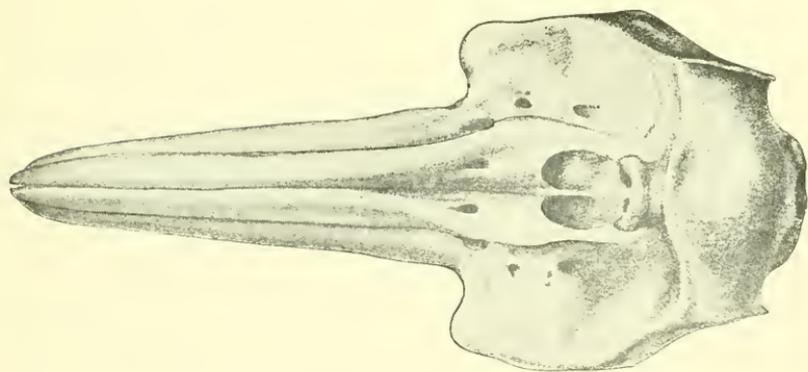


FIG. 2. *Tursiops abusalam* (Rüppell).
(From Rüppell, Museum Senckenburgianum, iii, 1845, pl. 12 fig. 3.)

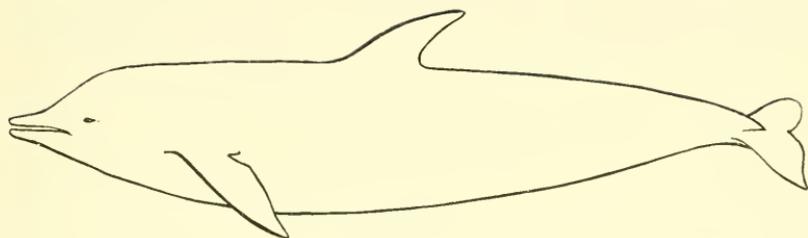


FIG. 1. *Tursiops gillii* Dall.

(From Scammon, Marine Mammalia, 1874, p. 102. Approximate outlines.)

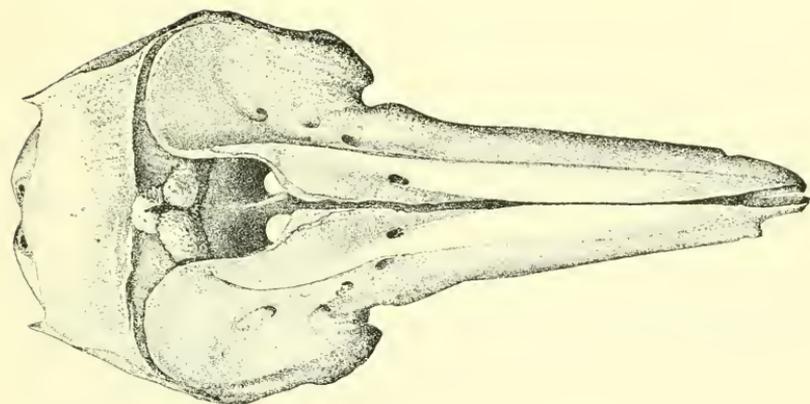


FIG. 2. *Tursiops gillii* Dall.

(From the type-skull, No 12054, in the U. S. National Museum.)

GENUS TURSIOPS.

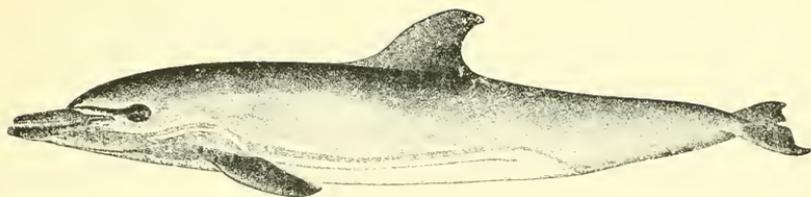


FIG. 1. COMMON DOLPHIN.

Delphinus delphis Linné.

(From a sketch by J. H. Emerton.)

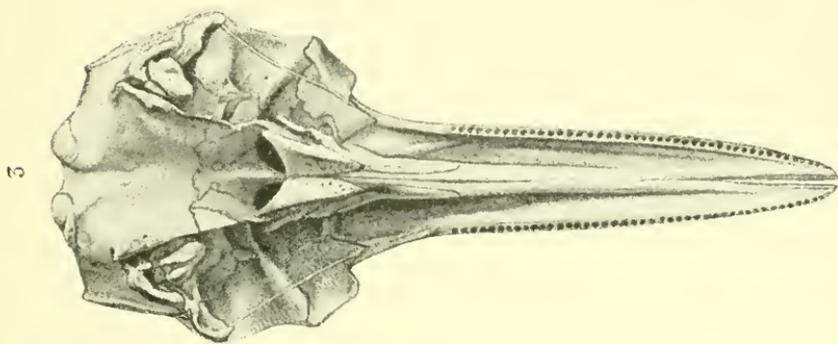


FIG. 2. COMMON DOLPHIN.

Delphinus delphis Linné.

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, pl. 39, fig. 3.)

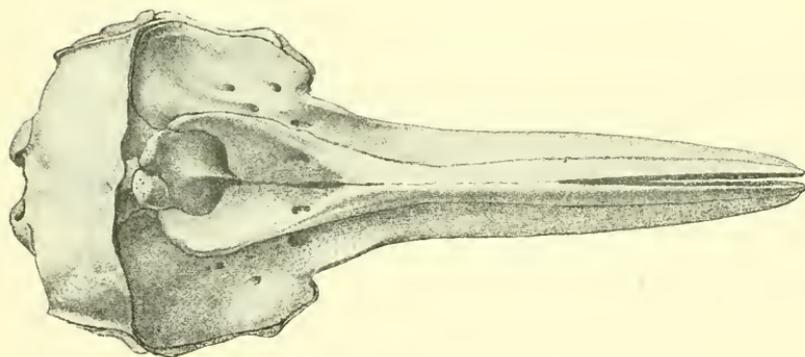


FIG. 3. COMMON DOLPHIN.

Delphinus delphis Linné.

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, pl. 39, fig. 3.)

GENUS DELPHINUS.

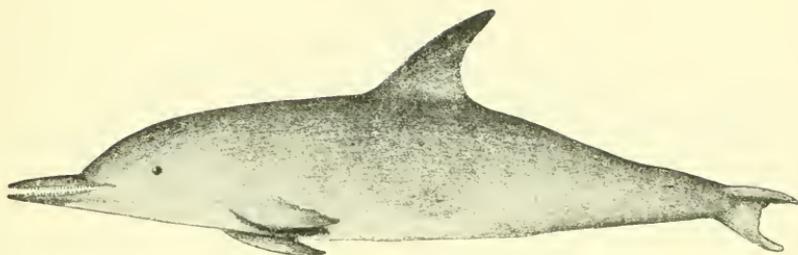


FIG. 1. *Delphinus copensis* Gray.

(From Gray, Spicilegia Zoologica, 1828, pl. 2, fig. 1.)

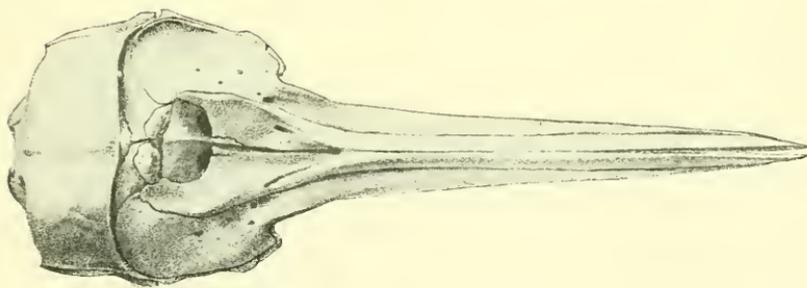


FIG. 2. *Delphinus longirostris* Cuvier.

(From Van Beneden and Gervais, Ostéographie des Cétacés, 1868-'79, pl. 39, fig. 10.)

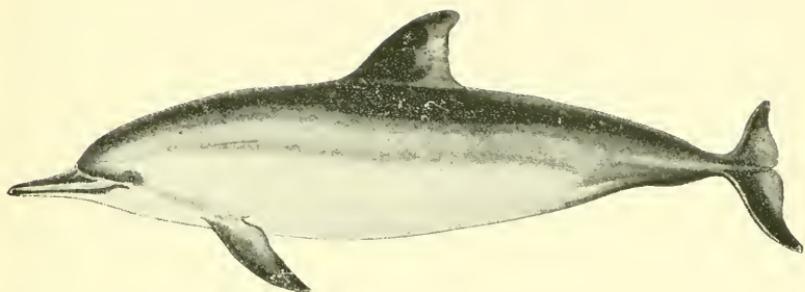


FIG. 1. *Delphinus roseiventris* Wagner.

(From Jacquinot et Pucheran, Zoologie du Voyage de l'Astrolabe et Zélée 1853, pl. 22, fig. 2.)

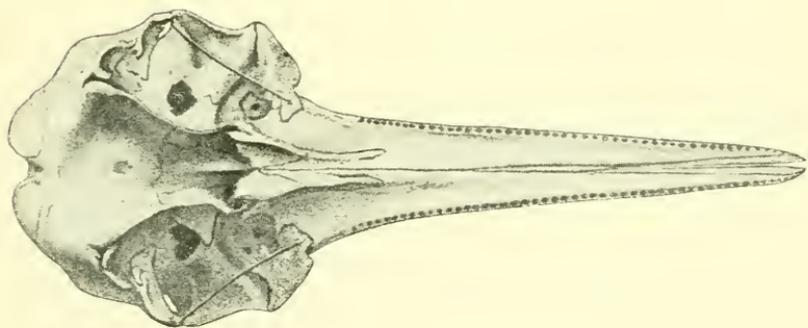


FIG. 2. *Delphinus roseiventris* Wagner.

(From Van Beneden and Gervais, Ostéographie des Cétacés, 1868-'79 pl. 38, fig. 6a.)

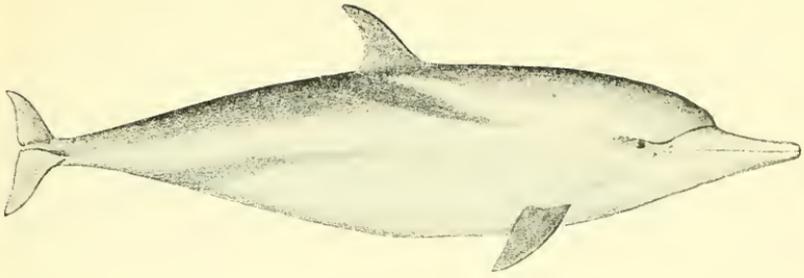


FIG. 1. *Prodelphinus caeruleo-albus* (Meyen).

