

May 24, 1864.

Prof. Huxley, F.R.S., V.P., in the Chair.

Mr. Leadbeater exhibited a remarkable pair of tusks of the Indian Elephant from the collection of Sir Victor Brooke, Bart., F.Z.S.

The following papers were read :—

1. ON THE CETACEA WHICH HAVE BEEN OBSERVED IN THE SEAS SURROUNDING THE BRITISH ISLANDS. BY DR. JOHN EDWARD GRAY, F.R.S., ETC.

There is no series of large animals more difficult to observe and to describe than the Whales and Dolphins ; they are unwieldy to collect and compare. It is almost impossible to preserve their skins ; and when preserved, they are difficult to keep without deterioration, and on account of their odour.

They are only seen at distant periods, and generally either isolated or each kind and age in the same school or herd. They are only seen alive at a distance from the observer, and generally in rapid motion and under unfavourable circumstances for study.

When the larger kinds are cast ashore, they are seized on by the lord of the manor or some other person and sold for their blubber, and their bones are often sold for manure. The preparing of the oil and the putrefying of the flesh render them by no means desirable neighbours ; so that it is not to be wondered at that they are usually got rid of as soon as they can be, and that the naturalist has seldom the opportunity of examining them. Yet they are objects of general interest ; and when they are cast ashore near populous places, they are often shown for a time, and the smaller species are sometimes even carried far inland and exhibited.

The only chance that the zoologist has of examining fresh specimens of these animals is to watch for their occurrence, and hasten to see them while they are in a more or less complete state.

We have until lately been chiefly indebted to Sibbald, John Hunter, and Dr. Knox for the history and anatomy of the British species.

Mr. Scoresby gave some very interesting particulars on the habits and manners of the animals which came under his observation as an Arctic whaler.

Dr. Trail, Mr. Patrick Neil, Dr. Barclay, Dr. Fleming, Mr. Brightwell, and I have described some isolated specimens which have occurred to us, and which had not before been observed in the British seas.

During the last twenty years I have never allowed an opportunity to pass when I could examine a recent-caught Cetacean animal or its bones, whether they consisted of an entire skeleton or only a skull or some isolated bones ; and I have from time to time, in the ' Monograph on Cetacea,' in the ' Zoology of the Erebus and Terror,' in the ' Catalogue of Cetaceans in the Collection of the British Mu-

seum,' and in papers in the 'Proceedings of the Zoological Society' and in the 'Annals and Magazine of Natural History,' brought the results of my labours before the scientific public. The result of these examinations has been to increase very greatly the number of species now known to inhabit the British seas, beyond those hitherto recorded as found in them in the different works on the British fauna, and further to establish those species by personal examination and the comparison of specimens collected on our coast or in our estuaries with the specimens obtained from foreign neighbours or distant regions. I have had the good fortune to be able to examine specimens or osteological remains of all the British species here recorded, except *Physeter tursio* and *Steno rostratus*.

This is the more important, as Dr. Fleming is the only author of a British Fauna that appears to have seen a British whale in the flesh, or to have examined its bones; he describes one species in the 'Wernerian Transactions.' The accounts of these animals in our British Faunas are merely compilations, and those of the larger Whales are almost entirely derived from the work of Sibbald. Some of the authors regard the individual he described as a species; and others, as Bell, in his 'British Animals,' deem the three or four specimens which have been regarded as species by other authors as a single species, without more reason than his predecessors had had for separating them.

The species of the different families have a very great similarity when examined externally and as a whole; and the best characters for the discrimination of genera and species are to be obtained from the examination of their skeletons, and especially of their skulls, cervical vertebræ, and the bones of their fore limbs. But here, as in other vertebrate animals, it requires great care to observe the external characters of the animal and the peculiarities of their osteology, so that the outer form, colour, &c., may be known at the same time as the osteological characters.

To give some idea of the progress of our knowledge of British Cetacea, I have compiled the following table. The number in a column shows the number of the species in the work of the author cited; the same number repeated in a column shows that the author regarded the species as the same. The letters S and H indicate that they occur in the Scandinavian or Dutch fauna:—

		Turton, 1807.	Fleming, 1828.	Jenyns, 1835.	Bell, 1837.
S. H.	1. <i>Balæna mysticetus</i>	48	48	73	12
S.	2. <i>Megaptera longimana</i>	50?	.....	75, part	13
S.	3. <i>Physalus antiquorum</i>	49-51	45-47	74-76	13
	4. — <i>duguidii</i>.....	.....	.....	.....	13
	5. — <i>sibbaldii</i>.....	.....	.....	.....	13
	6. <i>Benedenia knoxii</i> .....	.....	.....	.....	.....
	7. <i>Sibbaldus laticeps</i> .....	.....	.....	.....	.....
	7*. — <i>borealis</i> .....	.....	.....	.....	.....
S.	8. <i>Balænoptera rostrata</i>	52	46, part	.....	13

	Turton, 1807.	Fleming, 1828.	Jenyns, 1835.	Bell. 1837.
H. 9. <i>Catodon macrocephalus</i>	53-55	59	71	10
10. <i>Physeter tursio</i>	56	57, 58	72, 72.2	11
H. 11. <i>Steno rostratus</i>				
S. H. 12. <i>Delphinus delphis</i>	59	52	63	1
S. 13. — <i>euphrosyne</i>				
S. H. 14. — <i>tursio</i>	16	53	64	2
S. 15. <i>Lagenorhynchus leucopleurus</i>				10
S. 16. — <i>albirostris</i>				
17. — <i>acutus</i>				
S. H. 18. <i>Hyperodon butskopf</i>	61	55	70	7
19. <i>Lagenocetus latifrons</i>				
H. 20. <i>Ziphius sowerbiensis</i>	57		70, part	8
S. H. 21. <i>Globiocephalus svineval</i>		51	67	5
22. — <i>affinis</i>				
23. — <i>incrassatus</i>				
S. H. 24. <i>Orca gladiator</i>	60	50	66	4
25. — <i>crassidens</i>				
26. <i>Grampus cuvieri</i>				
S. H. 27. <i>Phocæna communis</i>	58	49	63	3
S. 28. <i>Beluga catodon</i>	54, 18	54-60	68, 71.2	6
S. 29. <i>Monoceros monodon</i>	47	56	69	9

Turton indicates as British 18 species of Cetacea, which are reduced by Fleming to 16, by Jenyns and Bell to 14 species. In this paper the number is increased to 30, belonging to 20 genera.

The British seas seem to be particularly rich in these animals, or our zoologists have been more industrious in collecting them than others; for, while our fauna contains 30 species, Schlegel, in his 'Fauna of Holland,' 1862, gives only 10 species, viz., 1. *Delphinus delphis*; 2. *D. rostratus*; 3. *D. tursio*; 4. *D. orca*; 5. *D. phocæna*; 6. *D. melas*; 7. *D. micropterus*; 8. *D. hyperodon*; 9. *Physeter* —? 10. *Balæna physalus*.

Nilsson, who had studied my essay in the 'Zoology of the Erebus and Terror,' in his 'Scandinavisk Fauna,' 1847, enumerates 16 species, viz., 1. *Delphinus delphis*; 2. *D. euphrosyne*, Gray; 3. *D. obscurus*; 4. *D. leucopleurus*; 5. *D. ibsenii*; 6. *D. tursio*; 7. *D. orca*; 8. *D. globiceps*; 9. *D. leucas*; 10. *D. phocæna*; 11. *Monodon monoceros*; 12. *Hyperodon borealis*; 13. *Balæna rostrata*; 14. *B. physalus*; 15. *B. boops*; 16. *B. mysticetus*.

I have given here the more important synonyms of the species, paying particular attention to the descriptions and figures of British specimens, and the names derived from them. For more extended synonyms and for the general observations on the genera and the species I must refer the student to the 'Catalogue of the Cetacea in the British Museum,' where he will find recorded some of the difficulties which occur in referring with any certainty to preceding authors, even in the case of the most common and generally known species; and at every new reference to authors fresh difficulties occur.

Suborder I. CETE.

Skin smooth, bald. Teats two, inguinal. Limbs clawless; the fore limbs fin-shaped; hinder limbs united, forming a forked horizontal tail. Nostrils enlarged into blowers. *Carnivorous*.

The size of the head, compared with that of the body, varies greatly according to the age of the specimen. In the newly-born whales the head is small; and it enlarges regularly, but at a more rapid rate than the body, as the whale increases in size. In the Greenland Whale, the adult head is two-fifths of the length of the body.

Sect. I. MYSTICETE. *Palate furnished with transverse fringed horny plates of baleen or whalebone. Teeth none in adults. Head large, depressed. Nostrils separate, longitudinal. Gullet very contracted. Tympanic bones large. Lachrymal bone none. Living on Mollusca and fish.*

The skulls of the different genera differ considerably in external form, from being nearly as wide as the lower jaw, as in *Sibbaldus*, to being very narrow so as only to form a narrow central arch, as in *Balæna*. The genera may be thus arranged according to the width of the skull:—1. *Sibbaldus*. 2. *Balænoptera* (Gray, Zool. E. & T.). 3. *Rorqualus* (Rudolphi, Berlin Acad. 1829). 4. *Megaptera* (Eschricht, Nord. Hvaler, t. 3. f. 2). 5. *Physalus* (Eschricht, l. c. t. 3. f. 3). 6. *Eubalæna* (Cuv. Oss. Foss.). 7. *Balæna* (Eschricht, l. c. t. 3. f. 1).

The width chiefly depends on the lateral expansion of the maxilla. In *Balæna* it is band-like; and in *Sibbaldus* very broad, being more than twice as wide as the intermaxillary bones.

Fam. 1. BALÆNIDÆ.

Dorsal fin none; belly smooth; baleen elongate, slender. Vertebrae of neck anchylosed. Pectoral fin broad, truncated at the end. Tympanic bone rhombic. Maxillary bones narrow, linear, rounded; the maxilla narrow, linear, rounded. Lower jaw with only a rudimentary ramus. Scapula higher than wide, with a distinct coracoid process.

“They roar like an enraged bull. The females are generally the largest” (Beal, 13, 14).

As the elongated form of the periotic bones and the more or less rhombic form of the tympanic bone are characteristic of the Right Whales or the family *Balænidæ*, so the tympanic portion of each species has a peculiar and specific form, and may be used for the specific character of the species, in the same manner as I have shown, in the ‘Zoology of the Erebus and Terror,’ that the existence of several species of Right Whales may be proved, and, indeed, the species characterized, by the form and the internal structure of the baleen.

Unfortunately, when species are determined from these characters, the outer form of the animal is unknown; and, unless the ear-bones and baleen are obtained from the same specimen, there is

the fear that one may be giving two names, one characterized by the ear-bone, and the other by the baleen of the same animal, and *vice versâ*.

Yet I think it is so important that we should avail ourselves of every assistance in determining the species of these animals which are so difficult to observe, that one must run the risk of making such a mistake, as it can easily be corrected when the opportunity occurs to some competent naturalist to examine a specimen containing both the baleen and the ear-bones.

Professor Owen, in the 'Hist. Brit. Fossil Mammals,' has named and figured the ear-bones of the genus *Balæna*, which have been observed in the Crag; he has named them as if he regarded the following as distinct species:—1. *Balæna affinis*, fig. 221; 2. *B. definita*, fig. 222; 3. *B. gibbosa*, fig. 223; 4. *B. emarginata*, fig. 224. These bones are all very imperfect, and the figures of the two latter are not sufficient even to decide whether they belong to the genus *Balæna* or to *Physalus*.

1. BALÆNA.

Skull high and contracted behind; the frontal very narrow, marginal, directed backwards; tympanic bone rhombic, large; orbits small (see Cuvier, Oss. Foss. v. t. 25. f. 9, 10, 11). Baleen tough, flexible; enamel thick; internal fibres few, very slender, forming a beautiful thin flaccid fringe. Cervical and the first dorsal vertebræ united by their bodies (see Cuv. Oss. Foss. v. p. 380, t. 26. f. 18). Blade-bone much higher than broad, with a broad acromium (Cuv. t. 26. f. 8). Pelvis of three bones (Cuv. t. 26. f. 25).

Head about one-third of the entire length. The frontal bone short, broad, and band-like, obliquely truncated over the orbit. The upper maxillary bone and intermaxillaries are very narrow, linear. The nasal rather large. The lower jaw is thick and rounded, with scarcely any ramus near the base (Eschr. & Reinh. Nord. Hvaler, t. 5. f. 1). The pectoral fin moderate, with five short unequal fingers, and a short spur on the inner side at the base of the first finger; the middle finger longest, then the second, then the first; the outer or little finger very short and rudimentary (see Eschr. & Reinh. *op. cit.* t. 2. f. 1, & fig. p. 578).

The five first cervical vertebræ are united into a mass by the bodies; the sixth free, with rudimentary inferior lateral processes; the seventh free, without any inferior process (see Eschr. & Reinh. *op. cit.* t. 2. f. 3).

The bladebone three-sided, nearly equal-sided, with a small anterior coracoid process (see Eschr. & Reinh. *op. cit.* t. 2. f. 1, & fig. p. 574).

BALÆNA MYSTICETUS. The Right Whale.

Balæna mysticetus, Linn.; Gray, Zool. E. & T. 15, 47, t. 1. f. 4 (baleen); Cat. Cetacea, B.M. 12, 1850; Bell, B. Quad. 514. fig.; Nilsson, Scand. Fauna, 642; Turton, B. Fauna, 15; Fleming, B. A. 33; Jenyns, Man. 46.

“De *Balænis hujusmodi*,” &c., Sibbald, Bal. 27.

The Right or Whalebone Whale, Dudley, Phil. Trans. xxxiii. 256; Scoresby, Arctic Reg. p. 448, t. 12. f. 1.

Balæna mysticetus borealis, Knox, Cat. Anat. Prep. Whales, 21.

Nordhval, Eschricht & Reinhardt, Kong. Dansk. Videns. 1861, 46 (anatomy).

Hab. North Sea. Skull and lower jaw in the British Museum. Peterhead, 1682 (*Sibbald*). ? Tynemouth (*Willughby*). Coast of Zetland, occasionally (*Barclay*; see Bell, B. Q. 518).

In the Museum there are the cervical vertebræ united into one mass. Dredged at Bridport, 1860.

A skull and a complete skeleton from Greenland in the Museum of the College of Surgeons.

There is a dried foetus of this Whale in the Derby Museum at Liverpool; the upper lip is very large and dependent. And a similar dried foetus in the Museum of the Philosophical Society of Hull: I could not observe any appearance, even a rudiment, of the baleen; but the mouth is closed.

In the skeleton of the adult, which is $41\frac{1}{2}$ feet long, figured by Eschricht and Reinhardt (t. 2), the head occupies two-fifths of the entire length of the skeleton. In the new-born specimen figured on the first plate of their interesting essay, the body is much longer, and the head only occupies about two-sevenths of the entire length, showing that the head increases in length at a greater rate than the body. This seems general in Whales; for the skull of the foetal *Balæna australis*, figured by Professor Huxley in his ‘Elements of Comparative Anatomy’ (fig. 107, on p. 270), is short and broad for the genus, the skull of the foetal and young *Physalus antiquorum*, figured by Eschricht, is shorter than the adult skull, and that of the foetus is very short indeed.

The ear-bones, with the tympanic *in situ*, are represented by Eschricht (Nord. Hvaler, t. 5. f. 4). The tympanic bone is sub-rhombic; the upper surface flat, with a large, subangular, rugose prominence occupying about two-thirds of the upper inner side; the upper margin rounded, the outer edge rather sharp and slightly arched; the lower edge flat, truncated, with a sharp upper and lower edge, which is angulated at the lower outer corner. There is a deep groove between the inner dorsal prominence and the lower edge. The lower surface convex, with a large oblong opening of nearly equal width the whole length.

The specimen in the British Museum is rather sea-worn and polished; but I have compared it, through the kindness of Mr. W. Flower, with the ear-bone of the skeleton which the College of Surgeons have just received from Greenland.