(From Meyen, Nova Acta Academiae Cæsareæ Leopoldino-Carolinæ Naturæ Curiosum, xvi, 1832, pl. 43, fig. 2.)

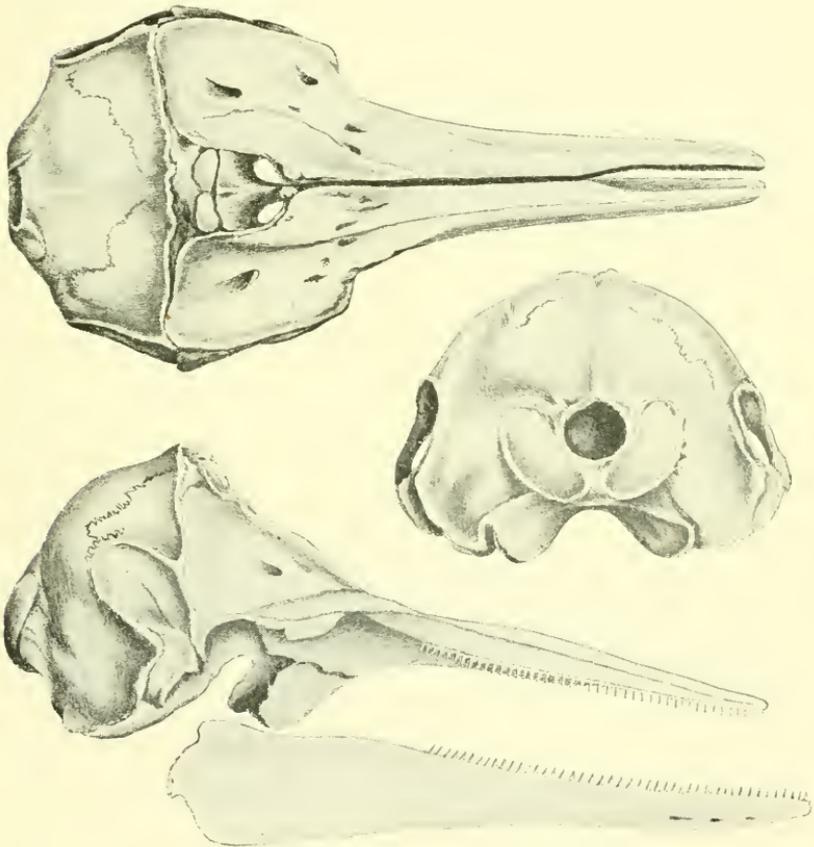


FIG. 2. *Prodelphinus caeruleo-albus* (Meyen).

(From Schreber's Säugethiere, pl. 364.)

GENUS PRODELPHINUS.

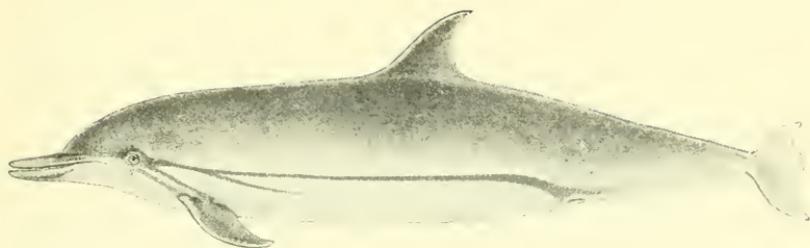


FIG. 1. *Prodelphinus euprosyue* (Gray).

(From Pucheran, Revue et Magasin de Zoologie, 2d series, viii, 1856, pl. 25. *D. marginatus*.)



FIG. 2. *Prodelphinus euprosyue* (Gray).

(From Gray, Synopsis of Whales and Dolphins, 1868, pl. 22.)

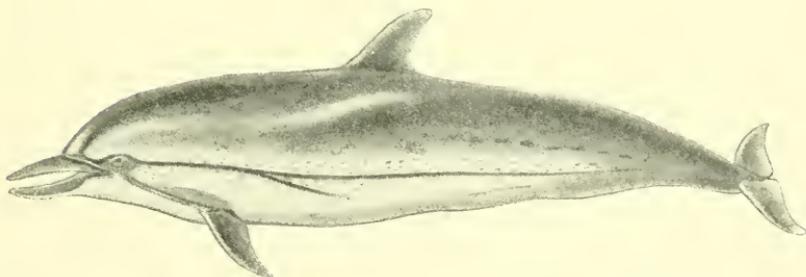


FIG. 3. *Prodelphinus* (?) *lateralis* (Peale).

(From Peale U. S. Exploring Expedition, Mammalogy and Ornithology, Atlas, pl. 8, fig. 1.)

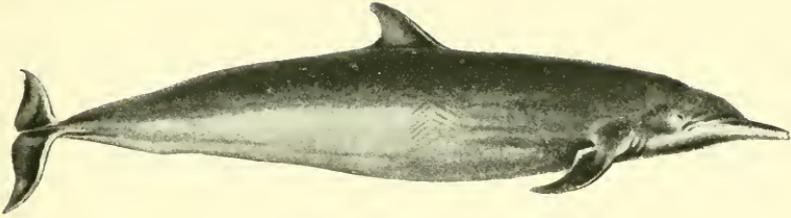


FIG. 1. *Prodelphinus malayanus* (Lesson).

(From Jacquinet et Pucheran, Zoologie du Voyage de l'Astrolabe et Zéélé, Mammifères et Oiseaux, Atlas, pl. 21, fig. 2. *Dauphin à petites pectorales.*)

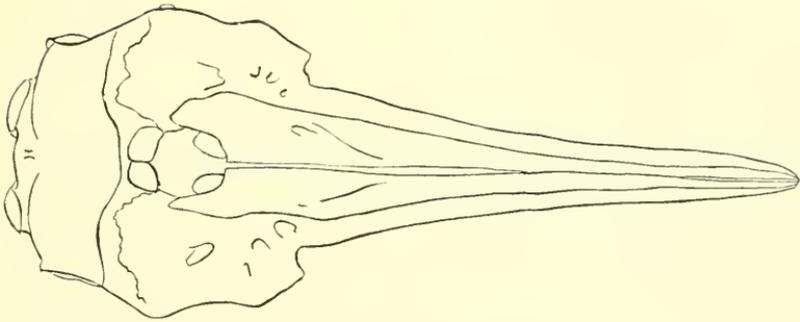


FIG. 2. *Prodelphinus malayanus* (Lesson).

(From Schlegel, Abhandlungen aus dem Gebiete der Zoologie. 1841. pl. 1, fig. 2.)

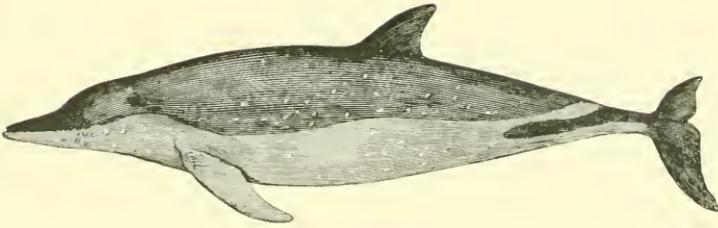


FIG. 1 *Prodelphinus attenuatus* (Gray).

(From Gray Catalogue of Whales and Dolphins, 1866, p. 399, fig. 101. *C punctata*)

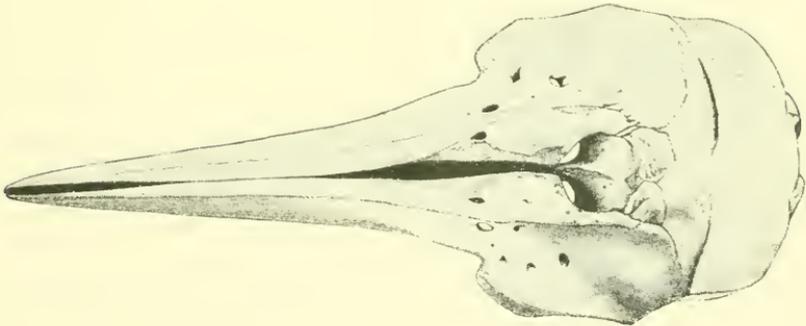


FIG. 2. *Prodelphinus attenuatus* (Gray).

(From Gray Synopsis of the Whales and Dolphins, 1868, pl. 28.)

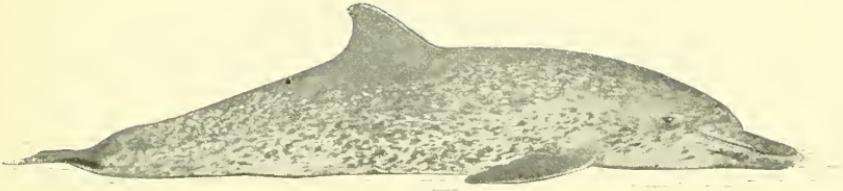


FIG. 1. SPOTTED DOLPHIN.

Prodelphinus plagiodon (Cope).

(From a photograph taken on board the U. S. Fish Commission Steamer Albatross.)

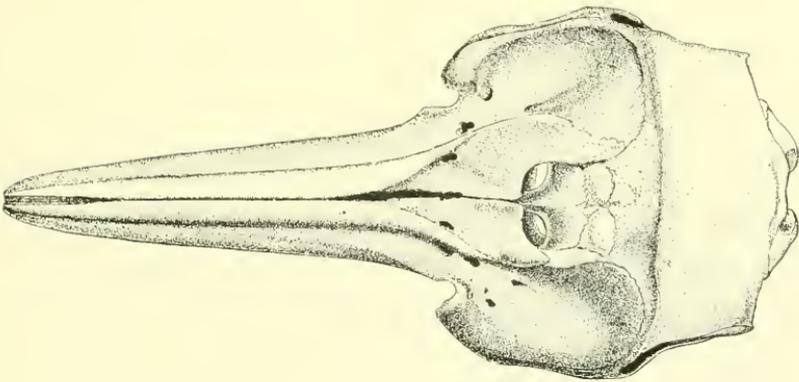


FIG. 2. SPOTTED DOLPHIN.

Prodelphinus plagiodon (Cope).