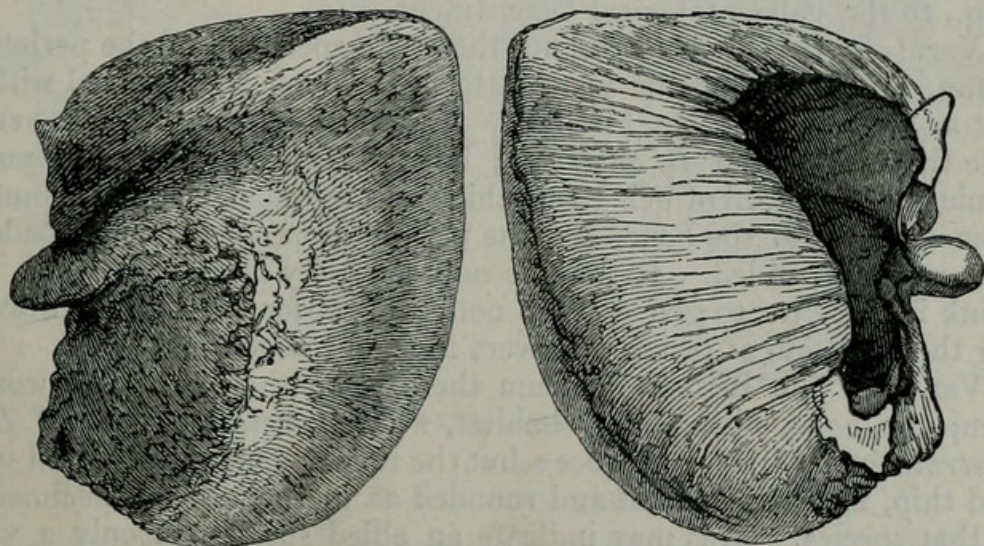
In the British Museum there is a pair of ear-bones very like the former, which evidently came from the same animal, and must belong to this or a very nearly allied species. They chiefly differ from the ear-bones of *B. mysticetus*, above described, in the whole surface being smooth, with only a little rugosity on the dorsal prominence on the inner edge, and in the angle of the outer upper and lower

hinder edges being sharper and more marked ; the outer hinder angle of the dorsal surface is also more concave. I propose to regard it for the present as a variety, *B. m. angulata* (fig. 1).

These bones are said to have been found in the Orkneys ; but I have not much confidence in the accuracy of this habitat, as they were by some means confounded with the ear-bones of *Physalus duguidii* which were sent from Orkney by Mr. Heddle.

In the British Museum there are two tympanic bones, which differ from all the above in the hinder end being flattened above, bevelled off, narrow, and rounded on the edge ; but they are so imperfect that I do not think I am justified in noticing them more particularly, though I believe they indicate another species of *Balæna*. They are both without any locality, and were purchased of dealers, one along with the ear-bone of the Greenland *B. mysticetus*.

Fig. 1.



Tympanic Bones of *Balæna mysticetus*, var. *angulata*.

The Right Whale of the Bay of Biscay (*B. biscayensis*) is regarded as a different species by Eschricht and Van Beneden.

2. EUBALÆNA.

Skull broad and depressed behind. The frontal bones broad, band-like, transverse (see Cuvier, *Oss. Foss.* v. p. 375, t. 25. f. 1–4 of young, and f. 5–8 of adult animal). Tympanic bones rhombic, large. Baleen thick, rather brittle ; enamel thin ; internal fibres numerous, thick, rather intertwined, forming a thick rigid fringe.

Cervical vertebræ all united by the neural apophyses into a single crest (Cuv. *l. c.* t. 26. f. 13).

Ribs 15/15, the four last pairs not reaching the vertebræ. Sternum (Cuv. t. 26. f. 11). Blade-bone flat, higher than broad, with a single prominent acromion (t. 26. f. 7). Arm-bone short. Fingers five, short, the middle longest (t. 26. f. 23). Os hyoides (Cuv. t. 26. f. 14.)

EUBALÆNA AUSTRALIS.

The tympanic bone is subcubical and rugose, the back is very much swollen, the inner edge is very protuberant, and forms an angle with the surface nearer the outer margin; the upper portion is very prominent and subangular, and separated from the lower portion by two irregular depressions; the hinder margin is very thick, convex, and rounded. The lower surface is rather flattened, with an irregular-oblong, rather kidney-shaped aperture, which is very strongly plaited on the hinder margin, and nearly as long as the bone.

Hab. Sea near the Cape of Good Hope.

The periotic bones, with the tympanic bones *in situ*, are figured by Prof. Huxley in 'Elem. Comp. Anat.' fig. 109, from a specimen presented to the College of Surgeons by Dr. G. Bennett.

We have three specimens similar to this figure in the British Museum:—two, presented by H. H. Russell, Esq., as the ear-bone of the Sperm Whale; one from South Africa, presented by G. Byham, Esq., to the Palæontological Department.

Var.? In the British Museum there is a specimen of the periotic bones, with the tympanic bones attached, which we received without an habitat from Dr. Mantell. In several particulars it is very like the specimen of *B. australis*; but the hinder edge of the tympanic bones, instead of being very thick and rounded, is much thinner than any part of the bone, and the periotic bones are much broader and more expanded. It may be only a variety of *B. australis*. I think it is better to give a short notice of it, for the sake of drawing the attention of future observers to the peculiarity.

Var.? In the British Museum there is another imperfect worn tympanic bone, without any habitat, which resembles those of *B. australis* in general appearance; but the hinder margin is shelved off and thin, instead of broad and rounded as in the typical specimens of that species. This may indicate an allied species, or only a variety.

The Whalebone Whales may be thus characterized by their tympanic bones:—

* *Tympanic bone rhombic; aperture oblong, only slightly contracted at the upper end, and about two-thirds of the length of the bone.* BALÆNA and EUBALÆNA.

** *Tympanic bone irregular rhombic; aperture irregular, much contracted at the upper end, and the wide part not half the length of the bone.* CAPEREA.

BALÆNA (CAPEREA) ANTIPODARUM, Gray, Zool. E. & T. t. 1. ¶

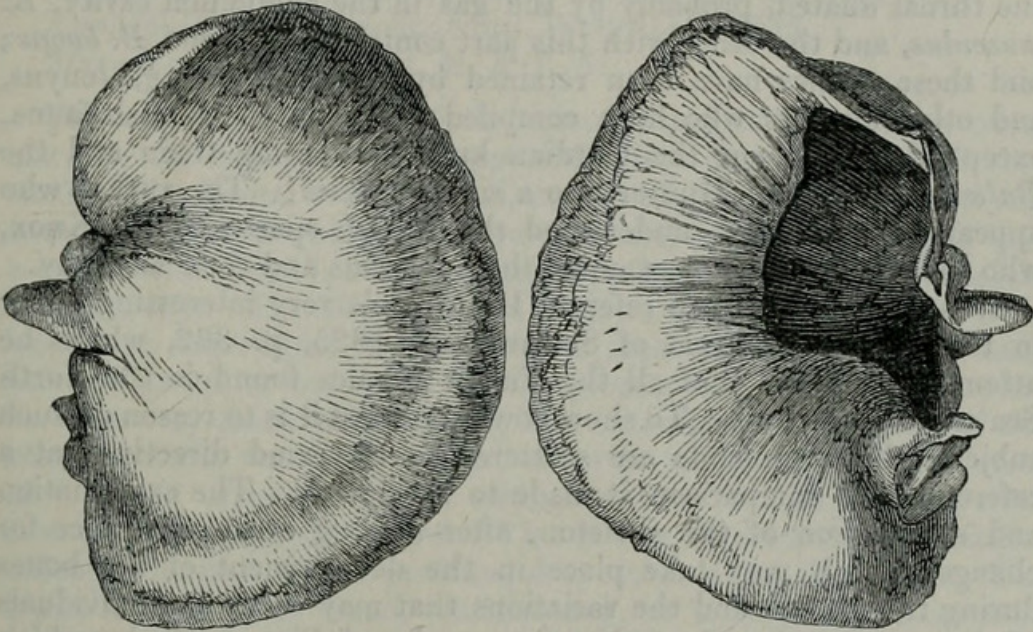
The tympanic bone oblong, rugulose; the upper and outer margin thick and rounded; the lower edge truncated; the back regularly convex, with a smooth, broad, slightly depressed portion just above the middle.

The lower truncated end very broad, with a regular convexity on the inner half, and keeled on the outer half of the upper margin; the lower margin angular. The lower surface is moderately convex, the aperture very irregular, narrow, and contracted above, truncated below (see fig. 2).

Hab. New Zealand, Otago (*Mr. Stuart*).

This is most probably the ear-bone of the Whale described by me as *Balæna antipodarum*, in Dieffenbach's Journal, t. 1.

Fig. 2.



Tympanic Bones of *Caperea antipodarum*.

Fam. 2. BALÆNOPTERIDÆ.

Dorsal fin distinct. Belly plaited. Baleen short and broad. Maxillary bones broad, expanded, sharp-edged. Pectoral lanceolate. Vertebrae of neck free; first and second rarely ankylosed. Tympanic bone oblong ovate. Frontal bone flat, expanded, broad over the orbit; orbit large. Scapula broader than high, with or without a coracoid.

Martens (Spitz. 125, t. ii. f. c) figures a whale, under the name of *Fin-fish*, which agrees in all points with this group; but, as there are no folds on the belly in the figure, Ray, and after him Brisson and Linnæus, established for it a species under the name of *Balæna physalus* (S. N. i. 186). As, however, the name *Fin-fish*, used by Martens, is the one now given by the Greenland whalers to these fin-backed whales with plaited bellies, and as Martens does not mention the colour, nor say a word about the belly, and as Scoresby says, from report, that the skin of the *Fin-fish* is smooth, "except about the sides of the thorax, where longitudinal rugæ or sulci occur," I think there can be little doubt that this whale was only a common finner, and that the absence of the plaits arose from a mistake of the artist. This renders the existence of the section which Lacépède

calls *Rorquals à ventre lisse*, and which Dr. Fleming transformed into a genus under the name of *Physalus*, very doubtful.

Lacépède referred to the smooth-bellied Rorquals the "Hunch-back" of Dudley, who distinctly says the belly is "reeved;" but Lacépède did not understand that word to be synonymous with plaited.

Sibbald (*Balænologia Nova*, 1692) figures two specimens of Finners, caught on the coast of Scotland. Ray (*Hist. Piscium*, 17) noticed these specimens. Brisson and Linnæus regarded them as separate species. Linnæus designated the one with the skin under the throat dilated, probably by the gas in the abdominal cavity, *B. musculus*, and the other with this part contracted and flat *B. boops*; and these species have been retained by Turton, Fleming, Jenyns, and other authors who have compiled works on the British fauna, except Bell, who cut the Gordian knot by uniting them and the *Balæna rostrata* of Hunter into a single species! The author who appears to have best understood the British species is Dr. Knox, who took some pains to examine these animals and their anatomy.

It is only necessary to refer to Dr. Jacob's very interesting paper in the 'Dublin Journal of Science' for 1825, p. 332, where he attempts to prove that all the Finner Whales found in the North Sea are of one species. To show how dangerous it is to reason on such subjects, his arguments are scattered to the wind directly that a reference and comparison is made to specimens. The examination and comparison of the skeleton, after making every allowance for changes which may take place in the development of the bones during the growth and the variations that may occur in individuals of the same species, show that the species of Finner Whales which inhabit the northern hemisphere are much more numerous than was formerly suspected; and it is probably the same with those that inhabit the southern half of the globe.

Professor Eschricht, in 1846, had so little confidence in the number of species of Whales inhabiting the North Sea that he considered that he had made an advance when he thought it was proved that there were at least three different species having their abode in the North Sea (4th Mem. p. 157).

Cuvier, in his essay in the 'Ossements Fossiles,' admits three kinds of Finner; each of them now forms the type of a genus: Rorqual du Cap = *Megaptera*; Rorqual de la Méditerranée = *Physalus*; Rorqual du Nord = *Sibbaldus* and *Balænoptera*. Van Beneden, in 1861, progresses one step further; he admits four—that is, separates the Rorqual du Nord into two species: thus,—1. *Pterobalæna minor* = *Balænoptera*; 2. *Pterobalæna communis* = *Physalus* (and perhaps *Benedenia*); 3. *P. gigas* = *Sibbaldus*; 4. *Kyphobalæna longimana* = *Megaptera*. (See *Nouv. Mém. Acad. Roy. Brux.* 1861, xxxii. 38.)

I. *Dorsal fin low, broad. Pectoral fin elongate, with four long fingers. Blade-bone broader than high, with only a small or no coracoid process. Cervical vertebræ often anchylosed. Frontal bone broad, narrowed at the orbital end; orbit moderate.*

Nuchal arch high, subcircular. MEGAPTERINA. Hunchbacked Whales.

1. MEGAPTERA.

Pectoral fin elongate, about one-fifth of the entire length of the animal. Dorsal fin low, truncate; second cervical vertebra with two short truncated lateral processes; first rib simple-headed, without any internal process.

Megaptera, Gray, Zool. E. & T. 16; Cat. Cetac. 23.

Hunch- or Humpbacked Whales, Dudley and the whalers.

Kyphobalæna, Eschricht, Nord. Wallthiere, 1845.

Megapteron, Gray, Zool. E. & T. 61.

The upper maxillary bone is rather broad, with a convex outer margin; the intermaxillaries are moderately broad; the nasal very small. The frontal bone is broad, much and gradually narrowed and contracted over the orbit. The lower jaw slender, subcylindrical, with a compressed ridge-like ramus near the base (see Eschr. & Reinh. f. a, p. 542). The atlas vertebra with an oblong body, and with a large and short broad lateral process from the upper part of each side. The upper and lower lateral processes of the second cervical vertebra very thick, short, blunt, and separated at the ends; of the other cervical vertebræ slender, more elongate, separate. Neural arch of the cervical vertebræ strong, high, with a large subcircular cavity for the spinal marrow. The bodies of the cervical vertebræ oblong, roundish, or subquadrangular, rather wider than high. The scapula short and broad, without any, or a very small, coracoid process. The arm-bone long; wrist with a broad flat spur; the fingers four, elongate, very unequal in length, the third longest, the second rather shorter, the fourth much shorter, and the first shortest; the longest is formed of eight joints (see Eschr. Dan. Trans. 1845, t. 2. f. D, & t. 3. f. 4). The front ribs thick, oblong, compressed, without any swelling or compressed dilated part near the condyle.

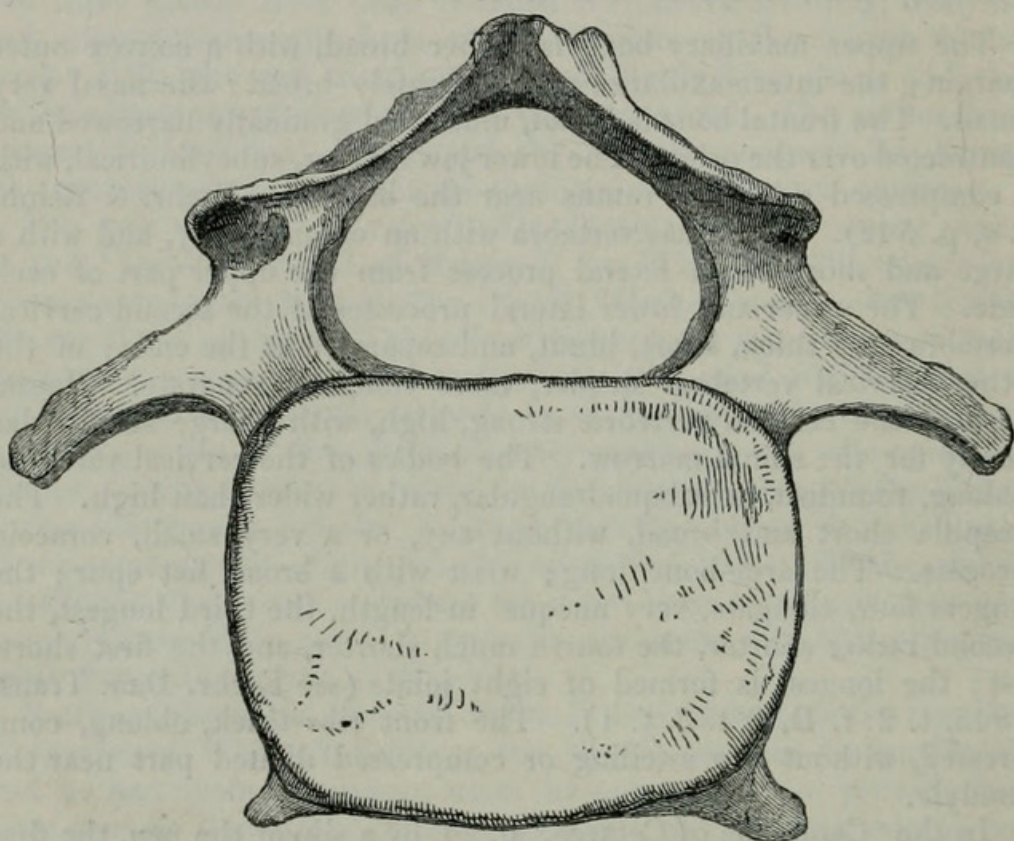
In the 'Catalogue of Cetacea,' p. 24, by a slip of the pen, the first rib is incorrectly said to be forked at the end near the vertebra.

The cervical vertebræ are liable to be more or less anchylosed together. In two specimens, one of *M. longimana*, in the Museum, all the cervical vertebræ are free. In the young specimen in the Derby Museum at Liverpool, which is probably *M. longimana*, the second and third cervical vertebræ are very thin and anchylosed, both by the body and the neural arch. In the specimen of *M. poseskop* in Paris, according to Cuvier, the second and third cervicals are united by the upper part of their body; and in a specimen, apparently of the same species, from the Cape, in the British Museum the second and third cervical vertebræ are only anchylosed by *one side* of the neural arch, and free everywhere else. The breast-bone is irregular rhombic; in one specimen of *M. longimana* from Greenland it is pierced with a large central perforation; in another adult specimen of the same species it is imperforate.