(From the type-skull, No. 3884, in the U. S. National Museum.)

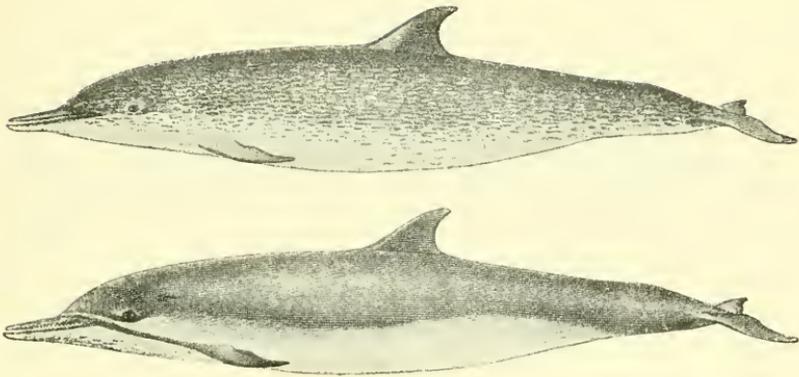


FIG. 1. *Prodelphinus frownatus* (F. Cuvier).

(From Lütken, K. Danske Videnskabs Selskabs Skrifter, 6^{te} Række, v. 1889. Two varieties. The form of the body is conventional.)

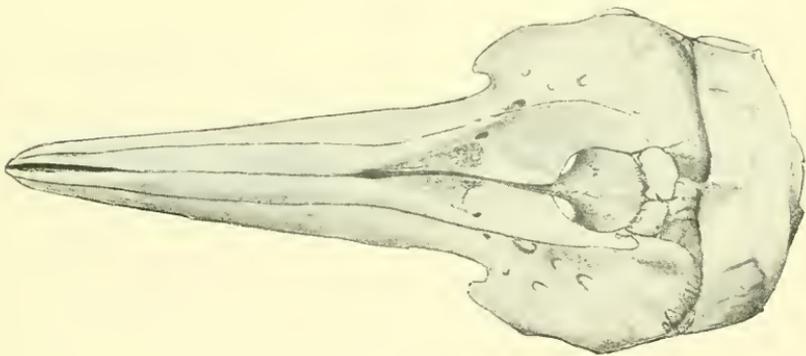


FIG. 2. *Prodelphinus frownatus* (F. Cuvier).

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 25.)

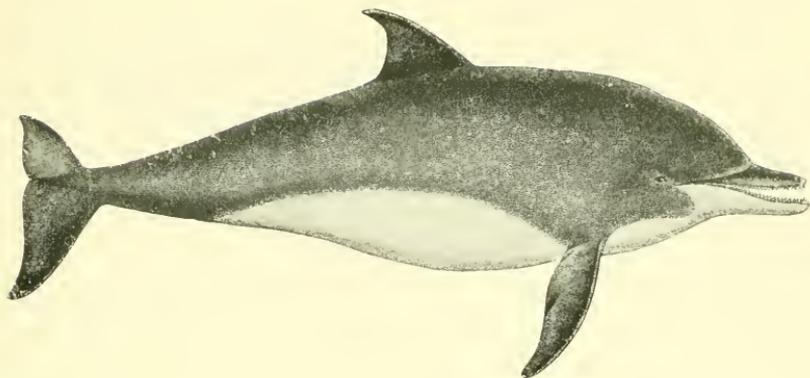


FIG. 1. *Prodelphinus fraenatus* (F. Cuvier). Young.
(From F. Cuvier, Histoire naturelle des Cétacés, 1836, pl. 10, fig. 1.)

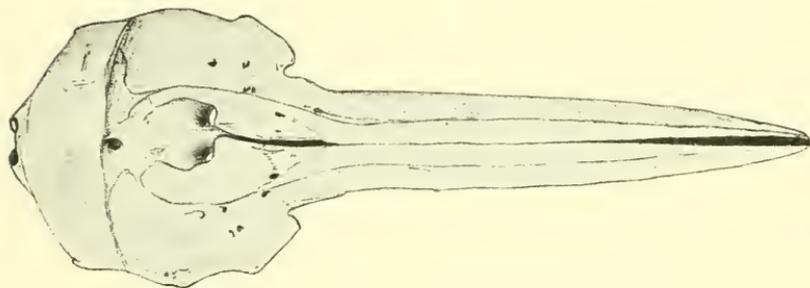


FIG. 2. *Prodelphinus longirostris* (Gray).
(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 25. *Delphinus microps*.)

GENUS PRODELPHINUS.



FIG. 1. *Tursio peronii* (Lacépède).

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 15, fig. 1.)

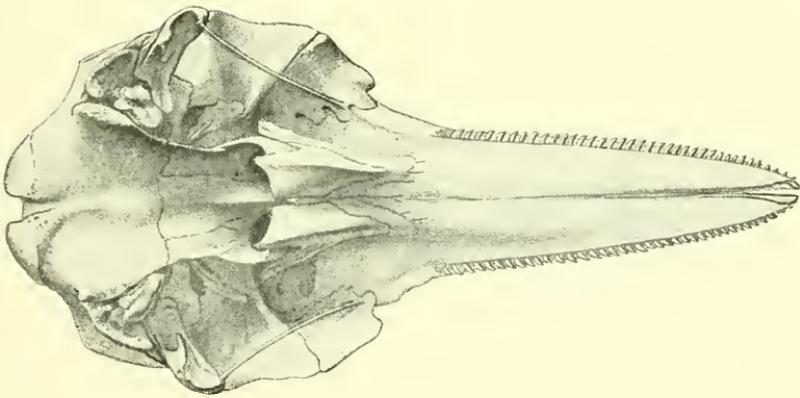


FIG. 2. *Tursio peronii* (Lacépède).

(From Van Beneden and Gervais, Ostéographie, pl. 38, fig. 3.)

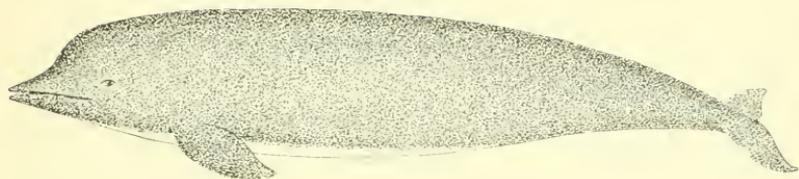


FIG. 1. PACIFIC RIGHT-WHALE PORPOISE.

Tursio borealis (Peale).

(From Scammon, Marine Mammalia, 1874, pl. 19, fig. 4.)

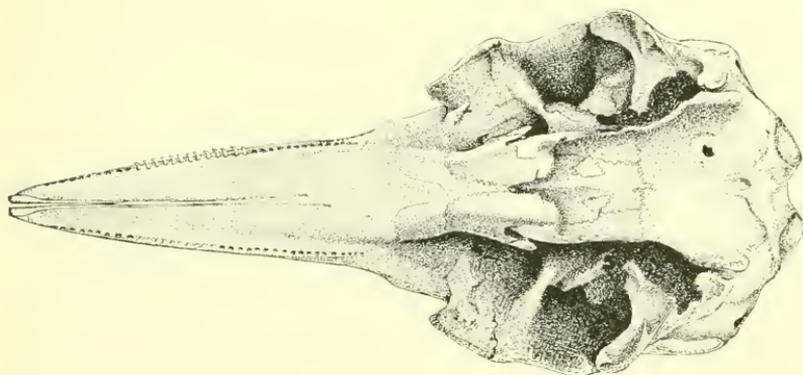


FIG. 2. PACIFIC RIGHT-WHALE PORPOISE.

Tursio borealis (Peale).

(From skull No. 8160, in the U. S. National Museum.)



FIG. 1. STRIPED DOLPHIN.

Lagenorhynchus acutus Gray.

(From a photograph in the U. S. National Museum, of an individual captured at Woods Ho'l, Mass.)

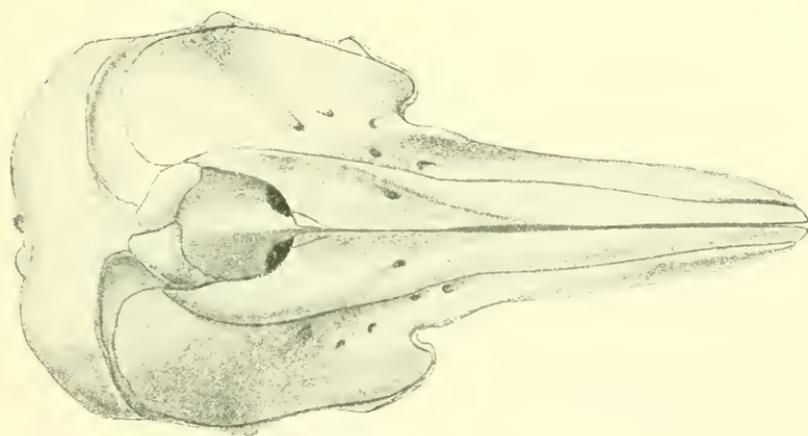


FIG. 2. STRIPED DOLPHIN.

Lagenorhynchus acutus Gray.

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, pl. 36, fig. 4.)

GENUS LAGENORHYNCHUS.

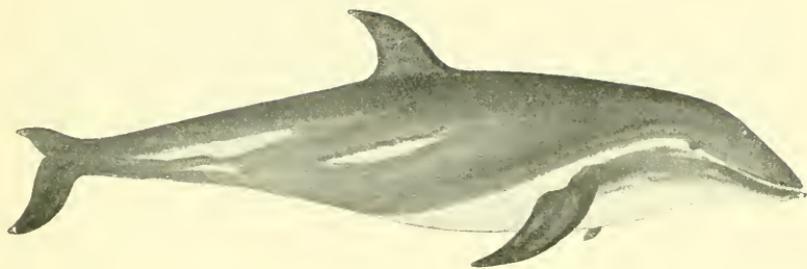


FIG. 1. *Lagenorhynchus fitzroyi* (Waterhouse).

(From Waterhouse, Zoology of the Voyage of the Beagle, Mammalia, 1839, pl. 10.)



FIG. 2. *Lagenorhynchus thicola* Gray.

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 36.)

GENUS LAGENORHYNCHUS.