Professor Eschricht, who seems to have formed a theory that the number of species of Whales was very limited, states that he could not find any distinction in the skeleton of the Cape specimen in the Paris Museum to separate it as a species from the Greenland examples. I cannot make any observation as regards the Paris skeleton; but it is said to have been brought by Lalande from the Cape, and is probably from those seas.

M. Van Beneden, in his "Researches on the Cetacea of Belgium," also regards the Cape species as the same as the Greenland one (see *Nouv. Mém. Acad. Roy. Bruxelles*, xxxii. 38, 1861).

Fig. 3.



The fifth Cervical Vertebra of *Megaptera lalandii*.

The cervical vertebræ which are in the British Museum (see fig. 3), received direct from the Cape, present several most important characters, especially the square form of the body of the vertebra, which afford most striking specific distinctions; but perhaps Professor Eschricht may not have been able to examine the form of this part, as the skeleton in the Paris Museum is articulated, and the articular surface of the cervical vertebræ not shown. According to Cuvier, it differs from the Greenland *Megaptera* in the following particulars:—

Cervical vertebra (Cuv. t. 26. f. 19); axis distinct (t. 26. f. 19); second and third cervicals united by spinous apophyses (t. 26. f. 20); the fourth (t. 26. f. 21), fifth, sixth, and seventh free. Blade-bone short, much broader than high, with a small acromion (Cuv. t. 26. f. 9). Humerus short, thick; the forearm-bones elongated; hand

very long; fingers four, very long, the two middle much the longest (Cuv. t. 26. f. 22). Pelvis crescent-shaped (Cuv. t. 26. f. 24).

The genus may be thus divided:—

* *Blade-bone without any coracoid process; the body of the cervical vertebræ oblong, subcircular. North Sea. MEGAPTERA.*

1. MEGAPTERA LONGIMANA.

** *Blade-bone with small coracoid process; the body of the cervical vertebræ nearly square, with the angles rounded, &c. South Sea. POESCOPIA.*

2. MEGAPTERA LALANDII. (Fig. 3.)

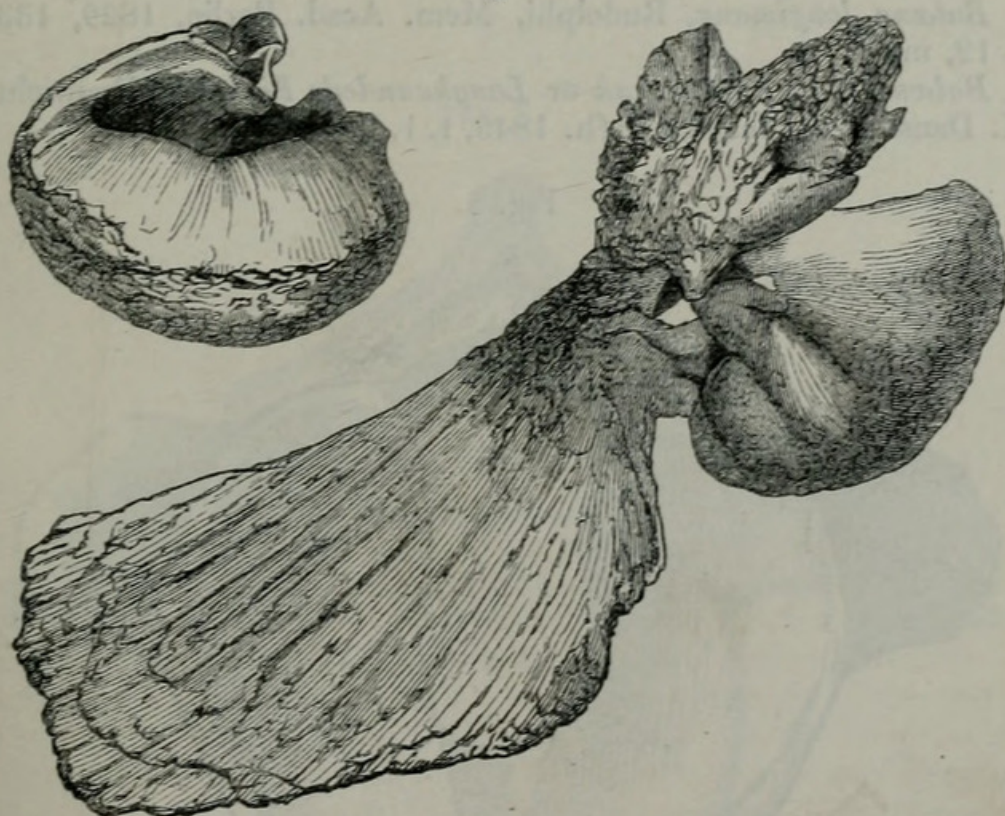
Balæna lalandii, Fischer.

3. MEGAPTERA NOVÆ-ZELANDIÆ. (Fig. 4.)

The tympanic bones very like those of *M. longimana*, but shorter and more swollen, and the periotic bone broad and expanded; the rest of the skeleton, unfortunately, is unknown.

Hab. New Zealand.

Fig. 4.



Ear-bones of *Megaptera novæ-zelandiæ*.

In the British Museum there is a specimen of the bones of the ear, with tympanic bones attached, sent from New Zealand by Mr. Stuart, which are very like these bones in the *Megaptera longimana*

from Greenland in the Museum collection, but differ in the tympanic bone being rather shorter and more swollen. The latter is nearly regularly oblong, and very convex at the upper part, with a somewhat hemispherical outline and rather wider below.

The bones attached to the tympanic are broad and expanded, very unlike the same bones in the Greenland species.

It may be the same as the one from the Cape; but it is well to indicate the existence of a Humpbacked Whale in this district, in the hope of inducing some naturalists to give an account of it, or to send a skeleton of it to England for comparison.

M. Van Beneden states that there is the incomplete skull of a *Megaptera*, brought from Java by Professor Reinhardt, in the Leyden Museum, showing that the genus is very generally distributed; and it is to be observed that whenever specimens of Whales can be procured from distant localities to be compared, it is proved that each species has only a limited habitation, each probably making a more or less large migration within its district.

MEGAPTERA LONGIMANA. (Figs. 5, 6, 7.)

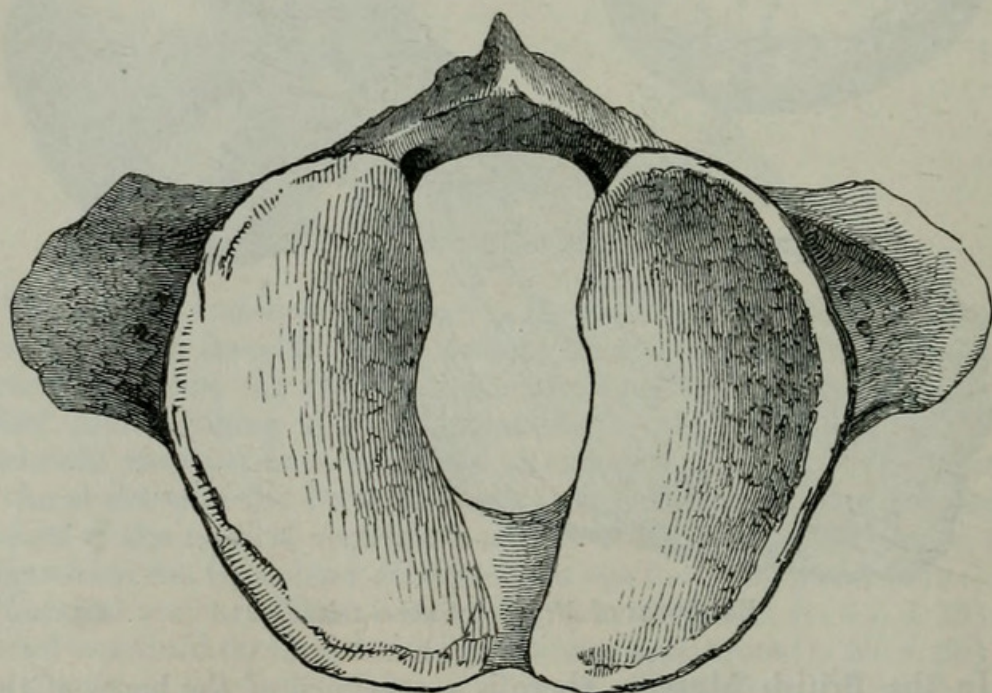
Balæna boops, O. Fab. Fauna Grœnl.; Turton, Brit. Fauna, 16; Nilsson, Scand. Fauna, 639.

Whale, Johnson, Trans. Nat. Hist. Soc. Newcastle, vol. xvi. t. 1, female, on its back.

Balæna longimana, Rudolphi, Mem. Acad. Berlin, 1829, 133. t. 12, male.

Balæna boops (*Keporkak* or *Langhaandede Finhval*), Eschricht, K. Dansk. Vet. Selskab. Afh. 1845, t. 1, 2, 3, 4.

Fig. 5.



Atlas vertebra of *Megaptera longimana*.
Extreme width 20 inches; height 13 inches.

Fig. 6.

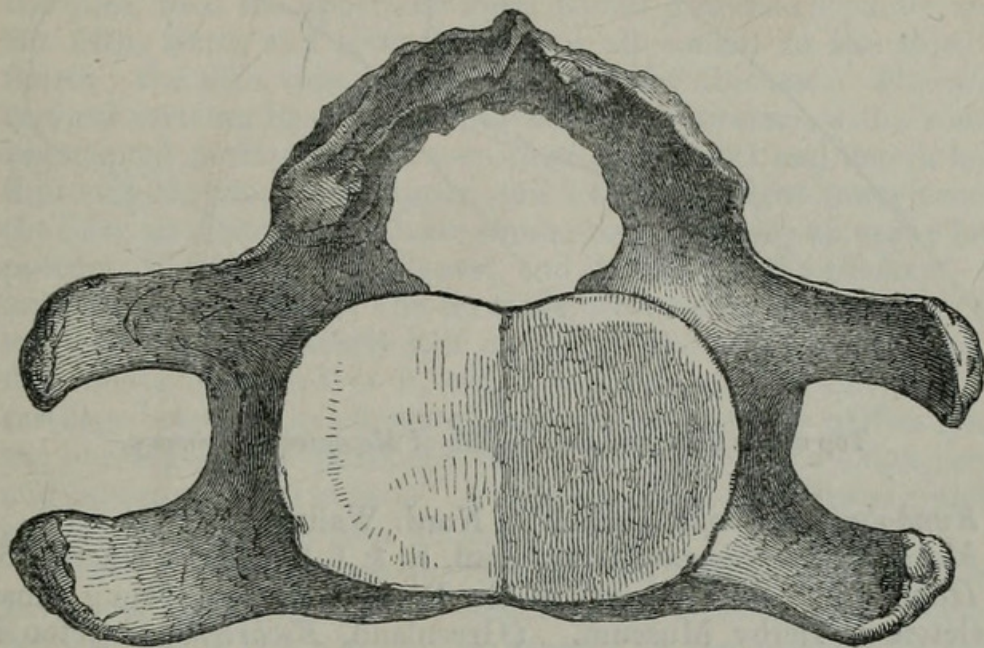
Second Cervical Vertebra of *Megaptera longimana*.

Fig. 7.

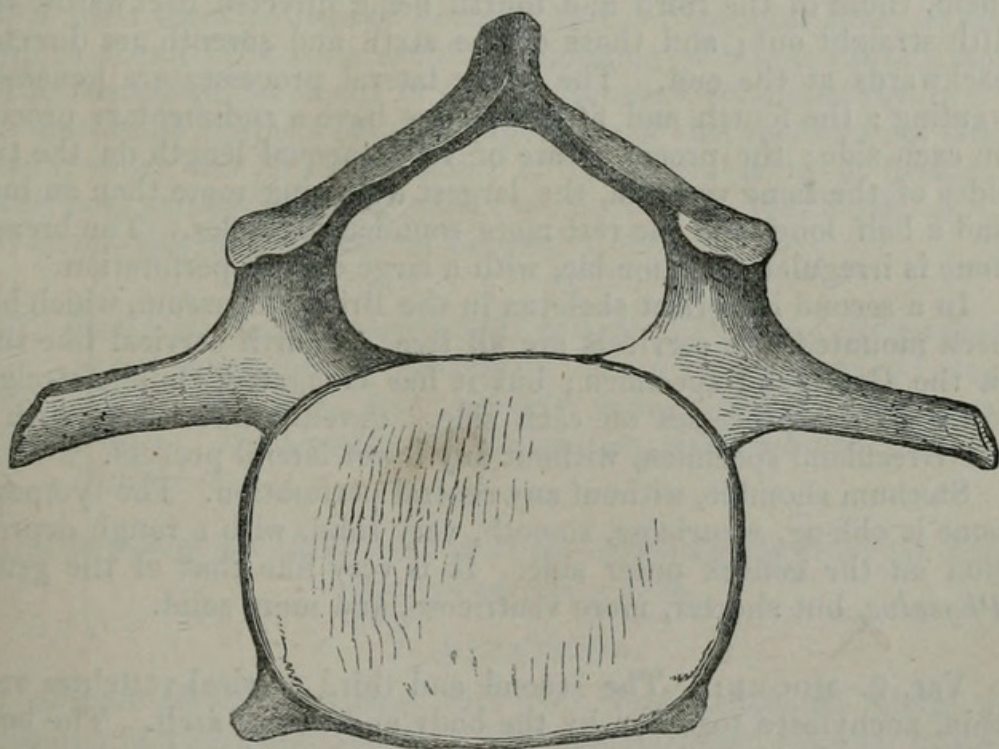
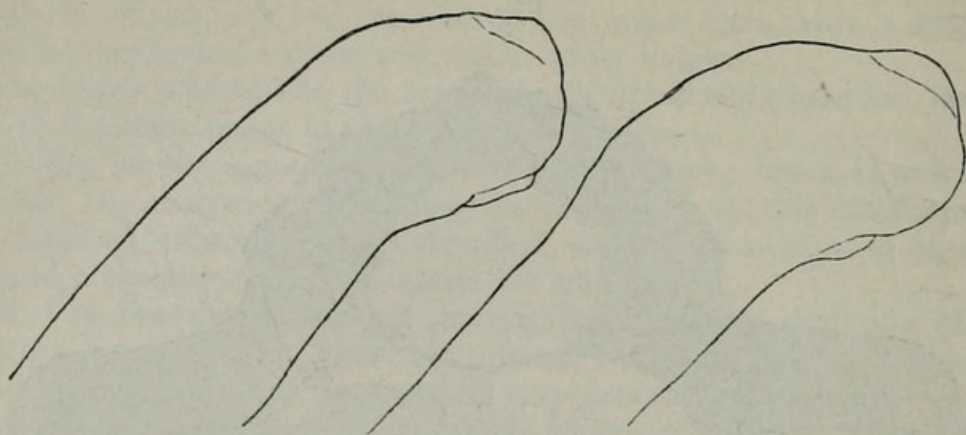
Fifth Cervical Vertebra of *Megaptera longimana*.

Fig. 7 a.

Top of the First and Second Rib of *Megaptera longimana*.

Kyphobalæna boops, Eschricht, Nord. Wallthier. 1849.

Megaptera longimana, Gray, Zool. E. & T. 17; Cat. Cetacea, 36.

Hab. North Sea; estuary of the Dee (*T. Moore*), young female skeleton in Derby Museum. (Greenland, *Eschricht*, skeleton in Brit. Mus.)

Var. 1. The cervical vertebræ are all free; the second cervical is very thick; the third, fourth, fifth, sixth, and seventh are thicker and of nearly equal thickness, the seventh being rather the thickest. The upper lateral processes are developed and nearly equal in all of them, those of the third and fourth being directed backwards, the fifth straight out; and those of the sixth and seventh are directed backwards at the end. The lower lateral processes are generally wanting; the fourth and fifth vertebræ have a rudimentary process on each side; the processes are of very unequal length on the two sides of the same vertebra, the largest not being more than an inch and a half long, and the rest mere rounded tubercles. The breast-bone is irregular, subrhombic, with a large central perforation.

In a second imperfect skeleton in the British Museum, which had been mounted, the cervicals are all free. Fourth cervical like that in the Greenland specimen; but it has elongated, simple, straight lower lateral processes on each side. Seventh like the seventh in the Greenland specimen, without any lower lateral process.

Sternum rhombic, without any central perforation. The tympanic bone is oblong, ventricose, smooth, very solid, with a rough depression on the convex outer side. It is very like that of the genus *Physalus*, but shorter, more ventricose, and more solid.

Var. 2. *MOOREI*. The second and third cervical vertebræ very thin, anchylosed together by the body and neural arch. The body of the cervical vertebræ oblong, transverse, much wider than high. The neural arch rather slender, with a subcircular oblong cavity, which is fully two-thirds as high as wide.

Hab. Estuary of the Dee (1863, *Thos. Moore*). Skeleton in Derby Museum, Liverpool; a young female 31 feet long.

The atlas is very thick; the second cervical nearly as thick as the atlas, with the upper and lower lateral processes separate, short; the fifth, sixth, and seventh cervical all similar to the third and fourth; the fifth thin, and the seventh the thickest. The second cervical vertebra has two short broad thick processes, with a rounded interrupted perforation between them; the third and fourth have a thin long shelving-down upper, and a short straight lower process; the fifth, sixth, and seventh are similar, but have only an upper lateral process; the fifth is the thinnest, and the seventh the thickest. The arms were 10 feet long; the cartilage between the bones of the arms and the fingers is nearly half as long as the arm-bones; there are four bones immersed in it, small, variously shaped and sized; the cartilage between the elongated finger-bones is nearly half as long as the phalanges; the phalanges nearly all of the same oblong shape, and subsymmetrical in form. The bones of the skull are so fragile as scarcely to bear their own weight.

Moore, in the lithographic 'Naturalist's Scrap-Book' (printed in Liverpool) for July 17, 1863, observes, "It yielded no oil; the blubber was like a cow's udder, as exposed in the market for sale in Liverpool. Length 31 feet 4 inches. Bought by a manufacturer of oil and grease, who made nothing of it." "All black; belly mottled and streaked with white; pectoral fins milk-white, with a black blotch here and there. Baleen very closely packed together, thirty-eight blades in a foot; the largest blade was nearly 2 feet long." "Female: length 31·4, of gape 8·0, from snout to eye 8·0, of eye 0·3, from snout to base of pectoral 11·0, of pectoral 10·0; extreme width of tail 11·0, from snout to beginning of hump 18·0, of hump 3·3, from snout to cloaca 21·0." "Stomach contained shrimps."

Eschricht figures a new-born specimen of this species from Greenland, which was 35 inches long; it has several series of bristles on the lips, parallel with the gape (see K. Dansk. Vid. Selsk. xi. t. 3. f. 1, and the teeth as seen in the jaws t. 4).

II. *Dorsal fin erect, compressed, falcate. Pectoral fin moderate, about one-eighth of the entire length of the animal; fingers short; phalanges few; scapula broad, with a long coracoid process; the neural arch broad, low, much broader than high.*
PHYSALINA.

a. *The dorsal fin about two-thirds the entire length from the snout; cervical vertebræ free.*

2. BENEDENIA.

Second cervical vertebra with two short truncated lateral processes; first rib simple-headed, with a compressed internal process.

Physalus, § *Rorqualus*, Gray, Cat. Cet.

Pectoral fins moderate; dorsal fin falcate; skull rather broad;

maxillæ broad, with nearly straight outer margins. The second cervical vertebra (fig. 8) with two separate, broad, strong, nearly equal-sized lateral processes, which are rather expanded and truncated at the tip (as in *Megaptera*). The third, fourth, fifth, and sixth cervical vertebræ with elongated slender upper and lower lateral processes, which are attenuated and separated at the end (not forming rings). The bodies of the cervical vertebræ oblong, transverse; the canal of the neural arch low, oblong, transverse, much wider than high. The scapula short, broad, with a strong, well-marked coracoid process.

Vertebræ 60. Ribs 15, all simple; the front ones compressed and dilated at the end; the first with a broad rounded lobe on the inner side; the second with an elongate, slender, rounded internal process.

This genus is only described from the skeleton of a young specimen; it combines the characters of *Megaptera* and *Physalus*. Its second cervical vertebra has the form of that of *Megaptera*; and it has the low neural arch and the oblong transverse canal for the spinal marrow, the blade-bone with the strong anterior process, the same kind of front ribs, and the short pectoral fins of the genus *Physalus*.

It has been suggested to me by a comparative anatomist of considerable experience that perhaps the lateral processes of the cervical vertebræ of this Whale might be lengthened in the adult age, and the end of the upper and lower processes united into a broad expanded plate as in the genus *Physalus*.

In the skeleton of the small fœtus of *Balænoptera*, only 9 inches long, figured by Eschricht in the 'Royal Danish Transactions' for 1846, t. 14. f. 2, the lateral processes of the second vertebra are very nearly of the same shape as in the adult, forming a broad expansion, with a perforation at its base. The cervical and other vertebræ of this fœtus seemed to agree, in all details of form, with the same bones in the adult.

I do not deny that the lateral process of the first cervical vertebra may not be continued in cartilage, and be of the same form as that of the genus *Physalus*; but at any rate we have no proof, if this be the case, that the cartilage at the end ever becomes ossified in this genus any more than in the genus *Megaptera*, both genera agreeing in the equality of the thickness and strength and shortness of the lateral processes.

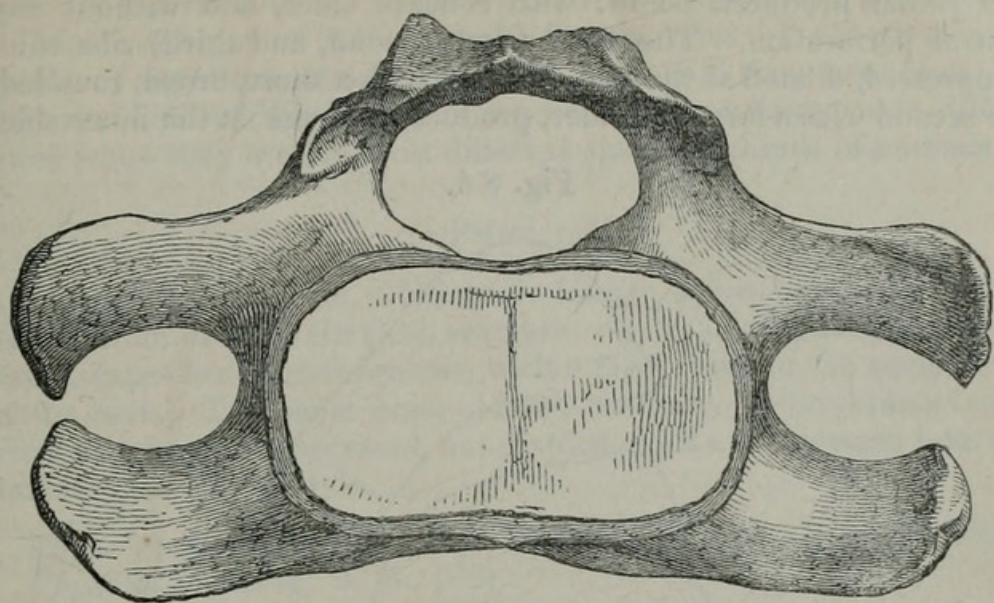
BENEDENIA KNOXII. (Figs. 8, 8 a.)

Physalus (*Rorqualus*) *boops*, Gray, P. Z. S. 1847, 91; Cat. Cetac. 41.

Hab. North Sea; coast of North Wales, towed into Liverpool, 1846; skeleton, 30 feet long, in the British Museum.

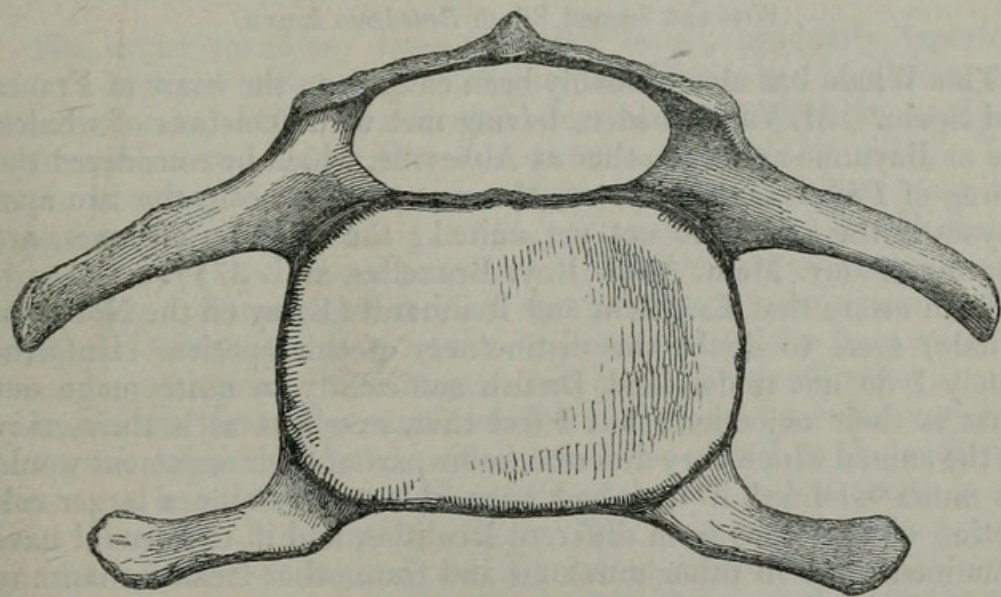
Cervical vertebræ all free; the upper lateral processes bent down; the lower ones ascendant at the end, with a more or less acute angle on the lower edge near the base. The second cervical vertebra moderately thick. The third, fourth, fifth, sixth, and seventh rather thin, and all nearly of the same thickness. The upper lateral processes

Fig. 8.



Second Cervical Vertebra of *Benedenia knoxii*.
Extreme width 19 inches ; height 10 inches.

Fig. 8 a.

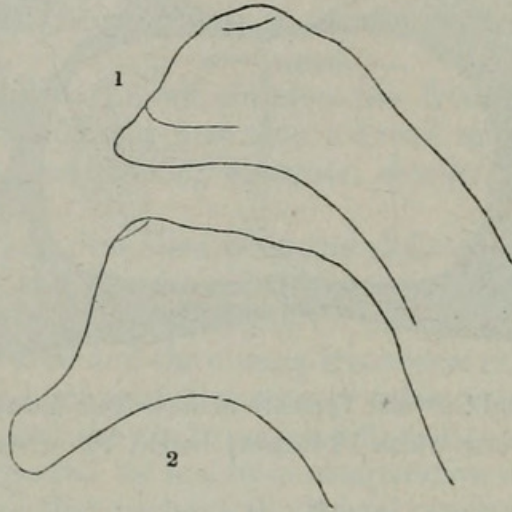


Fifth Cervical Vertebra of *Benedenia knoxii*.

of the third and fourth very slightly bent back at the end ; of the fifth similar, but nearly straight ; of the sixth and seventh broader and stronger to the end, and rather bent forwards towards the head at the end. The lower lateral process of the third, fourth, and fifth vertebræ compressed, high, nearly similar, and nearly equally strong, with an obscure angular prominence on the lower edge near the base ; of the sixth vertebra not so long, high, and compressed at the base, tapering at the end, and with a decided angular projection on the lower edge, where the end bends up. The seventh vertebra without any lower lateral process on either side.

The breast-bone broad above, with an arched upper edge, narrow and rather produced below, with concave sides, and without any central perforation. The front (first, second, and third) ribs thin, compressed, dilated at the end; the first with a short, broad, rounded, the second with a larger, slender, produced process on the inner side.

Fig. 8 b.

First and Second Rib of *Benedenia knoxii*.

This Whale has also probably been caught on the coast of France and Spain. M. Van Beneden, having met with skeletons of whales, one at Bayonne and the other at Abbeville, which he considered the young of *Physalus antiquorum*, observes that, in both, the two apophyses of the axis were not yet united; the ribs, he observes, are wanting (Nouv. Mém. Acad. Roy. Bruxelles, xxii. 37)*.

I am aware that Eschricht and Reinhardt (Essay on the Northern Whale) seem to doubt the distinctness of this species. Unfortunately I do not understand Danish sufficiently to quite make out what is their objection; but I feel that, excellent as is their essay on the animal which they describe, some part of their argument would be much modified if they had been able to examine a larger collection of skeletons from different localities, and if they could have examined those in other museums and from other localities more in detail; but unfortunately they give their opinions on specimens which they have not seen, and, like many other Continental naturalists, without making sufficient allowance for the very large extent of the collection in England, or considering that the species here described are not separated until after careful consideration and comparison.

There is unfortunately an inclination in most of the Continental naturalists to believe that all the species they do not possess are the same as, or only slight variations of, those they have—an idea that is a fertile source of confusion and error in reasoning.

* Perhaps, if he had examined the cervical bones separately, he would have observed that the perforation was situated in a different part of the lateral processes, and was of a different form from that of *Physalus antiquorum*.

This theory of the limited number of species of Whales greatly destroys the value of M. Eschricht's observations on the anatomy of Whales, in his papers in the 'Danish Transactions;' for he constantly speaks of variations which would only be true if they were found in the same kind of Whales, but are peculiarities and important differences when they are found in different species or kinds of animals.

3. PHYSALUS.

Pectoral fin moderate. Dorsal fin falcate, three-fourths the entire length from nose. Cervical vertebræ all free; the second with a broad, expanded lateral process, with a large hole in the upper part of its base. Tympanic bone oblong, elongate. Vertebræ 54-64. First ribs simple, compressed, not divided, with a compressed internal process near the condyle.

Physalus, Lacép.; Gray, P. Z. S. 1847, 88; Cat. Cetac. 34, 1850.

Physalis, Fleming, B. A. 1828.

Physelus, Rafin.

Balæna tripennis, Ray (Razorback).

Balænopterus, sp., Lacép.

Balænoptera, sp., Lacép.

Pterobalæna, sp., Eschr.

The upper maxillary bone is rather broad, gradually tapering, with a straight outer edge; the intermaxillaries are moderate, and the nasal very small. The frontal bone is broad and short, suddenly narrowed on the outer side, and truncated over the orbit. The lower jaw slender, arched, with a distinct elevated ramus near the base (see Eschr. & Reinh. p. 544). The atlas vertebra with a sub-circular body; the lateral processes cylindrical and near the middle of the side. The second cervical vertebra has a broad, more or less elongated lateral process, which is pierced near the base with an oblong perforation. The upper margin of the perforation is narrow, and the lower edge much broader. The other cervical vertebræ have two lateral processes, which are often united at the ends into a more or less broad ring. The body of the cervical vertebræ is oblong, transverse, broader than high. The neural arch is long, with an oblong transverse canal for the spinal marrow, which is much broader than it is high. The front ribs compressed, thin, with a broad, more or less elongated expansion on the inner edge near the condyle. The scapula high, with a broad coracoid process near the joint.

The baleen forms three or four concentric lines on the palate, the rows forming transverse lines. The plates of the inner rows are short, of the outer elongate triangular; they are all fringed on the inner oblique side. (See Ravin, Ann. Sci. Nat. v. 270, t. 11. f. 5-10; see also Rosenthal, Abhandl. K. Acad. Berlin, 1827, 127.)

The shape of the lateral process of the second cervical vertebra seems to be a good character of the genus. The perforation at the base of it is rather above the middle of the base of the process, so

that the upper margin is narrower than the lower. In the genus *Balænoptera* it is nearly in the centre of the base.

The genera *Megaptera* and *Rorqualus* have separate, short upper and lower lateral processes, which are rather dilated and truncated at the end, having an interrupted circular perforation between their inner bases. It has been suggested that, in the latter genus at least, the separated processes may be only the imperfectly developed state of the broad lateral process of the genus *Physalus*, the end that is wanting in the skeleton probably existing in the living animal in the state of cartilage. But if this should be the case (which I much doubt), the form of the margin of the perforation and the perforation itself must undergo great change during the ossification of the end of the process for there to be any resemblance between the lateral processes of these genera and that of the genus *Physalus*. From what I have observed, I believe that no such change does take place, and that the form of the processes and the situation of the perforations afford good characters for the separation of the species into groups and the species from each other.

- * *The upper and lower lateral processes of the third, fourth, fifth, and sixth cervical vertebræ elongate, united, forming a ring; the body of the cervical vertebra oblong, transverse, much wider than high; the upper and lower edge nearly straight; the lateral process of the second cervical elongated.*

PHYSALUS ANTIQUORUM. The Razorback. (Figs. 9, 10, 11, 12.)

Balæna maximus borealis, Knox, Cat. Whales.

Great Northern Rorqual (Knox), Jardine, Nat. Lib. t. 6 (skeleton).

Physalus antiquorum, Gray, P. Z. S. 1847, 96; Cat. Cetac. 38; Heddle, P. Z. S. 1855, 195, fig. verteb. bad.

Rorqual de la Méditerranée, Cuvier, Oss. Foss. v. 370, t. 26. f. 5.

Balæna antiquorum, Fischer, Syn. 525 (from Cuvier).

Balænoptera antiquorum, Gray, Zool. E. & T. 50.

Balæna physalus, Turton, B. F. 15; Jenyns, Man. 47; Nilsson, Scan. Fauna, 636.

Balænoptera boops (part), Fleming, B. A. 31; Jenyns, Man. 47.

Balæna musculus, Turton, B. F. 16; Jenyns, Man. 47.

Balænoptera musculus, Flem. Brit. Anim. 30.

Balænoptera acuto-rostrata, Scoresby, Arct. Reg. i. 485, t. 13. f. 2.

Balænoptera boops, Bell, B. Quad. 520, f. 1.