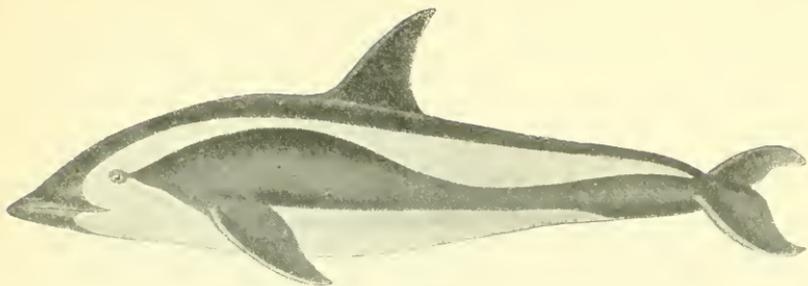


FIG. 1. *Lagenorhynchus cruciger* (d'Orbigny et Gervais).

(From d'Orbigny and Gervais, Voyage dans l'Amérique Méridionale ix, 1847, pl. 21, fig. 4.)

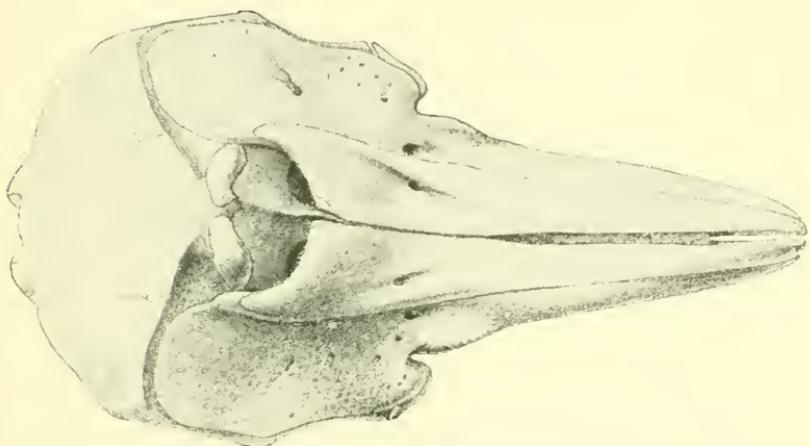


FIG. 2. *Lagenorhynchus cruciger* (d'Orbigny et Gervais).

(From Van Beneden and Gervais, Ostéographie des Cétacés, 1868-'79, pl. 36 fig. 3.)

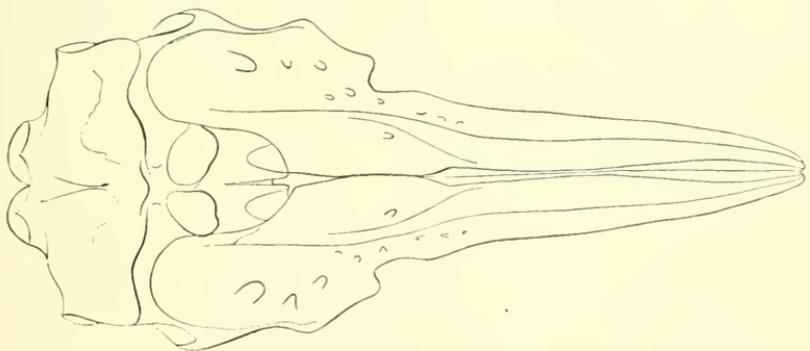


FIG. 3. *Lagenorhynchus superciliosus* (Schlegel).

(From Schlegel, Abhandlungen aus dem Gebiete der Zoologie, 1841, pl. 1, fig. 3.)

GENUS LAGENORHYNCHUS.

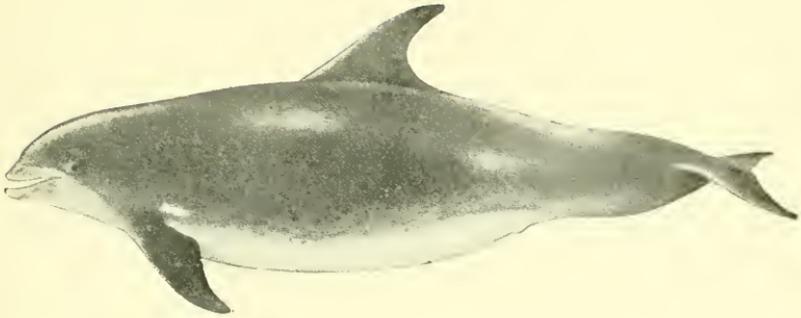


FIG. 1. WHITE-BEAKED DOLPHIN.

Lagenorhynchus albirostris Gray.

(From Lütken, Kgl. Danske Videnskabs Selskabs Skrifter, 6^{te} Række, iv, 1887, pl. 2.)

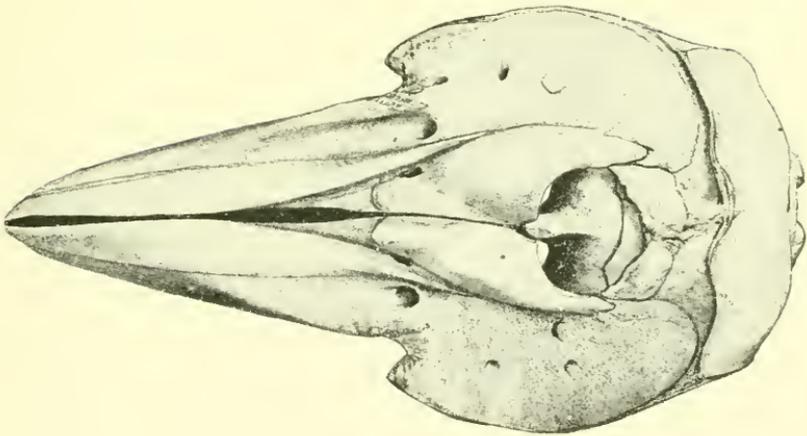


FIG. 2. WHITE-BEAKED DOLPHIN.

Lagenorhynchus albirostris Gray.

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 11.)

GENUS LAGENORHYNCHUS.



FIG. 1. *Lagenorhynchus obliquidens* Gill.

(From Scammon, Marine Mammalia, 1874, pl. 19, fig. 2.)

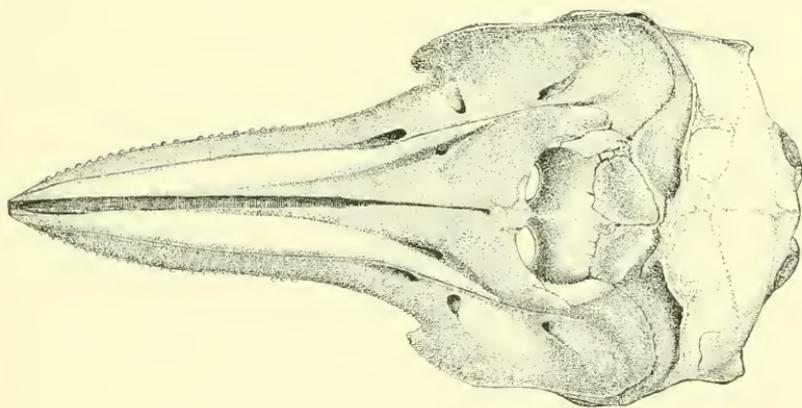


FIG. 2. *Lagenorhynchus obliquidens* Gill.

(From the type-skull, No. 1963, in the U. S. National Museum.)

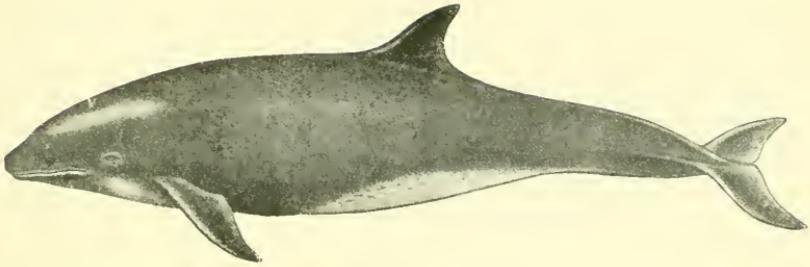


FIG. 1. *Lagenorhynchus electra* Gray.

(From Peale, U. S. Exploring Expedition, Mammalogy and Ornithology, Atlas, pl. 5, fig. 2.)

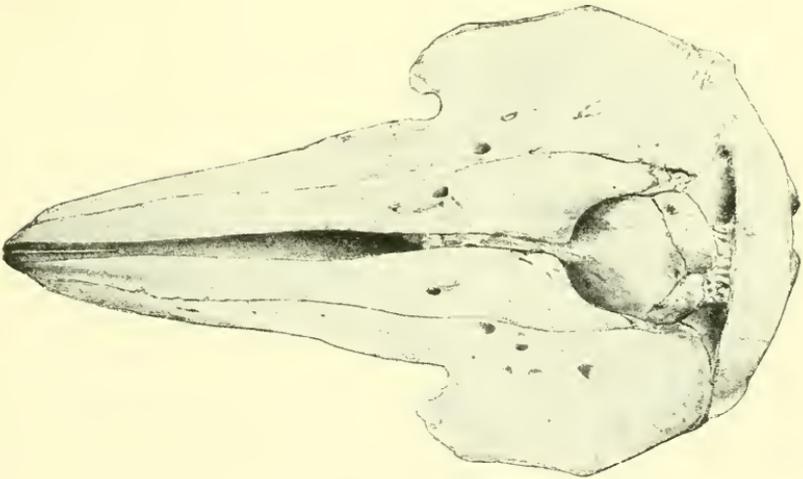


FIG. 2. *Lagenorhynchus electra* Gray.

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 14.)

GENUS LAGENORHYNCHUS.

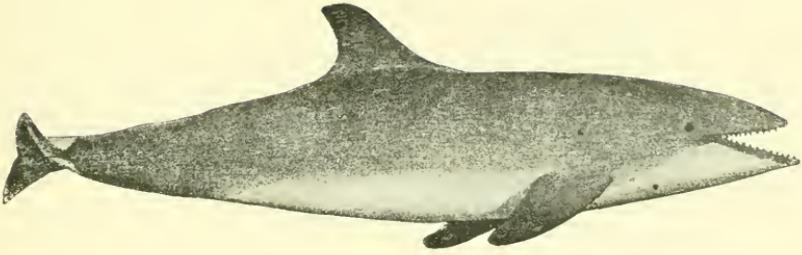


FIG. 1. *Lagenorhynchus obscurus* (Gray).
(From Gray *Spicilegia Zoologica*, 1828, pl. 2, fig. 3.)

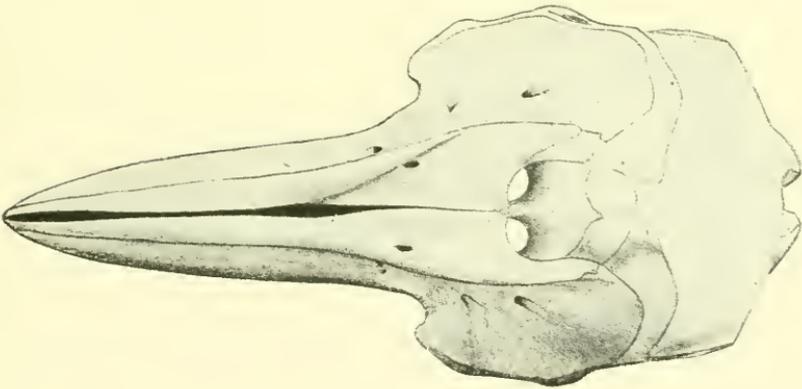


FIG. 2. *Lagenorhynchus obscurus* (Gray).
(From Gray, *Synopsis of the Whales and Dolphins*, 1868, pl. 16.)

GENUS LAGENORHYNCHUS.

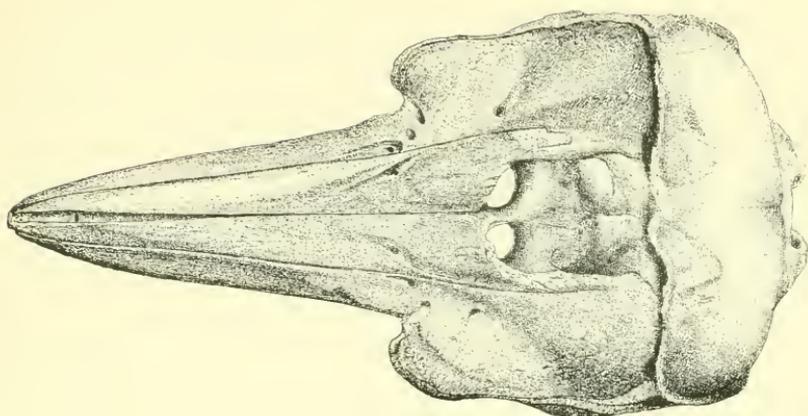


FIG. 1. *Sagmatias amblyodon* Cope.

(From the type-skull, No. 3887 in the U. S. National Museum.)

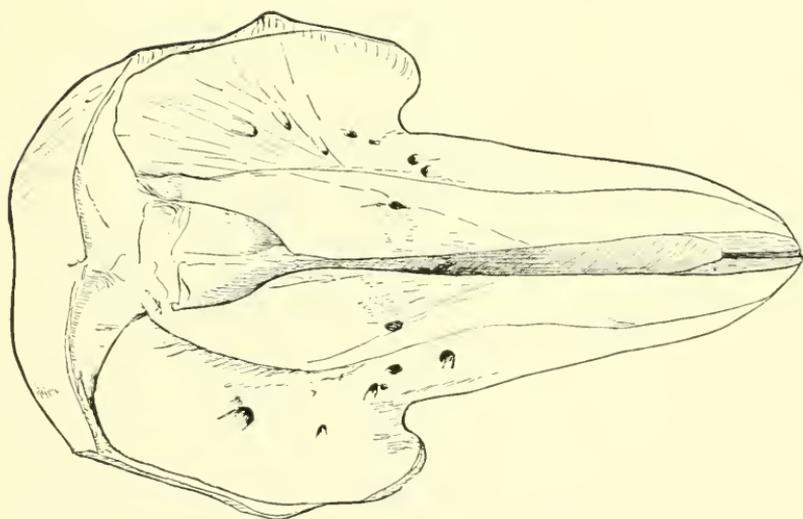


FIG. 2. *Feresa intermedia* Gray.

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 8.)

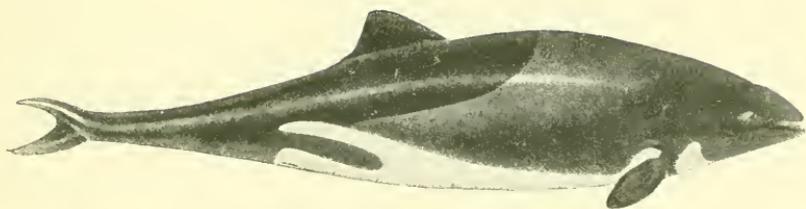


FIG. 1. *Cephalorhynchus heavisidei* Gray.

(From P. J. Van Beneden, Bulletin de l'Académie Royale de Belgique, 2d series, xxxv, 1873, pp. 32-40, 1 pl.)

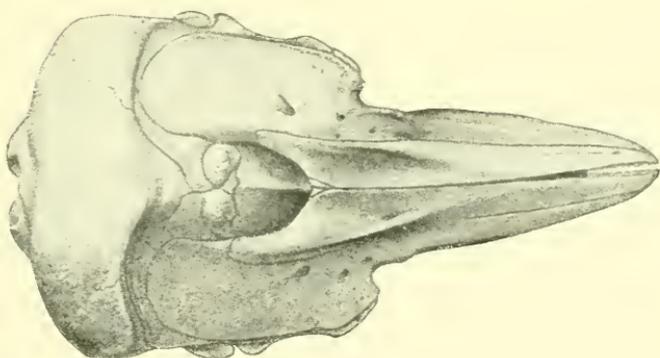


FIG. 2. *Cephalorhynchus heavisidei* Gray.

(From Van Beneden and Gervais, Ostéographie des Cétacés, 1868-'79, pl. 36, fig. 1.)

GENUS CEPHALORHYNCHUS.



FIG. 1. *Cephalorhynchus albifrons* True.

(From Hector, Transactions of the New Zealand Institute, v, 1873, pl. 3.)

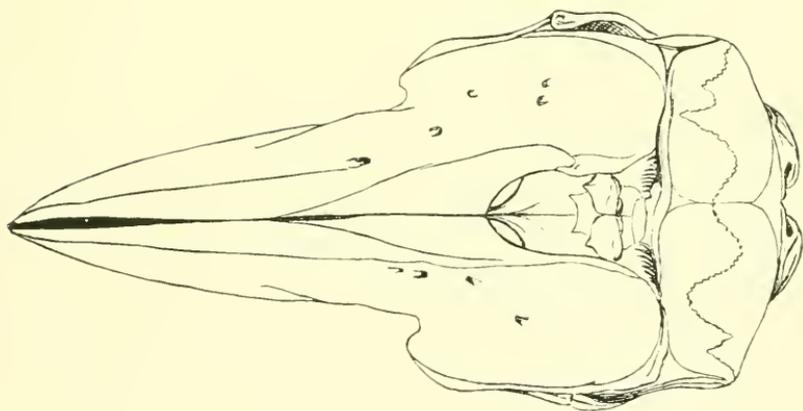


FIG. 2. *Cephalorhynchus albifrons* True.

(From Hector, Transactions of the New Zealand Institute, v, 1873.)

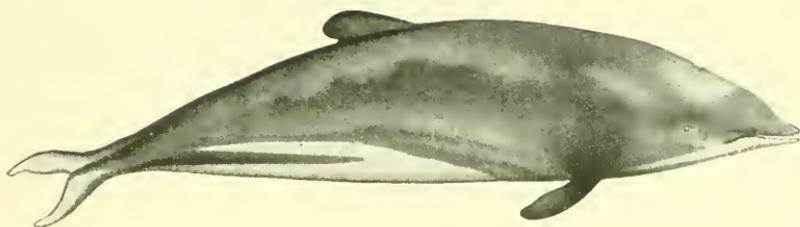


FIG 1 *Cephalorhynchus hectori* (Van Beneden).

(From Van Beneden, Bulletin de l'Académie Royale de Belgique, 3d series, i, 1881, pl. 2.)

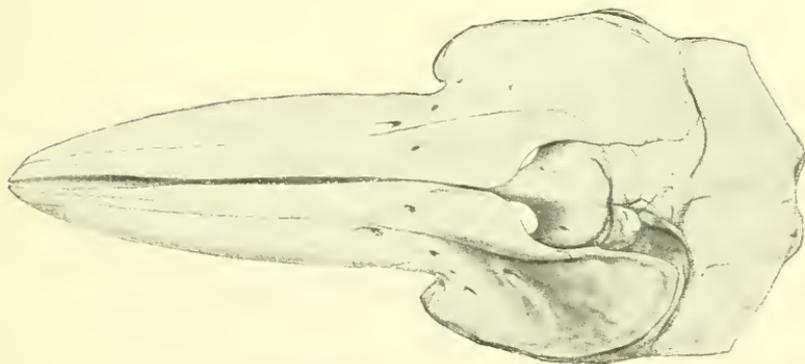


FIG. 2. *Cephalorhynchus eutropia* (Gray).

(From Gray, Synopsis of the Whales and Dolphins, 1868, pl. 34.)

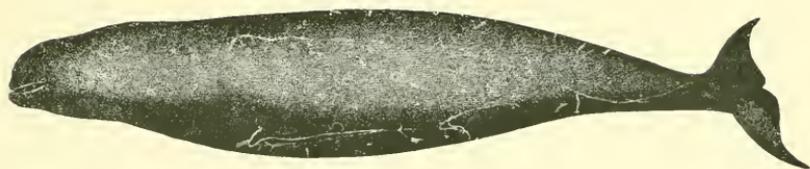


FIG. 1. NAMENO-JUO.

Neomeris phocaenoides (Cuvier).

(From Schlegel, Fauna Japonica, 1850, pl. 25, fig. 1.)

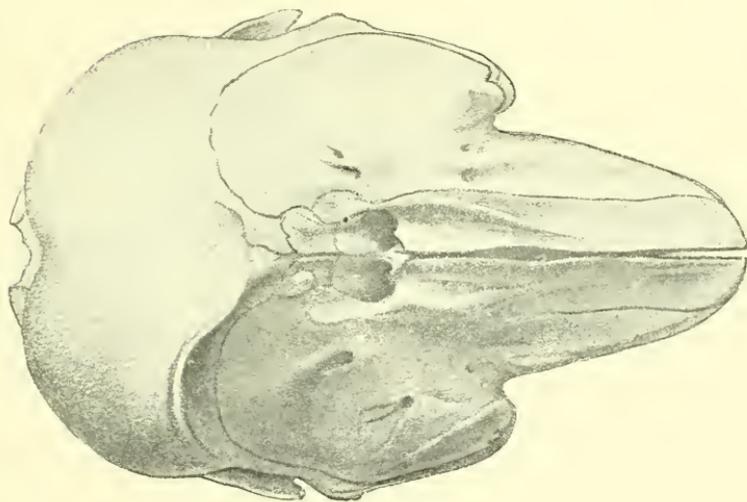


FIG. 2. NAMENO-JUO.