Balænoptera physalus, Schlegel, de Dieren, 101, t. 20.

Fin Whale, Neil, Wern. Mem. i. 201.

Balæna physalus, O. Fab. F. G. 35.

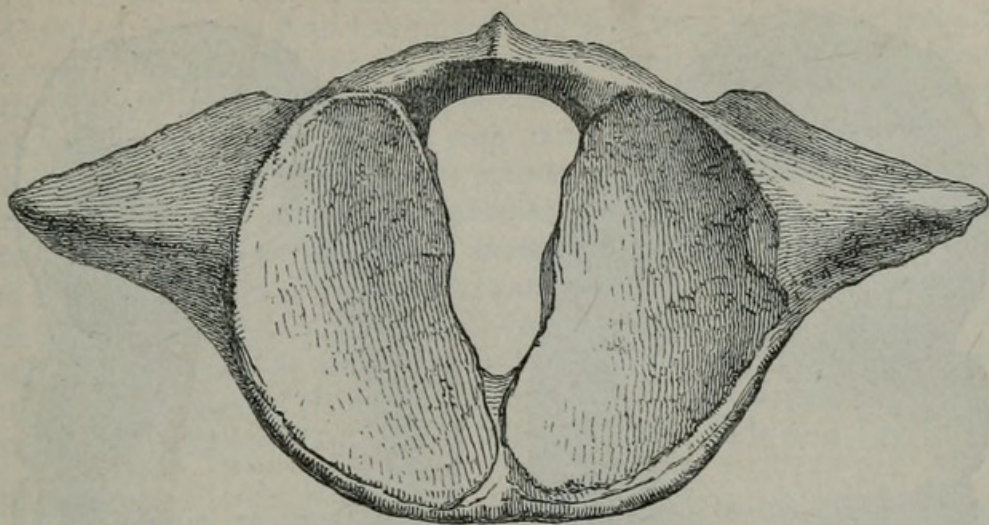
Physalus vulgaris, Fleming, B. A. 32.

Balænoptera gibbar, Scoresby, Arctic Reg. i. 478.

Pterobalæna communis, Eschricht, Van Beneden, Bull. Acad. Brux. ser. 1, 1857, i. 390; Nouv. Mém. Acad. Brux. xxxii. (1861) 37.

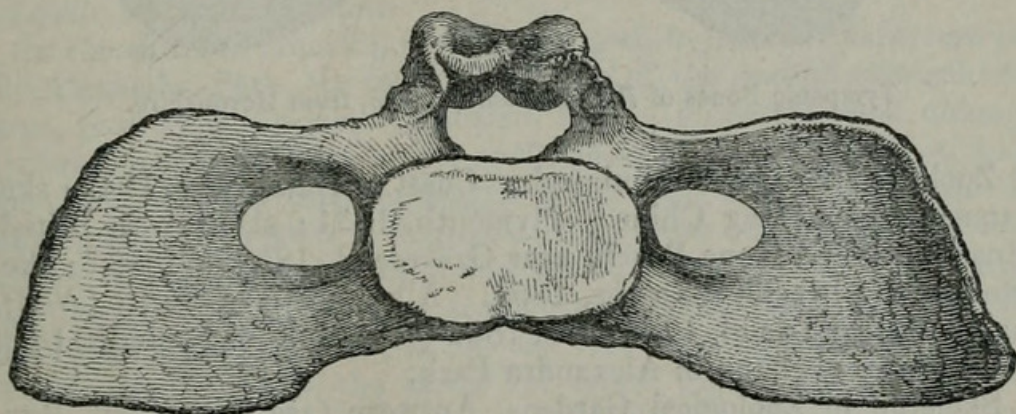
Hab. North Sea; North Berwick, 1831 (*Dr. Knox*); skeleton

Fig. 9.



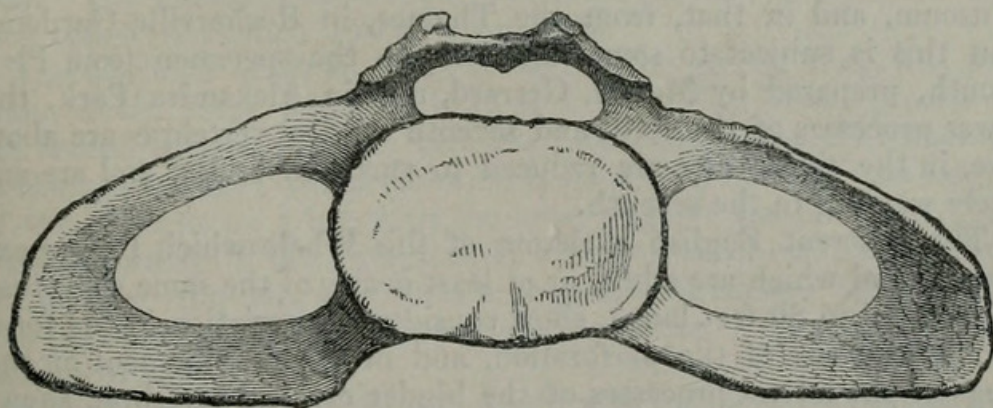
Atlas Vertebra of *Physalus antiquorum*, from Devonshire.
Extreme width 26 inches ; height 13 inches.

Fig. 10.



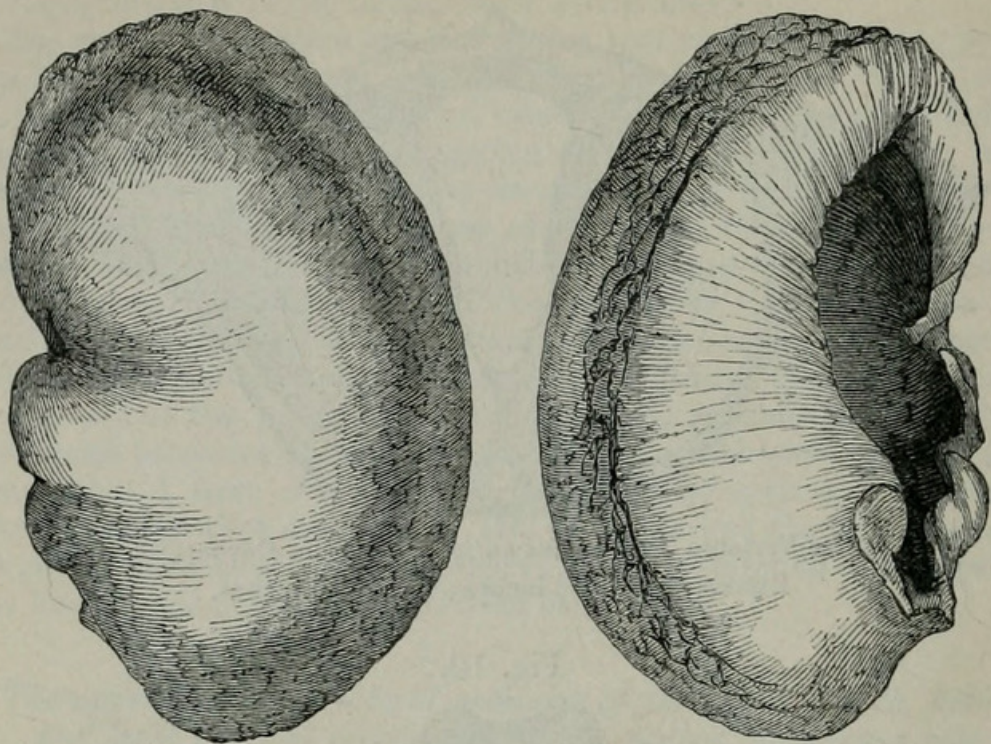
Second Cervical Vertebra of *Physalus antiquorum*, from Devonshire.
Extreme width 43 inches ; height $13\frac{1}{2}$ inches.
Width of articular surface 10 inches ; height 8 inches.

Fig. 11.



Fifth Cervical Vertebra of *Physalus antiquorum*, from Devonshire.
Extreme width $35\frac{1}{2}$ inches ; height $10\frac{1}{2}$ inches.
Width of articular surface 12 inches ; height $7\frac{1}{2}$ inches.

Fig. 12.

Tympanic Bones of *Physalus antiquorum*, from Devonshire.

at Zoological Gardens, Edinburgh. Coast of Hampshire, 1842; skeleton at Black Gang Chine. Plymouth, 1831; skeleton in British Museum. The Hope Reach, near Gravesend, 1858 or 1859?; skeleton at Rosherville Gardens, 1864. Alloa, Frith of Forth (*Neil*), male. Burnt Island, 10th June, 1862 (*Walker*). Plymouth, 1863 (*Gerrard*); skeleton in Alexandra Park.

Skeleton in Zoological Gardens, Antwerp (see Bull. Acad. Roy. Brux. xxiv. 3). Skeleton not mounted, Museum Paris. Skeleton, Museum Louvain, 1836, 60 feet long. Holland, 1836.

In the normal state of the cervical vertebræ of this species, both the upper and lower lateral processes of all of them are developed and united into rings. This is the case in the skeleton in the British Museum, and in that, from the Thames, in Rosherville Gardens. But this is subject to some variation: in the specimen from Plymouth, prepared by Messrs. Gerrard, now in Alexandra Park, the lower processes of the sixth and seventh cervical vertebræ are abortive, in the sixth they are reduced to small tubercles, and are entirely wanting in the seventh.

The different English skeletons of this Whale which I have examined and which are adult, or at least nearly of the same size (that is, from 70 to 80 feet long), show considerable variation in the form and in the size of the perforation, and in the development of the rings of the lateral processes of the hinder cervical vertebræ, showing that there are several species, or, what is more probable, that their bones are liable to a considerable amount of variation.

The skeleton which is now in the British Museum is said to

have been found dead, floating in the sea, at Plymouth on the 2nd of October 1831, and to have been 102 feet long and 75 in circumference. The cervical vertebræ are all free and separate; the second with a broad lateral expansion, pierced at the base; the third, fourth, fifth, and sixth with rings, the ring of the third being the broadest; the seventh with only a superior lateral process, without a small tubercular rudiment of a lower process; the lateral processes of the second and third cervical bent backwards, of the fourth straight, and of the fifth and sixth bent forwards. The hinder vertebræ large and heavy. Caudal vertebræ without chevrons 7, with chevrons 10, lumbar 17, dorsal 13, and cervical 7=54. The sternum is sinuous; but the front edge is truncated, on a line with the widest part, without the subtrifoliate front edge; it is 18 inches wide and $14\frac{1}{2}$ inches long.

The skeleton at Black Gang Chine is said to be 75 feet long. Ribs 14/14. Vertebræ: caudal 18, lumbar 15, dorsal 14, cervical 7=54. Baleen blue-grey, white-streaked on the narrow inner side. The second cervical vertebra with a broad lateral expansion, pierced with an oblong hole; the third, fourth, fifth, and sixth cervical with ring-like lateral expansions.

In the skeleton from Plymouth, prepared by Mr. Gerrard, now in the Alexandra Park, the lateral processes of the second cervical are large, produced, obliquely truncated, with a moderate-sized oblong perforation, not half the length of the process, on a line with it, and not more than one-third the length of the lower edge; of the third, fourth, and fifth vertebræ ring-like, not quite so long as those of the second vertebra, slender, thin, and weak; the processes of the fifth vertebra are the thickest and strongest, especially below; the sixth has upper processes only, which are very thin and slight; in the seventh they are like the sixth, but much thicker and larger, and bent back so that the two processes are close together at the upper edge: the sixth vertebra has small short tubercles in the place of the lower lateral process; none are present in the seventh vertebra. The sternal bone is subtrifoliate, much broader than high, with an elongated strap-like process below, and without any central perforation. The bodies of the second and third cervical vertebræ are oblong transverse, much broader than high.

The skeleton at Rosherville is said to be 70 feet long, and was taken in the Hope Reach in 1858 or 1859. The lateral process of the second cervical is large, elongate, produced, obliquely truncated at the upper edge; the perforation is moderate, not half the length of the process, on a line with the lower edge of the opening. The lateral processes of the third, fourth, fifth, and sixth cervical vertebræ are narrow, ring-like, thin, with a large central cavity; the seventh, like the dorsal, has only an upper lateral process. Lower jaw 13 feet; paddle 14 feet.

The young male, 42 feet long, caught near the mouth of the Somme, on the coast of France, described and figured by Ravin, Ann. Sci. Nat. x. 266, t. 11, xv. 337, t. 9, under the name of *Balenoptera rostrata*, from the form of the skull, seems to be a species of the

genus *Physalus*, probably *P. antiquorum*; but the details of the skeleton have not been given. The tympanic bones are drawn of a very small size (*l. c. t. 9. f. 2 r, 3 r*).

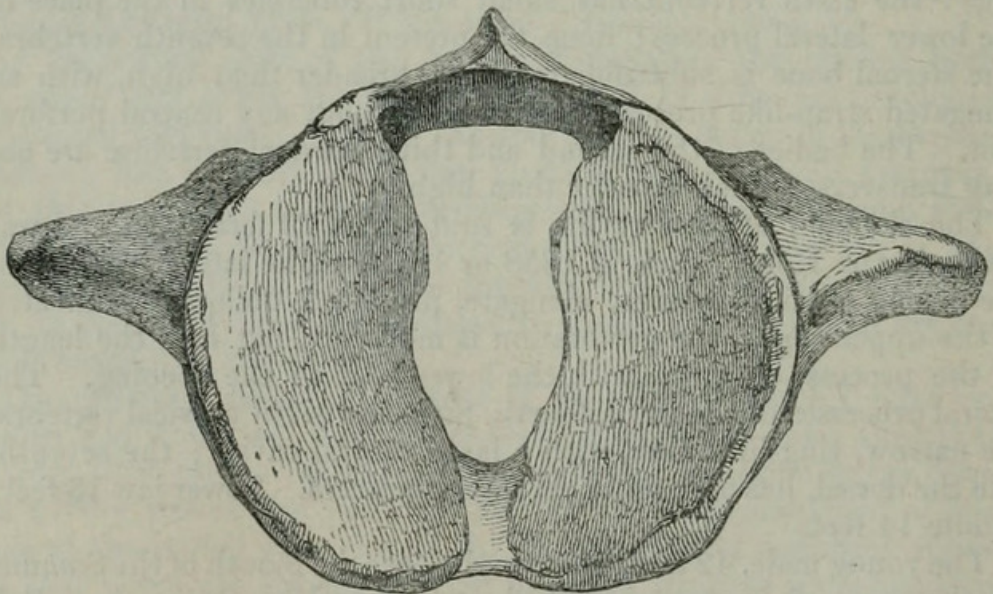
Lacépède (*Cétac. t. 5, 7*) describes and figures a whale stranded near the Isle of Marguerite in 1797. It is described as 61 feet long; distance from nose to pectoral $14\frac{1}{2}$, thence to dorsal $10\frac{3}{4}$, and from dorsal to caudal $8\frac{3}{4}$. But there must be some mistake, as this accounts for only 34 feet. The pectorals are 5 feet long (that is, only one-twelfth of the total length), and all black. Cuvier figured the skull of this whale (*Oss. Foss. t. 26. f. 5*), and founded on it his *Rorqual de la Méditerranée*. M. F. Cuvier (*Cétac. 334*) regarded this as the type of his *Balæna musculus*.

M. Campango notices a whale cast ashore near St. Cyprien. The entire length was 82 feet, of the head 16 feet; and the pectoral was 13 feet long. Vertebrae 61, viz. cervical 7, dorsal 14, lumbar 15, caudal about 25. It was dark grey, with the throat and sides of the pectoral white; the belly blue, white-banded; the pectoral greyish. M. F. Cuvier refers this to the *B. musculus*, or Mediterranean Rorqual. The skeleton was at Lyons in 1835.

M. Van Beneden (*Ann. Sci. Nat. n. s. vi. 159*) says the tympanic bones brought from Iceland by M. Quoy belonged to the *B. musculus* of Cuvier.

** *The upper and lower lateral processes of the third, fourth, fifth, and sixth cervical vertebrae elongate, slender, free at the ends; the upper one bent down; the lateral process of the second cervical large, truncated. Body of the cervical vertebrae oblong, ovate, not much broader than high; the upper edge concave; the lower very slightly convex.*

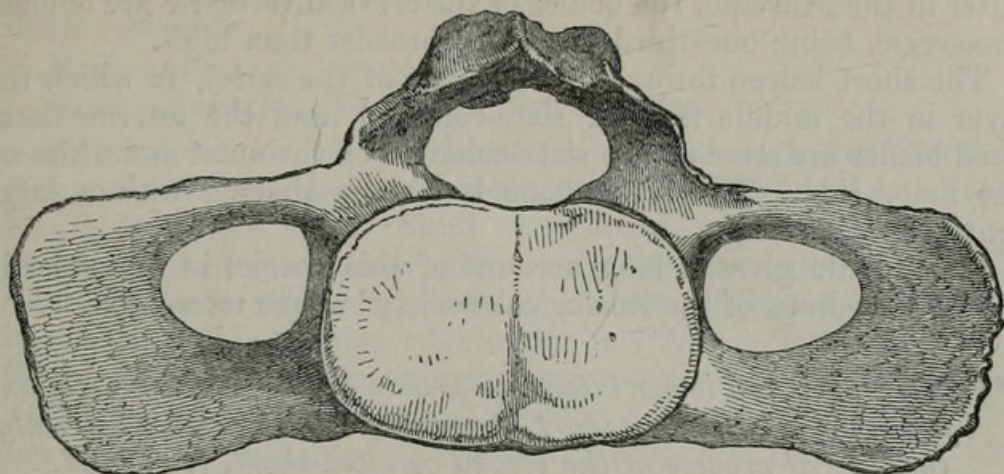
Fig. 13.