Neomeris phocaenoides (Cuvier).

(From Van Beneden and Gervais, Ostéographie des Cétacés, 1868-'79, pl. 56, fig. 1.)

GENUS NEOMERIS.

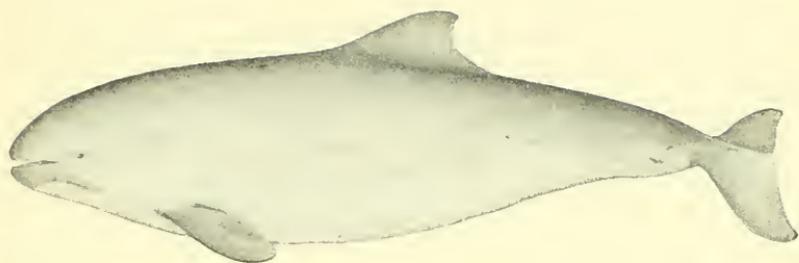


FIG. 1. HARBOR PORPOISE; HERRING HOG.

Phocaena communis Lesson.

(From a photograph in the U. S. National Museum.)

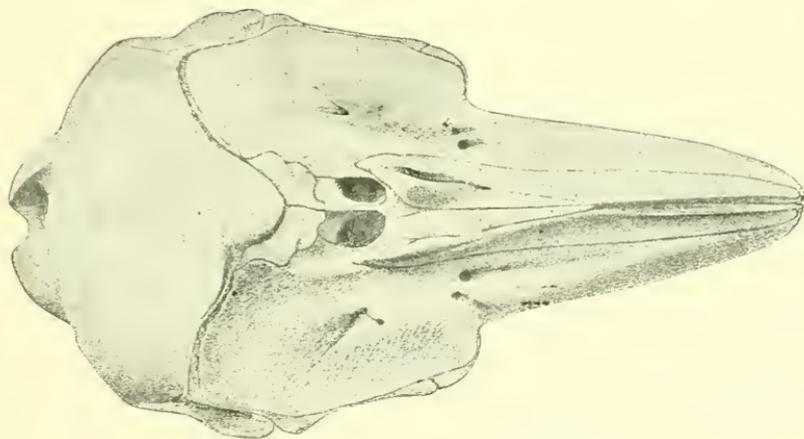


FIG. 2. HARBOR PORPOISE; HERRING HOG.

Phocaena communis Lesson.

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, pl. 56, fig. 10.)

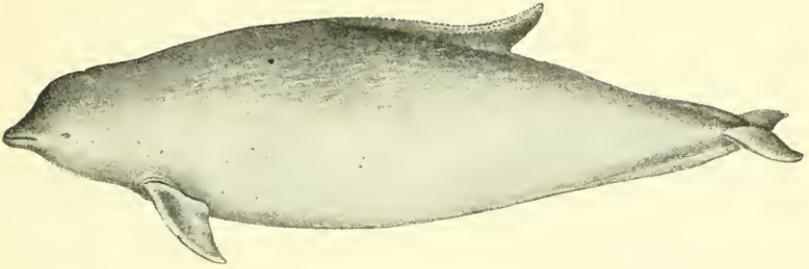


FIG. 1. *Phocoena spinipinnis* Burmeister.

(From Burmeister, Anales del Museo Público de Buenos Aires, i, 1864-'69, pl. 23, fig. 2.)

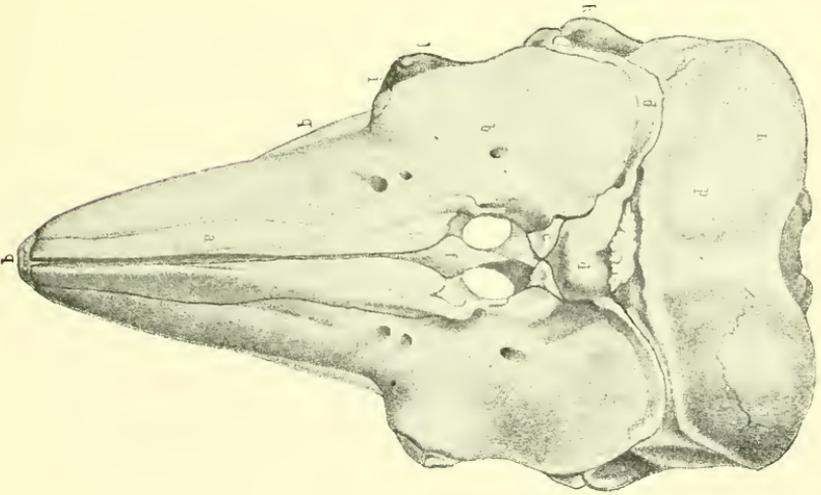


FIG. 2. *Phocoena spinipinnis* Burmeister.

(From Burmeister, Anales del Museo Público de Buenos Aires, i, 1864-'69, pl. 24, fig. 1.)

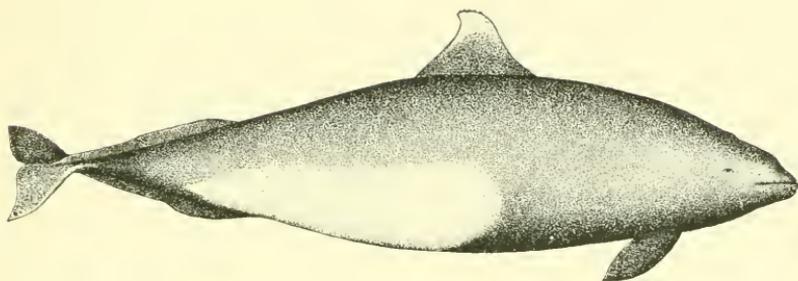


FIG. 1. DALL'S HARBOR PORPOISE.

Phocæna dallii True.

(From a drawing by William H. Dall.)

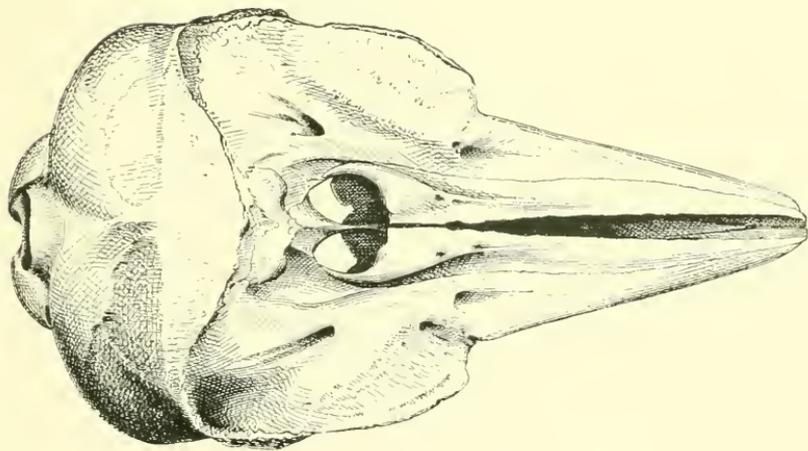


FIG. 2. DALL'S HARBOR PORPOISE.

Phocæna dallii True.

(From a drawing by William H. Dall of the type-skull, No. 21762, in the U. S. National Museum.)

GENUS PHOCÆNA.

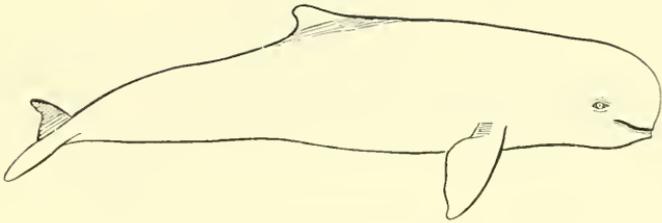


FIG. 1. *Orcella brevirostris* (Owen).

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, p. 552.)

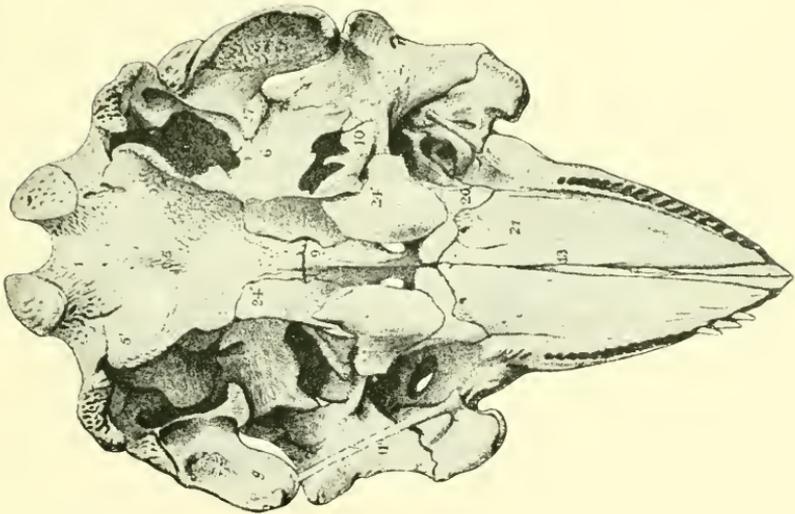


FIG. 2. *Orcella brevirostris* (Owen).

(From Owen, *Transactions of the Zoological Society of London*, vi, 1869, pl. 9, fig. 3.)

GENUS ORCELLA.

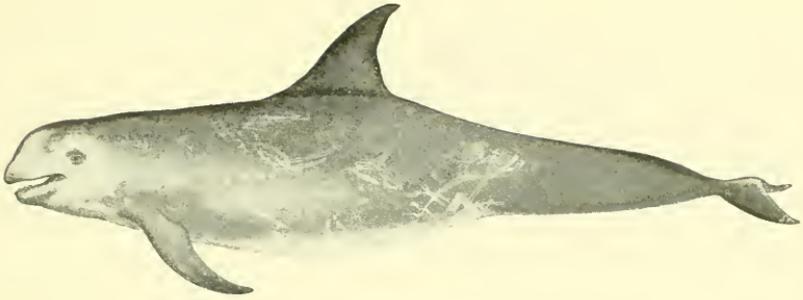


FIG. 1. GRAMPUS

Grampus griseus (Cuvier)

(From Flower, Transactions of the Zoological Society of London, viii, 1872, pl. 1, fig. 1.)