Atlas of *Physalus duguidii*.

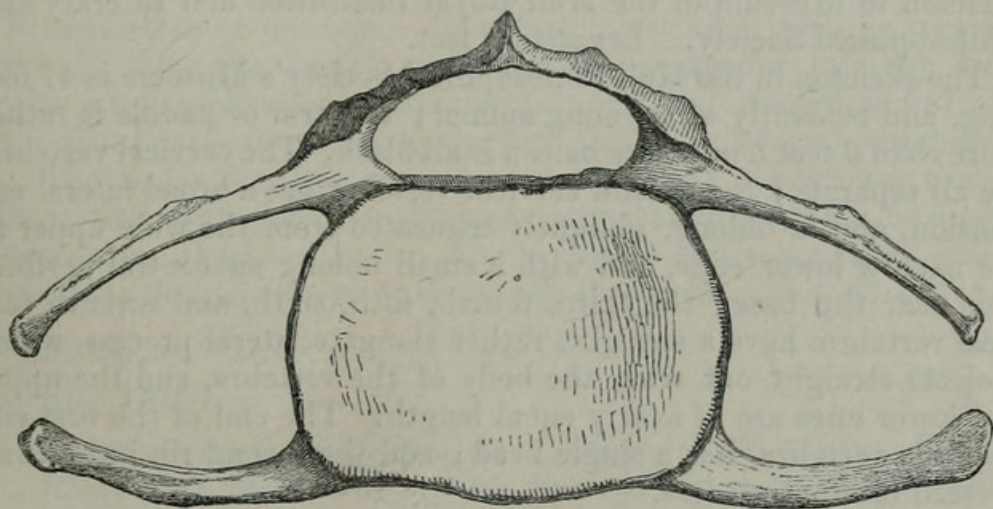
Extreme width 21 inches; height $12\frac{1}{2}$ inches.

Fig. 14.

Second Cervical Vertebra of *Physalus duguidii*.

Extreme length, measured by a cord, $25\frac{1}{2}$ inches; height 12 inches.
Articulating surface: height 7 inches; width 11 inches.

Fig. 15.

Fifth Cervical Vertebra of *Physalus duguidii*.

PHYSALUS DUGUIDII. (Figs. 13, 14, 15.)

The Orkney Whale (Physalus duguidii), Heddle, Proc. Zool. Soc. 1856, 187, Mamm. t. 44 & t. 45, anat. ♂ & ♀.

Hab. Orkney (*Heddle*); cervical and part of dorsal vertebræ and the baleen in the British Museum. Length 50 feet.

The upper lateral processes of the third, fourth, and fifth cervical vertebræ are very slender and bent down, with two slight angular ridges on the outer edge; the lower processes are much thicker and bent up at the end, with a broad flat lower edge near the base, which forms an angle at the end. The bodies of the cervical vertebræ are roundish oblong, rather wider below than above, about one-fourth the width wider than they are high. The form of the body and the slenderness and form of the lateral processes of the cervical vertebræ seem to separate this species from *P. antiquorum*, as well as the sepa-

rate form of the lateral processes. In the Plymouth specimen of the latter in the Museum, the bodies of the cervical vertebræ are oblong, transverse, being one-third the width broader than high.

The short baleen forms the front part of the series, in which the layer in the middle is dark slate-coloured, and the intermediate-sized blades are more or less slate-coloured on the outer and white on the inner side. The breast-bone is lozenge-shaped, with a large central perforation.

Mr. Heddle gives a long account of this species in his paper in the 'Proceedings of the Zoological Society' above referred to.

*** *The upper and lower lateral processes of the third, fourth, and fifth cervical vertebræ short, strong, separate, directed laterally; the lateral process of the second cervical short, truncated.*

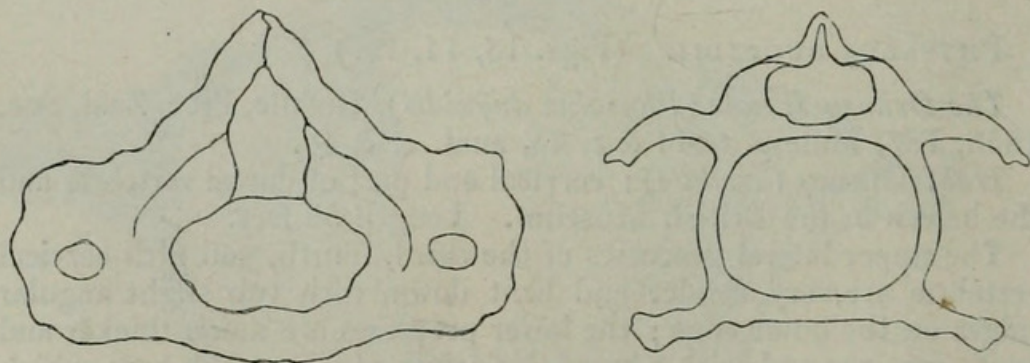
PHYSALUS SIBBALDII. (Fig. 15 a.)

Physalus (Rorqualus) sibbaldii, Gray, P. Z. S. 1847, 92; Cat. Cetac. 42.

Hab. North Sea, ascending rivers; in the Humber, Yorkshire; skeleton in Museum of the Hull Royal Institution and Literary and Philosophical Society. Length 50 feet.

The skeleton in the Hull Philosophical Society's Museum is 47 feet long, and evidently of a young animal; the arm or paddle is rather more than 6 feet long. The baleen is all black. The cervical vertebræ are all separate; the second cervical vertebra has a broad lateral expansion, and is oblong, obliquely truncated from the wide upper to the narrow lower edge, and with a small oblong subcentral perforation near the base; the third, fourth, fifth, sixth, and seventh cervical vertebræ have a straight, rather elongate lateral process, which projects straight out from the body of the vertebra, and the upper and lower ones are of nearly equal length. The end of the first rib, near the vertebra, has a single head; and the second rib has a compressed internal process.

Fig. 15 a.



Second and Fifth Cervical Vertebræ of *Physalus sibbaldii*. (From a sketch by Mr. Harrison, of Hull.)

4. SIBBALDUS.

The pectoral fins moderate. The second cervical vertebra with

a broad elongated process, perforated at the base. The front ribs double-headed.

Balænoptera, sp., Gray.

Pterobalæna, sp., Eschricht, Van Beneden.

Pectoral fin one-eighth the entire length; and the dorsal fin, "opposite the opening of the vent," nearly three-fourths the entire length from the nose. Skull very broad. Maxillary bones very broad, gradually tapering, with nearly straight outer edges. The intermaxillaries moderate, linear. The frontal bones broad, band-like, with a wide sinuous edge over the orbits. Nasal bones small. The lower jaw slightly arched, compressed, with a conical ramus near the condyle. The lateral process of the second cervical vertebra expanded, with a basal perforation (Rudolphi, Berl. Trans. 1822, t. 1. f. 2). Tympanic bone oblong, ventricose (see Dubar, t. 4. f. 1; Rudolphi, t. 3. f. 6). The lateral processes of the second to the sixth cervical vertebræ separate, elongate. The scapula broad, with a large, well-developed coracoid process in front. The hand with four rather short fingers; the second and third equal and longest; the inner or fourth rather shorter than the first. Vertebræ fifty-four. Ribs thirteen or fourteen. The first rib slender, with a process on the side near the condyle, as if the rib was divided into two somewhat similar lobes above (Rudolphi, t. 5. f. 6). According to Dubar, the first rib is articulated to the first and second dorsal vertebræ.

The under jaw less curved; but the great character is that the front rib is split into two separate parts near the condyle, or double-headed, as Dubar calls it. The tympanic bones are short, oblong, swollen (figured *in situ* in the skull, Rudolphi, *l. c.* t. 3. f. 6).

SIBBALDUS LATICEPS. (Figs. 16, 17.)

Ribs 13/13.

Balæna rostrata, Rudolphi, Berl. Abhand. 1820, t. 1 (not Hunter).

Rorqual du Nord, Cuvier, Oss. Foss. v. 564, t. 26. f. 6 (cop. from Rudolphi).

Balænoptera laticeps, Gray, Zool. E. & T., from Rudolphi.

Balæna borealis, Fischer, Syn. 524, from Cuvier.

Hab. North Sea; Holstein, 1819 (*Rudolphi*); skeleton in Mus. Berlin, 31 feet long. Zuyderzee, 1816, skeleton in Mus. Leyden.

There is also the first rib of a whale of this genus in the Museum of the College of Surgeons, which seems to indicate a fourth species. The origin of the specimen is unknown.

M. Van Beneden, who regarded this as the young of the following, observes that the skeleton in the Berlin Museum from Holstein is not quite adult; and also states that there is a skeleton, not quite adult, in the Leyden Museum from the Zuyderzee.

SIBBALDUS BOREALIS. (Fig. 18.)

Ribs 14/14.

Baleine d'Ostende, Van Breda, 1827, 341; Dubar, *Ostéographie*, Bruxelles, 8vo, 1828, t. 1-10.

Fig. 16.

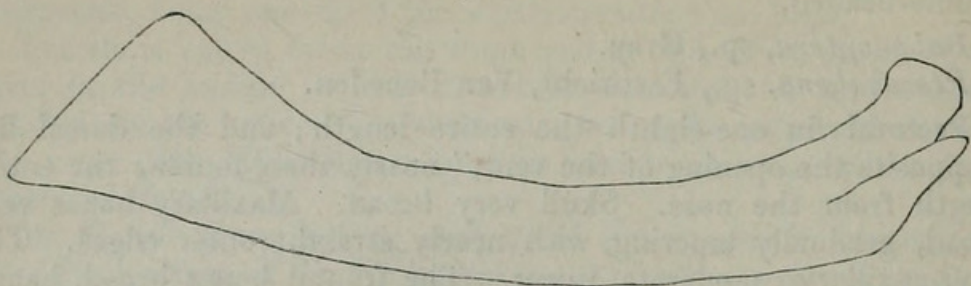
First Rib of *Sibbaldus laticeps*. (From Rudolphi.)

Fig. 17.

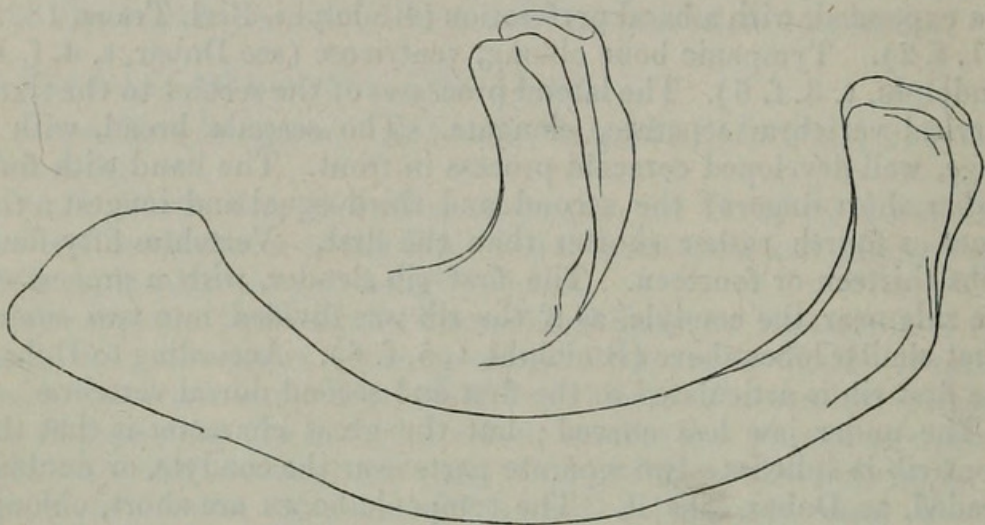
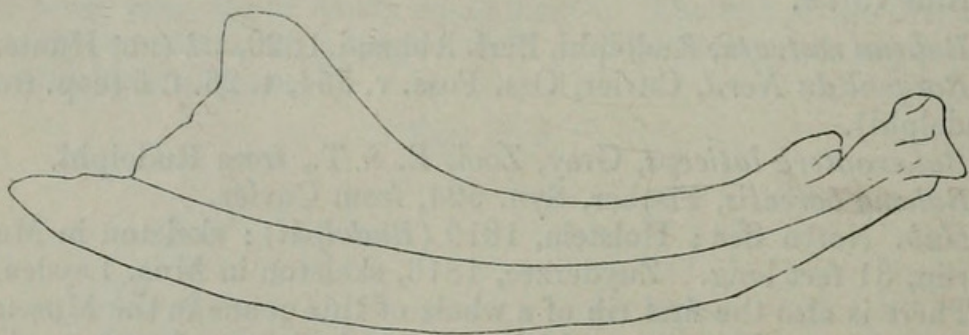
First Rib of a *Sibbaldus laticeps*?, in Mus. Coll. Surgeons.

Fig. 18.

First Rib of *Sibbaldus borealis*. (From Dubar.)

Baleinoptère d'Ostende, Van der Linden, 1828, Bruxelles, 8vo.

The Ostend Whale, Guide to the Exhibition at Charing Cross, with drawings by Scharff; Bernaert, 'Notice sur la Baleine échouée près d'Ostend,' Paris, 1829.

Great Northern Rorqual, "*R. borealis*, Lesson," Jardine, Nat. Lib. 125, t. 5, from Scharff.

Balæna borealis, part, Fischer, Syn. 524, from Dubar.

Balænoptera rorqual, Dewhurst, London Mag. N. H. 1832, v. 214.

Balænoptera gigas, Eschr. & Reinh. Nat. Bidrag, af Groenland, 1857.

Pterobalæna gigas, Van Beneden, Mém. Acad. Roy. Sci. Brux. 1861, xxxii. 37.

Balænoptera boops, Yarrell, Proc. Zool. Soc. 1840, p. 11.

Balænoptera tenuirostris, Sweeting, Mag. Nat. Hist. 1840, p. 342.

Hab. North Sea.

"A Whale was observed floating dead in the North Sea between Belgium and England," and towed into the harbour of Ostend on the 4th of November, 1827. The skeleton was exhibited at Charing Cross, and is now, I believe, in the United States.

The specimen was 102 feet long, the lower jaw $21\frac{1}{2}$ feet long, and the fins $13\frac{1}{2}$ feet long. Vertebrae 54. Ribs 14/14.

The atlas (Dubar, t. 6. f. 1): the second cervical vertebra with large lateral processes, pierced with a large hole; the third, fourth, and fifth with two lateral processes on each side, which are not formed into a complete ring as in the second; the fifth offers a rudiment of a spinal apophysis. The first rib double-headed, articulated to the first and second dorsal vertebrae. Bones of the ears (Dubar, t. 5. f. 1); os hyoides (t. 5. f. 2); breast-bone (t. 6. f. 4) not pierced, short and broad, with a broad hinder portion. The vertebral column 37. Dubar's figures represent the second, third, and fourth cervical vertebrae as with a ring, and the fifth, sixth, and seventh with deflexed upper and straight lower separate lateral processes. Ribs, first (t. 8. f. 1) with two heads, very broad at lower end; second (f. 2) with rather elongate internal process; fourteenth (f. 3) quite simple. Pelvic bones (t. 9. f. 1, 2). Shoulderblade short and very broad on the external edge, with a large lobe for the ridge (t. 10). Pectoral fin and bones (t. 11). Fingers four; the second and third nearly of equal length, and longest; the fourth or outer shorter, longer than the first or inner.

Mr. Yarrell (Proc. Zool. Soc. 1840, p. 11) notices a female of this genus under the name of "*Balænoptera boops*." It was stranded at Charmouth, Dorsetshire, on Feb. 5, 1840. It had no warts about the lips; back black; underside white; pupil oval, without any eyelashes. Length 41 feet. Pectoral fin $5\frac{1}{2}$ feet long, base $10\frac{3}{4}$ from tip of nose, and $1\frac{1}{2}$ foot wide. Dorsal small, conical, 11 feet in advance of the tail. Skeleton 40 feet long, head 10 feet. Vertebrae 60, viz. 7 cervical, 15 dorsal, 16 lumbar, 15 caudal, and with 7 caudal bones. Ribs 14/14; the first *double-headed*, and attached to the first two vertebrae; each of the other ribs is attached to a single vertebra, and has a single head. The dorsal vertebrae exceed the ribs by one. "The subcutaneous layers of fat varied in thickness from 3 to 5 inches." In other details the skeleton agreed with Dewhurst's description of the "Ostend Whale."