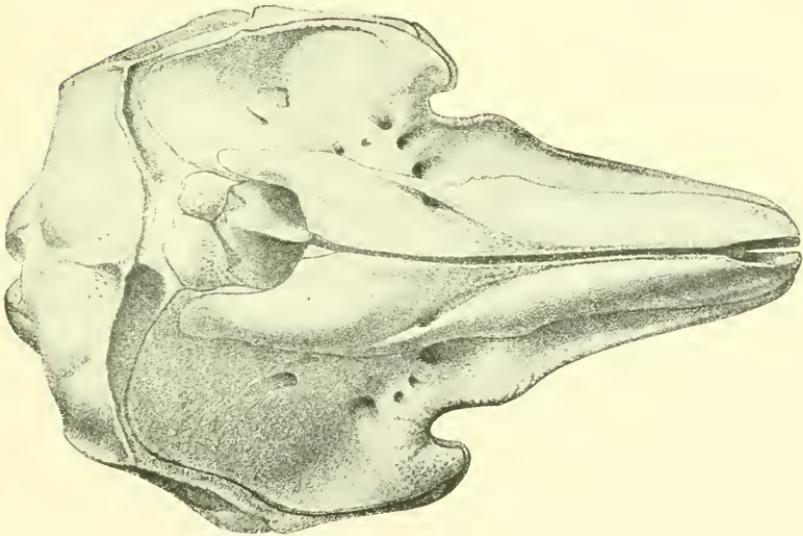


FIG. 2. GRAMPUS.

Grampus griseus (Cuvier).

(From Van Beneden and Gervais, Ostéographie des Cétacés, 1868-'79, pl. 54, fig. 7.)

GENUS GRAMPUS.

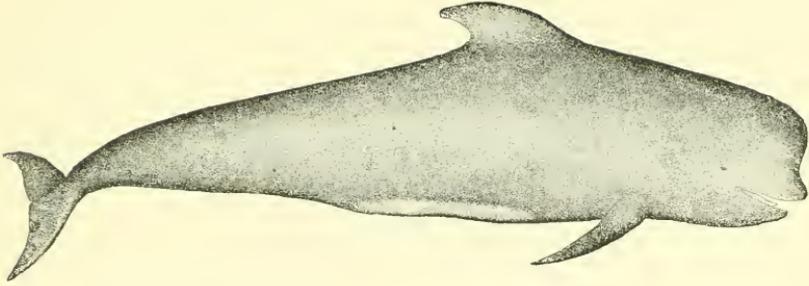


FIG. 1. COMMON BLACKFISH.

Globicephalus melas (Traill).

(From Murie, Transactions of the Zoological Society of London, viii, 1873, pl. 30, fig. 1.)

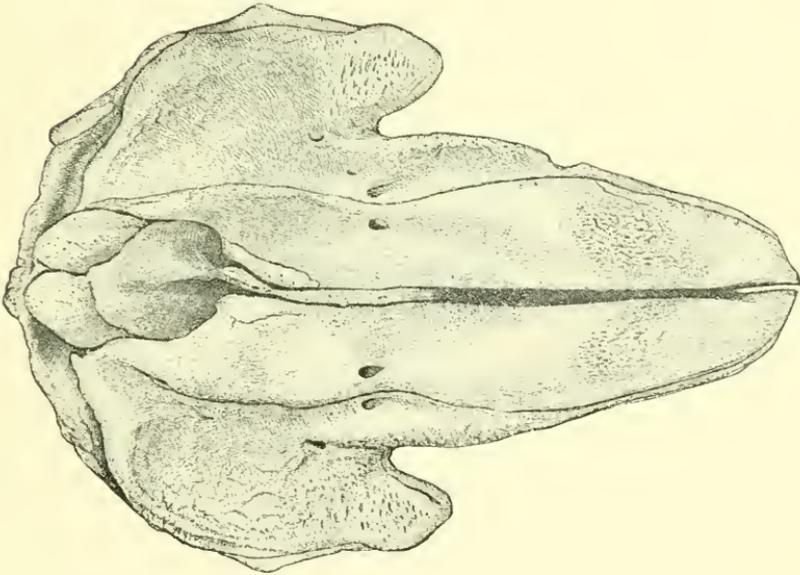


FIG. 2. COMMON BLACKFISH.

Globicephalus melas (Traill).

(From Gray, Catalogue of the Whales and Dolphins, 1866, p. 316, fig. 62)

GENUS GLOBICEPHALUS.

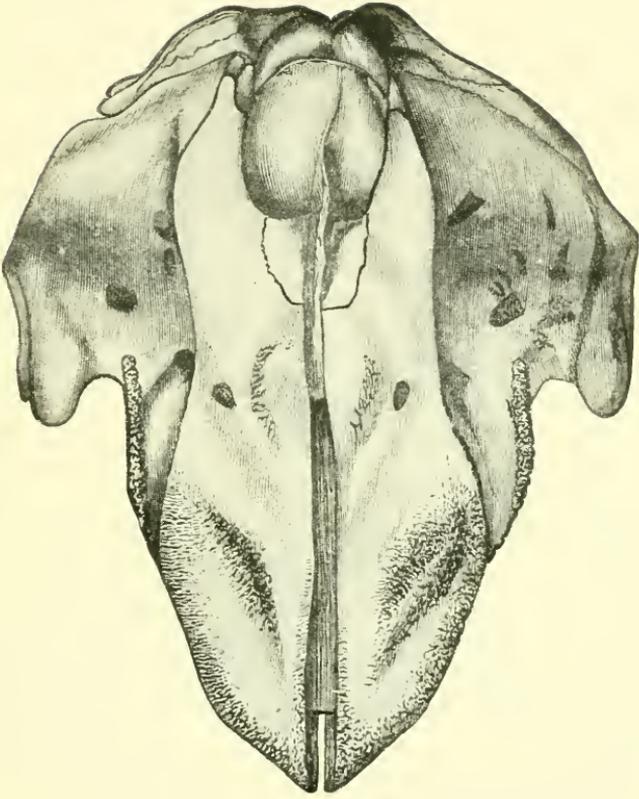


FIG. 1. *Globicephalus brachypterus* Cope.

(From Cope, Proceedings of the Academy of Natural Sciences, Philadelphia, 1876, p. 131.)

GENUS GLOBICEPHALUS.

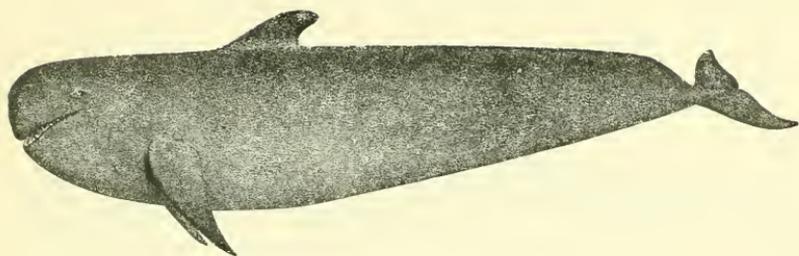


FIG. 1. NORTH PACIFIC BLACKFISH.

Globicephalus scammoni Cope.

(From Scammon, Marine Mammalia, 1874, pl. 16, fig. 1.)

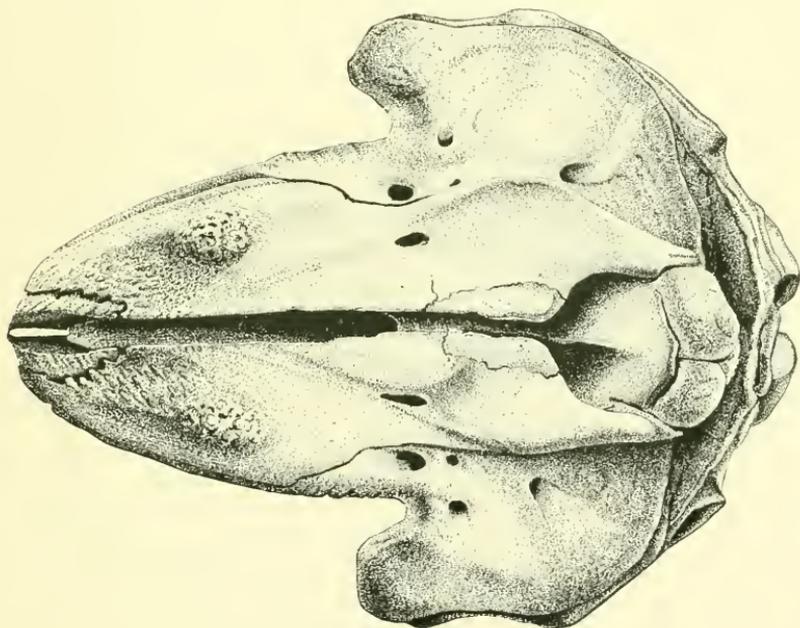


FIG. 2. NORTH PACIFIC BLACKFISH.

Globicephalus scammoni Cope.

(From skull No. 9074, in the U. S. National Museum.)

GENUS GLOBICEPHALUS.

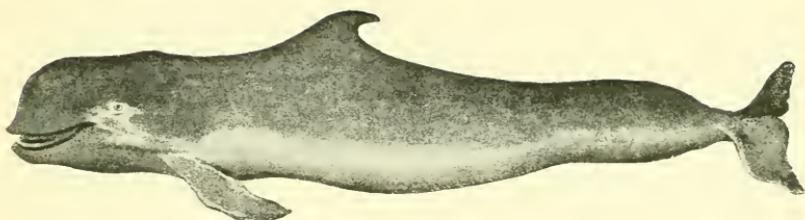


FIG. 1. *Globicephalus sieboldii* Gray.

(From Schlegel, Fauna Japonica, Mammalia, 1850, pl. 27, fig. 1.)

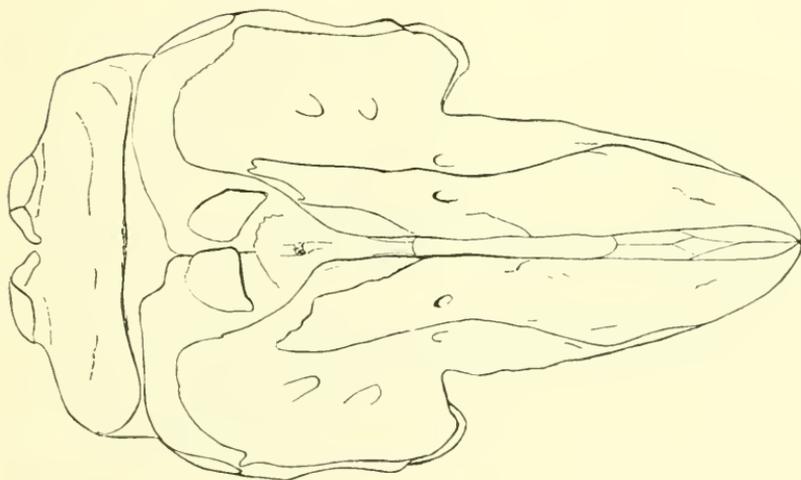


FIG. 2. *Globicephalus sieboldii* Gray.

(From Schlegel, Fauna Japonica, Mammalia, 1850, pl. 27, fig. 1.)

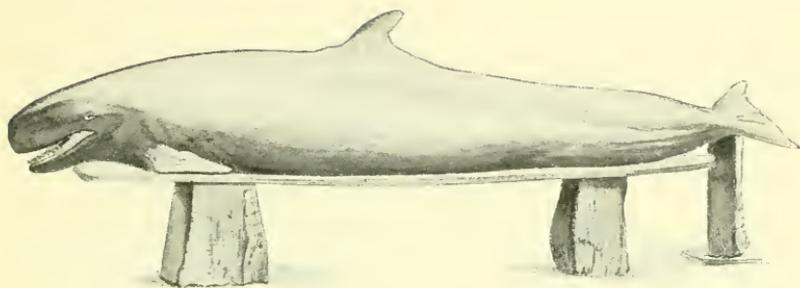


FIG. 1. *Pseudorca crassidens* (Owen).

(From Reinhardt, *Pseudorca crassidens*, Ray Society, 1866, p. 191.)

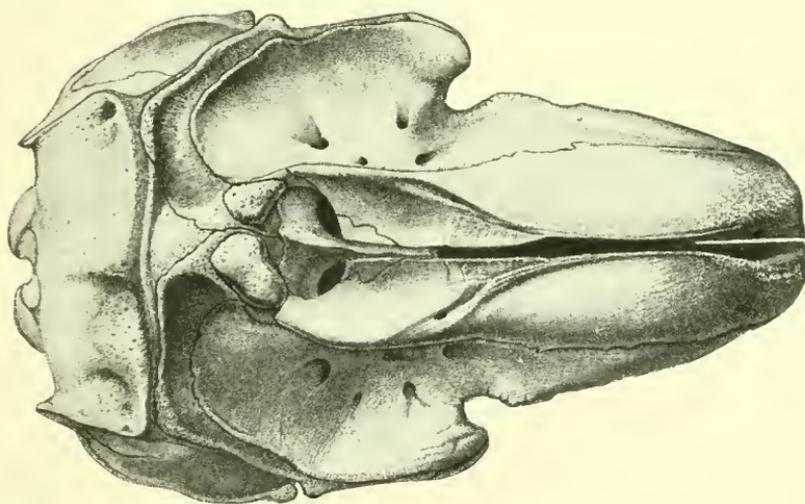


FIG. 2. *Pseudorca crassidens* (Owen).

(From Van Beneden and Gervais, *Ostéographie des Cétacés*, 1868-'79, pl. 50, fig. 7.)

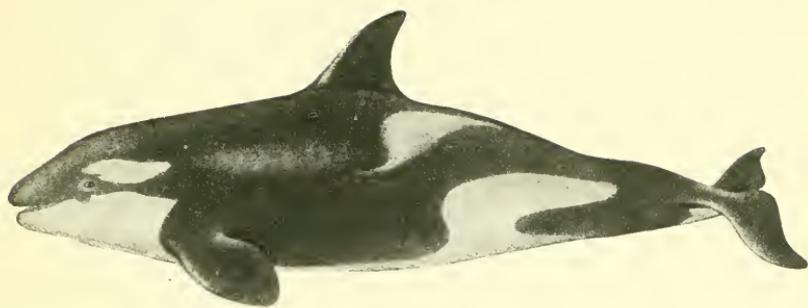


FIG. 1. KILLER WHALE.

Orca gladiator (Lacépède).

(From Lütken, Kgl. Danske Videnskabs Selskabs Skrifter. 6^{te} Række iv. 1887, pl. 1.)

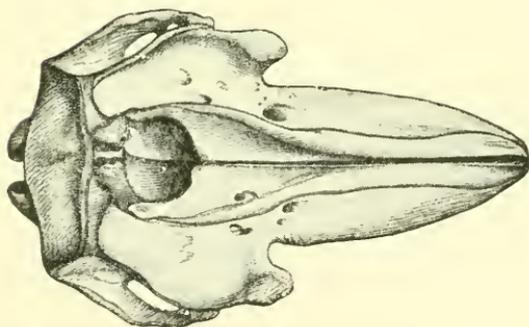


FIG. 2. *Orca gladiator* (Lacépède).

(From Lütken, Kgl. Danske Videnskabs Selskabs Skrifter. 6^{te} Række, iv, 1887, p. 372, fig. 9.)

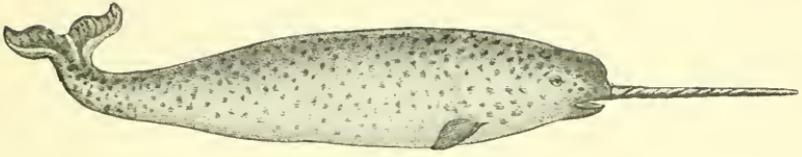


FIG. 1. NARWHAL. Male.

Monodon monoceros Linné.

(From Bell's British Quadrupeds, 2d edition, 1874, p. 435.)

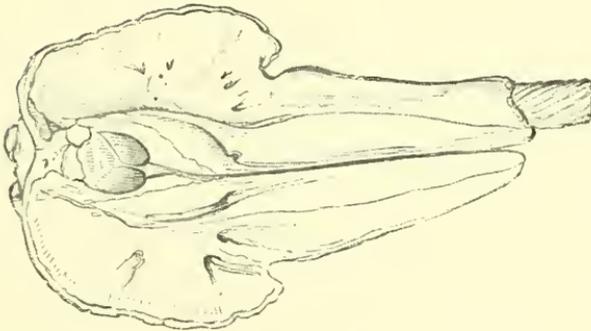
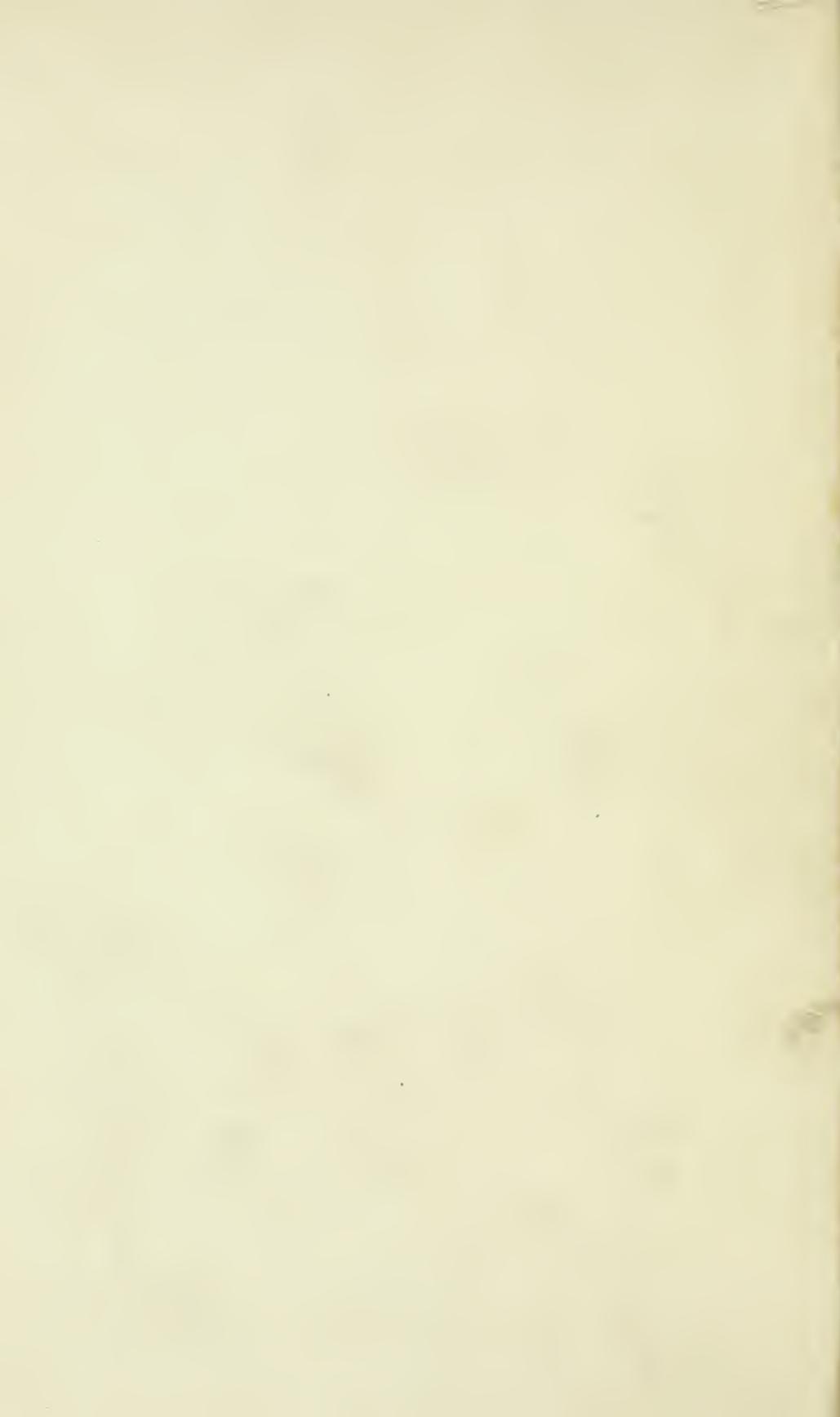


FIG. 2. NARWHAL. Male.

Monodon monoceros Linné.

(From Bell's British Quadrupeds, 2d edition, 1874, p. 439.)





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