"Head, back, tail, and outside of the pectoral fins black; inside of the pectoral fins, throat, breast, and belly beautiful white; inside of the under jaw black; tongue, palate, and the spaces intervening between the reefs on the belly pink. The under jaw the widest, and projecting 9 inches beyond the upper one; end of both jaws rounded. The muzzle longer and more attenuated than in *Balæna*. The spiracles longitudinal, like slits or fissures, nearly meeting in front, and

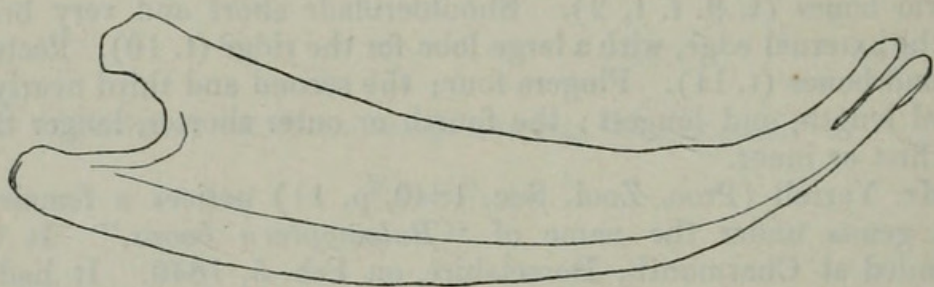
gradually diverging behind to a distance of about 3 inches. Baleen bluish black and yellowish white. Female 42 feet long, weighing 25 tons. Blubber varied in thickness from 3 to 5 inches; yielded three hogshheads of oil."—*Sweeting, Mag. N. Hist.* 1840, p. 342.

The accounts in the 'Mag. of Nat. Hist.' and in the 'Proc. Zool. Soc.' 1840, p. 11, are evidently from the same animal, but there are some discrepancies between them. Mr. Sweeting says, breadth 21 feet; Mr. Yarrell says, girth 21 feet. Mr. Sweeting, total weight 25 tons; Mr. Yarrell, probable weight between 20 and 25 tons. Mr. Sweeting, length of skeleton 41, and head 11 feet; Mr. Yarrell, 40, and head 10 feet. Mr. Sweeting says, for the discrepancy, "As to the number of vertebræ, &c., I am of opinion that this species has not been described before, and I have proposed for it the name *Balænoptera tenuirostris*." (Mag. N. Hist., 24th March, 1840.)

The skeleton here described was sold, about sixteen years ago, for five pounds, to Mr. Freane, and it was stated to have been sent to London as a present to the British Museum, but it has never been received, and I cannot find any further account of it; probably it was sold for manure.

One of the true Whales, *Balæna australis* (Temm. Fauna Japonica, t. 28, 29), has the first rib with a double head (fig. 19, a sketch by Gerrard from the skeleton in Mus. Leyden.).

Fig. 19.



First Rib of *Balæna australis*.

b. Dorsal fin two-thirds of the entire length from the nose; cervical vertebræ sometimes united.

5. BALÆNOPTERA.

Pectoral fin moderate. Dorsal fin falcate, two-thirds of the entire length from nose. Vertebræ 50; last very small. The first pair of ribs undivided near the condyle.

The lateral process of the second cervical vertebra elongate, pierced at the base; of the third, fourth, and fifth cervical elongate, slender, separate; the lower with an angular bend below. The front ribs simple, thick, with only a slight swelling on the inner edge near the condyle. Tympanic bones obovate, short, ventricose.

The lateral process of the second cervical vertebra expanded, broad, with a large ovate perforation in the middle of its base; the upper and lower margins being broad and of nearly equal width, the upper

being, if anything, rather the broadest of the two, very unlike the lateral process of the same bone in *Physalus*. The neural arch high, acute, with a rather high subcircular canal for the spinal marrow. The body of the atlas vertebra oblong, transverse, with a subcylindrical lateral process produced from the middle of the side.

Balænoptera, Gray, P. Z. S. 1847, p. 89.

Balænoptera, § 1, Gray, Zool. Er. & T. 50.

Pterobalæna, part, Eschricht.

Rorqualus, part, F. Cuvier.

The lateral processes of the cervical vertebræ are generally free and tapering at the tip; but some of them are sometimes united, forming a ring. Eschricht described those of the fifth and sixth vertebræ as sometimes united. In the specimen in the College of Surgeons the lateral processes of the sixth cervical vertebra are united on one side and free on the other.

In all these cases the form of the processes are not altered; the end is only elongated and united. The cervical vertebræ are sometimes quite free, as is the case with Hunter's specimen in the Museum of the College of Surgeons. The second and third vertebræ are often united by more or less of the surface of the neural arches; and this seems to be the normal state. In the specimens from Cromer, lately acquired by the College of Surgeons, the third and fourth cervical vertebræ are united by the neural arches; and the second and third free.

The elongated processes on the end of the front ribs have two muscles attached to them, one arising from each of the two neighbouring vertebræ. Eschricht, in his essay above cited, figured the foetus and a new-born specimen, which was 34 inches long, and gave the anatomy of it, with details of its skeleton (see Eschr. K. D. Vid. Selsk. 1846, fig. p. 309). They have a single series of bristles parallel with the lips (see K. Dansk. Vid. Selsk. xi. t. 1 & 2). Tympanic bones oblong, swollen, rounded above and below and at each end. They are figured *in situ* in the skull by Eschricht in the 'Danish Transactions,' vol. xii. t. 11. f. 2 *g* in the foetus, t. 9. f. 2 & 4 *g*, & t. 10. f. 2 *g*, in the more adult state.

In the 'Royal Danish Transactions' for 1846, Eschricht gives a detailed comparison of the bones of the head of a foetal specimen, and one 6½ and one 34 feet long (see t. 9-11), and the details of the skeleton of a foetus 9 inches long (t. 14).

It may be observed that the form of the cervical and other vertebræ of the skeleton seems to be nearly identical with that of those of the adult animal. The lateral processes of the second cervical process, for example, are united into a broad expanded blade, with a perforation near the body of the vertebra, which is so characteristic of the genus.

BALÆNOPTERA ROSTRATA. The Pike-Whale. (Figs. 20-24.)

Balæna rostrata, O. Fab. ?; Hunter, Phil. Trans. lxxvii. t. 20-23; Turton, B. Fauna, 16; Nilsson, Scand. Fauna, 632.

B. musculus, part, et *B. boops*, part, Fleming, B. A. 30, 31.

B. musculus, part, Jenyns, Man. 47.

B. boops, Giesecke, Edin. Encyl.; Newman, Zool. i. 33, fig.; Turner, Cat. Ost. Mus. Col. Surg. n. 1194 (Hunter's spec.?). North Sea.

B. minimus borealis, Knox, Cat. Whale, 1.

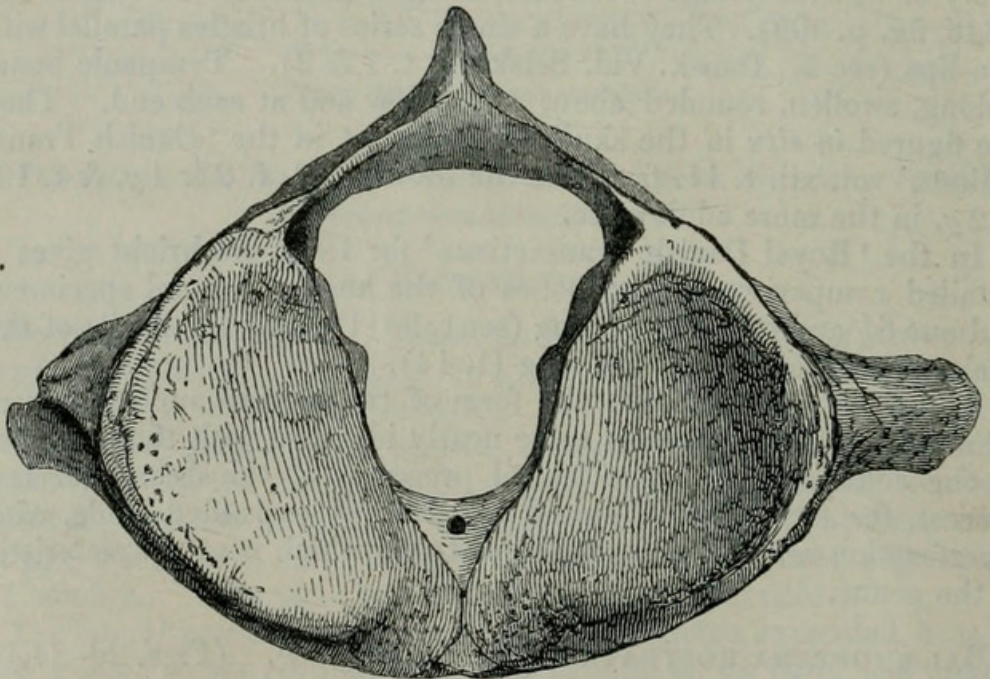
Rorqualus minor, Knox, Jard. Nat. Lib. 142. 7; Gaimard, Voy. Iceland, Mam. t. 13 (skeleton); t. 14 (skull).

Balænoptera boops, part, Fleming, B. A. 31; Bell, B. Quad. 520, fig. p. 521 (from Hunter).

Hab. Ascending the mouth of rivers; Thames at Deptford (Hunter), skeleton in Mus. Coll. Surg.; Frith of Forth, near Queensferry, 1834 (Knox); Cromer (Gurney), skeleton in Mus. Coll. Surg.; Thames opposite Deptford Creek, Oct. 23, 1842 (Illustrated London News, i. 388; Zoologist, 1842), skeleton in British Museum; Jutland, 1837, skeleton in Mus. Louvain; skeleton Mus. Bremen, head figured by P. Camper; Bergens, skeleton Mus. Paris, Charante.

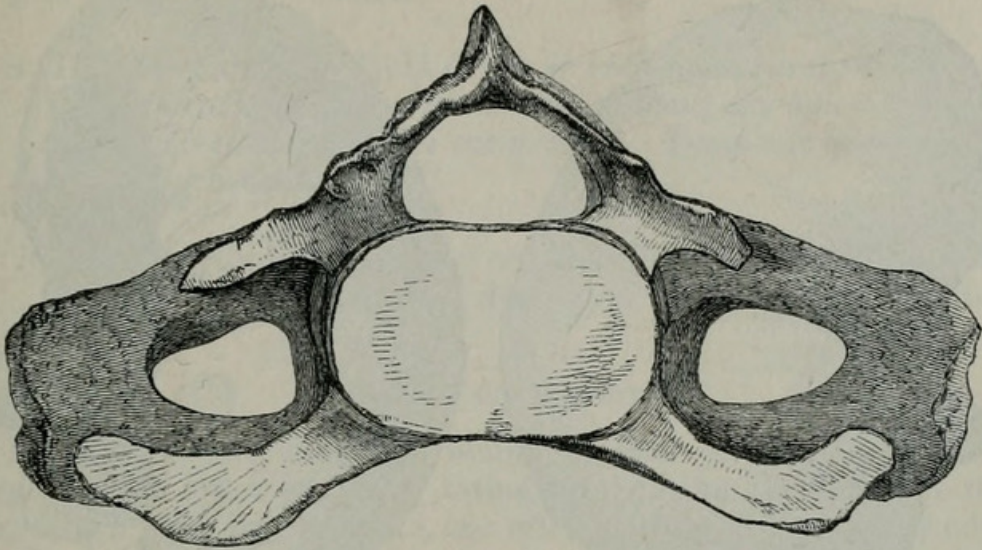
The student must not run away with the idea that, because the characters of the genera here given are taken from a few parts of the skeleton, they are the only differences that exist between the skeletons of the different genera and species. The form of the head and the peculiarities of the cervical vertebræ of the ribs and of the bladebone have been selected after a long and careful comparison of the skeletons, as the parts which afford the most striking characters, that can be most easily conveyed to the mind of the student in a few words, and therefore best adapted for the distinction of the genera and species.

Fig. 20.



Atlas Vertebra of *Balænoptera rostrata*.
Extreme width 9 inches; height $9\frac{1}{2}$ inches.

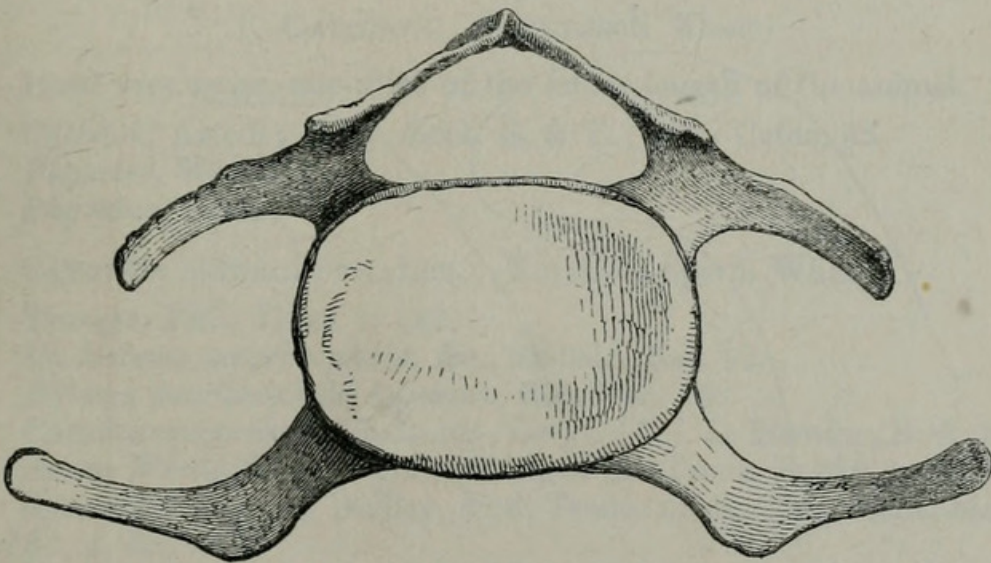
Fig. 21.



Second and Third Cervical Vertebrae of *Balænoptera rostrata*, united by the crural arch.

Extreme width 12 inches ; height 6 inches. Articular surface : width 4 inches.

Fig. 22.



Fifth Cervical Vertebra of *Balænoptera rostrata*.

The careful examination of many skeletons has proved to me that almost every bone of each genus is peculiar—that is to say, that no bone is exactly alike in any two genera ; but the difference between them is often very slight, so slight that it would be almost impossible to convey an accurate conception of it to the reader by words alone, yet it is permanent and characteristic. Though the same bones of the different skeletons of the same species of *Megaptera* or *Physalus*, which I have examined, offer a certain amount of variation in minor particulars, yet almost every bone of each species has a character of its own ; so that a person conversant with the subject, and fresh from the study and comparison, can say at once to which

Fig. 23.

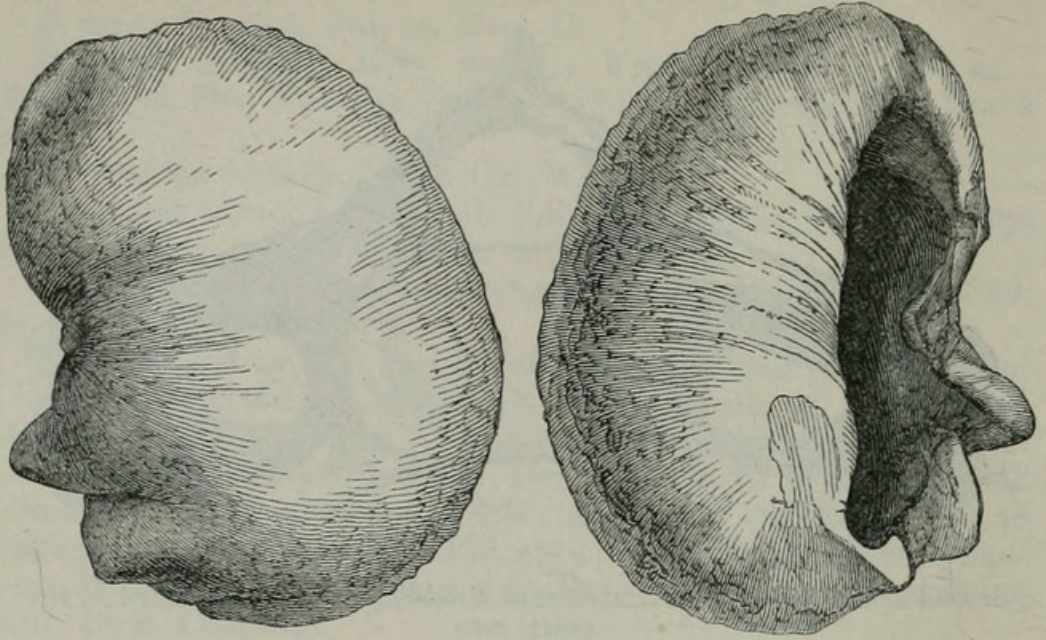
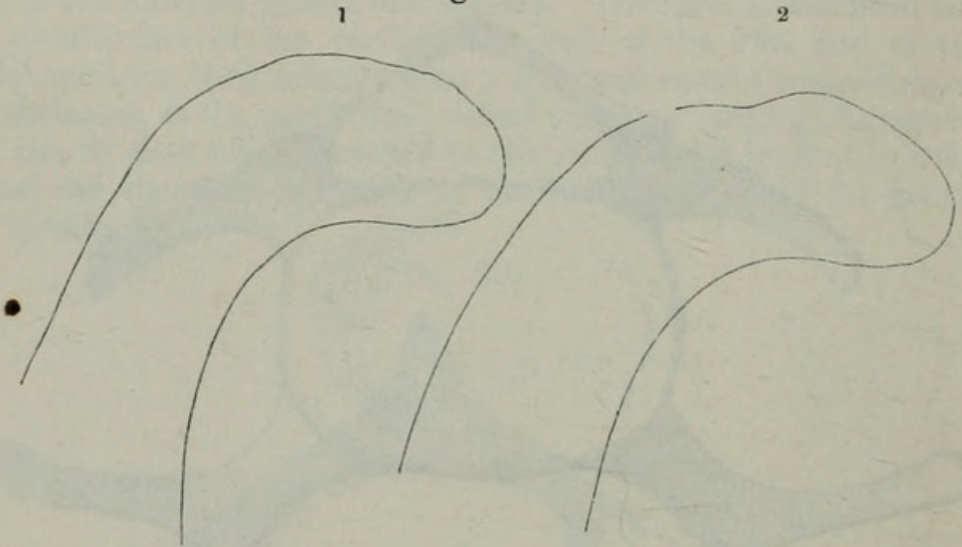
Tympanic Bones of *Balænoptera rostrata*.

Fig. 24.

Top of First and Second Ribs of *Balænoptera rostrata*.

genus or species any bone that might be shown to him belongs, even if it were only a phalange or a rib.

The ear-bones of each genus, as far as I have been able to examine, seem to afford very good characters; but, unfortunately, they are often sent to the Museum separate from the skull and other bones of the animal to which they belong.

Skeletons of whales are shown in museums and gardens, without any large and expensive building; indeed slight special buildings are best, permitting more ventilation. In Paris, the whale's skeleton is exhibited under a glass roof in the quadrangle of the Museum; at Antwerp, it is shown in a building formed of galvanized iron; and

they are shown in a similar manner at Edinburgh, at the Isle of Wight, and in other localities.

Sect. II. DENTICETE. *Teeth in one or both jaws, rarely deciduous. Palate lined with a hard membrane, without any baleen. Gullet large. Head more or less compressed. Tympanic bones small; lachrymal bone distinct.*

I. *Nostrils longitudinal, parallel or diverging, covered with a valve, one often larger and more developed. Pectoral broad, truncate.*

Fam. 3. CATODONTIDÆ.

Head large, subcylindrical, blunt. Lower jaw narrow. Teeth large, in the lower jaw only, fitting into pits in the gums of the upper one. Nostrils separate, one often abortive. The hinder edge of the maxillary elevated, forming a concavity on the forehead of the skull. Pectoral broad, truncated.

* *Head compressed, truncated; nostril in front of the truncated head; dorsal hump rounded.*

1. CATODON. . Spermaceti Whale.

Head very large, one-third of the entire length of the animal.

Catodon, Artedi; Gray, Zool. E. & T.; Cat. Cetac. 45.

Physeter, Wagler.

Physalus, Lacép.

CATODON MACROCEPHALUS. Northern Sperm Whale.

Trumppo, Phil. Trans. i. 132.

De Balæna macrocephala, &c., Sibbald, Bal. 12.

Balæna macrocephala bipennis, Raii Pisc. 15.

Catodon macrocephalus, Lacép. Cét. t. 10. f. 1; Fleming, B. A. 39.

Sperm Whale, Anderson, Cambridge Phil. Trans. ii. 250, t. 12-14.

Spermaceti Whale, Dudley, Phil. Trans. xxxii. 258; Gent. Mag. 1794, p. 33, t. 1.

Blunt-headed Cachalot, Robertson, Phil. Trans. lx. t.

Physeter trumppo, Bonnat. Cét. t. 8. f. 1, cop. Robertson.

Physeter macrocephalus, Turton, Fauna, 16; Jenyns, Man. 44; Bell, B. Quad. 506. fig., 511. fig.

Hab. North Sea; Teignmouth (*Gesner*, 1532); Whitstable Bay, 1794; Scotland (*Sibbald*; *Robertson*); Orkney (*Lowe*); mouth of the Thames, coast of Essex and Kent, Feb. 1788, twelve males; Holderness, Yorkshire, 1825 (*Beale*); skeleton of adult at Burton Constable Castle, near Hull, described by *Beale*; Sandy Side Bay, Thirso, 1863, skeleton in the British Museum, supposed to have been brought by the Gulf-stream—was decayed when discovered. Coast of Yorkshire (*Dr. Anderson*), described in Cambridge Phil. Soc. Trans. 1825; 58½ feet long; teeth 24/24.

The Spermaceti Whale frequently comes ashore in Orkney; one was caught at Hoy, 50 feet long ("Lowe," Flem. B. A. 29).

A male, 52 feet long, with a dorsal fin, was found at Limekilns, in the Forth, in Feb. 1689, and described by Sibbald (Bal. 33, t. 1).

After a hard gale of wind northerly, no less than twelve male whales, which undoubtedly came out of the Northern Ocean, were towed and driven on shore, all dead and in a high state of putrefaction, excepting one; six were found upon the coast of Kent, two on the coast of Holland. One at the Hope Point, in the River Thames, was the only one seen alive; he ran aground and smothered himself in the mud, and was afterwards made a show of in the Greenland Docks. (*Letter from Walderwick, on the coast of Suffolk, 7 March 1788*, in Sir Joseph Banks's copy of Phil. Trans. in B. M. library.)

Whitstable, Kent, Feb. 16, 1829 (P. Hunter & H. Wood, Mag. N. Hist. ii. 197). A male, 62 feet long and 16 feet high. The skeleton of this animal, which had been prepared by Mr. J. Gould, was presented by Messrs. Enderby and Sturge to the Zoological Society; but being claimed as a "royal fish," it was left on the shore (H. Wood, *l. c.*).

"The head is very thick and blunt in front, and is about one-third of the whole length of the animal; at its junction with the body is a large protuberance on the back, called the '*hunch of the neck*;' immediately behind this, or the shoulders, is the thickest part of the body, which from this point gradually tapers off to the tail; but it does not become much smaller for about another third of the whole length, when the '*small*' or tail commences; and at this point on the back is a large prominence of a pyramidal form, called the *hump*, from which a series of small processes run halfway down the *small* or tail, constituting what is called the *ridge*; the body then contracts so much as to become not thicker than a man's body, and terminates in the *flukes* or tail. The two *flukes* constitute a large triangular fin. The chest and belly are narrower than the broadest part of the back, and taper off evenly and beautifully towards the tail, giving a *clear run*. The depth of the head and body is in all parts, except the tail, greater than the width; the head, viewed in front, presents a broad, somewhat flattened surface, rounded and contracted above, considerably expanded on the sides, and gradually contracted below, so as in some degree to attain a resemblance to the cutwater of a ship. At the angle formed by the anterior and superior surface on the left side is placed the *single* blow-hole or nostril, which in the dead animal is a slit or fissure in the form of an S, extending horizontally. In the right side of the nose and upper surface of the head is a large, almost triangular-shaped cavity, called the *case*, which is lined with a beautiful glistening membrane, and covered by a thick layer of muscular fibres and small tendons running in various directions, finally united by common integuments. This cavity is for the purpose of secreting and containing an oily fluid, which is, after death, converted into a granulated substance of a yellowish colour—the *spermaceti*.

"Beneath the *case* and nostril, and projecting beyond the lower

jaw, is a thick mass of elastic substance—the *junk*, which is formed of a dense cellular tissue, strengthened by numerous strong tendinous fibres, and permeated with very fine oil and spermaceti.

“The mouth extends nearly the whole length of the head; both jaws, but especially the lower, are in front contracted to a very narrow point; and when the mouth is closed, the lower jaw is received within a sort of cartilaginous lip or projection of the upper one—but principally in front; for further back at the sides and towards the angles of the mouth both jaws are furnished with well-developed lips. In the lower jaw are forty-two large conical teeth; in the upper are no teeth, but depressions corresponding to and for the reception of the ends of the teeth in the lower jaw. Sometimes a few rudimentary teeth may be found in the upper jaw, never projecting beyond the gum, and upon which those in the lower jaw strike when the mouth is closed. The tongue is small, white; the throat capacious, very unlike the contracted gullet of the Right Whale. Mouth lined with a pearly-white membrane, continuous at the lip, which is bordered with the black external skin. Eyes small, with eyelids, the lower one most moveable, placed a little behind and above the angle of the gape, at the widest part of the head. Ears very small, without any external appendage, a short distance behind the eyes. The swimming-paws or fins are placed behind, not far from the angle of the mouth; they are not much used as organs of progression, but as giving direction and balancing the body in sinking suddenly, and occasionally in supporting their young.”

The full-grown male of the largest size is about as follows:—entire length 84 feet; depth of head 8 or 9 feet; breadth 5 or 6 feet; depth of body seldom exceeds 12 or 14 feet, so that the circumference rarely exceeds 36 feet; the fins about 6 feet long, and 3 feet broad; the tail or flukes 12 or 14 feet wide.

The atlas is distinct; the rest of the cervical vertebræ are ankylosed into one piece (Cuv. Oss. Foss. v. 346, t. 24. f. 12, 13). Ribs 14/14. Vertebra 60 (see Cuv. Oss. Foss. *l. c.* t. 24. f. 15–18). Bladebone higher than wide, with a large coracoid (*l. c.* t. 24. f. 11). Humerus and cubitus ankylosed, short and thick (t. 24. f. 14). Os hyoides very wide (Cuv. t. 25. f. 15?).

Skeleton of adult male 56 feet long, at Burton Constable (Turnstall in Holderness, Yorkshire, 1825), was articulated by Mr. Wallis (see Beale, 73). The skeleton is 49 feet 7 inches long; cranium 18 ft. $\frac{1}{2}$ in.; lower jaw 16 ft. 10 in. Teeth 24/24. Ribs 10/10, nearly circular; the first with one, the second, third, fourth, fifth, sixth, seventh, and eighth with two articulating surfaces, each articulated to two vertebræ. Cervical vertebræ 2—that is, atlas and another united; dorsal vertebræ 10; lumbar and caudal 32: = 44. Pelvis two flat bones; sternum of three bones; clavicles none; bladebone flat, without any spine; but with two projecting coracoid processes near the articulation; bones of pectoral fins 4 ft. 4 in. long; carpus of seven loose square bones; the phalanges five, the three middle ones each of four and the two outer each of three bones. The os hyoides $2\frac{1}{4}$ feet long (Beale).

The tympanic bone is small, scroll-like, oblong, ankylosed to a somewhat similar-shaped tegmen tympani and pars mastoidea (see Owen, Hist. Brit. Fossil Mam., fig. of natural size (not half the natural size, as marked on the plate).

When the young Cachalot has attained the length of 34 feet, its teeth are perfectly formed, though not visible until it exceeds 28 (Bennett, P. Z. S. 1836).

Mr. Bennett found eight rudimentary teeth on each side of the upper jaw in two instances, which, "though not visible externally in the young Cachalot, may be seen upon the removal of the soft parts from the interior of the jaw" (Proc. Zool. Soc. 1836).

Professor Huxley has figured the skull of a foetal specimen that is in the Museum of the College of Surgeons, at fig. 118, on page 275 of his 'Elem. Comp. Anat.' 1864.

In the foetal skull the right præmaxilla is much larger than the left, extending far back upon the right frontal, while the left does not reach the left frontal; the left nostril, on the other hand, is much more spacious than the right (see Huxley, Elem. Comp. Anat. 276. f. 110 a).

** *Head depressed, rounded in front; nostrils in the forehead; dorsal fin falcate.*

2. PHYSETER.

Head very large, one-third of the entire length of the animal, rounded, convex above. Teeth conical, compressed. Skull elongate.

Physeter, sp., Linn. S. N.; Illiger, Prodr. 143; Gray, Z. E. & T.; Cat. Cet. 53.

Tursio, Fleming, Phil. Zool. 211.

Cetus, Oken.

Cuvier (Oss. Foss. v. 328, 338) erroneously regards Sibbald's account as a bad description of a Sperm Whale. This error is important, as it vitiates many of his subsequent observations.

PHYSETER TURSIO. The Blackfish.

Physeter tursio, Gray, Cat. Cetac. 56.

1. *Balæna macrocephala quæ tertiam*, &c., Sibbald, Bal. t. 1. f. A, B, C.

Balæna major, &c., Raii Pisces, 15.

Physeter microps, Artedi, Syst.; Turton, B. F. 17; Fleming B. A. 38; Jenyns, Man. 46.

Physeter macrocephalus, Cuvier, Oss. Foss. v. 331, 334.

Tursio microps, Fleming, Phil. Zool. 21.

2. *Balæna macrocephala tripinna*, &c., Sibbald, Bal. t. 2. f. 1, 2, 4, 5, teeth; Raii Pisces, 16.

Physeter tursio, Artedi, Syst.; Linn. S. N. i. 107.

Physeter — ?, Schlegel, Dieren, 96. t. 19; Turton, B. F. 17; Fleming, B. A. 38; Jenyns, Man. 45; Bell, Brit. Quad. 512.

Delphinus globiceps or *D. grampus*?, Cuvier, Oss. Foss. v. 331.

Hab. North Sea, Scotland (*Sibbald, Barclay*).

A female came ashore in Orkney in 1687, which was described by Sibbald (Bal. 43):—"The dorsal fin was erect, like a mizen mast."

Mr. Barclay, of Zetland, states that "the *Physeter tursio*, or High-finned Cachalot, is frequently seen on these coasts in summer, and is easily distinguished by the long perpendicular fin on its back" (Bell, Brit. Quad. 513). Coast of Cornwall?, May 1850 (*Mr. Couch*); Ireland, Coast of Wexford (*Thompson*); West Coast, Ireland (*Templeton*).

The greatest desideratum of zoology is the power of examining some specimens of the genus *Physeter*, or Blackfish, as it is called by the whalers. There is not a bone, nor even a fragment of a bone, nor any part that can be proved to have belonged to a specimen of this gigantic animal to be seen in any museum in Europe. This is the more remarkable as the animal grows to the length of more than 50 feet, is mentioned under the name of the Blackfish in almost all the Whaling Voyages; and two specimens of it were examined by Sibbald, having occurred on the coast of Scotland. The only account which we have of the animal, on which zoologists can place any reliance, is that furnished by Sibbald in his little tractate on Scotch Whales.

Otho Fabricius describes the Ardluk, under the name of *Physeter microps*, as being rather abundant in the seas of Greenland. He calls it "one of the smaller Whales;" and it is very doubtful if he has not described the Killer (*Delphinus orca*) under this name—though he states the skin is black, and says nothing of the very distinctive white marks on the under side of the Killer.

II. *Nostrils united into a single transverse or crescent-shaped blower. Head moderate, more or less beaked. Teeth in both jaws, one or both sets often deciduous. The pectoral fin lanceolate, tapering.*

FAM. 4. DELPHINIDÆ.

Head more or less beaked, smooth. Teeth simple, cylindrical, conical, smooth. Back rounded. Dorsal fin distinct, falcate, rarely wanting.

A. *Head more or less beaked; beak of the skull as long or longer than the brain-cavity. Bottlenoses.*

a. *Pectoral fins moderate, lanceolate, far apart on the sides of the chest; teeth in both the jaws permanent. Delphinina.*

1. STENO.

Beak of the skull rather compressed, higher than broad. Symphysis of the lower jaw rather elongate. Dorsal fin medial.

Steno, Gray, Zool. E. & T. 43; Cat. Cet. 127.

STENO ROSTRATUS. The Beaked Dolphin.

Dauphin de Breda, Cuv. Oss. Foss. i. 278, 296. v. 400, t. 21. f. 7, 8.

Delphinus rostratus, Cuvier, Ann. Mus. xix. 9; Cuv. Mam. Lithog. t.; Schlegel, Dieren van Nederland. 85, t. 11.

Delphinus bredanensis, Fischer, Syn. 505, from Cuvier.

Delphinus oxyrhynchus, Jardine, Nat. Lib. t. 27, from Cuvier.

D. planiceps, Breda, Verh. Nederl. Hist. 1829, p. 263, t. 1, 2; Schlegel, Abh. 27, t. 4. f. 8.

Steno? rostratus, Gray, Zool. E. & T. 43; Cat. Cetac. 131.

Hab. North Sea, Holland (*Breda*); Brest (D'Orbigny); England (Sowerby).

I have not been able to find the skull of this animal, which was in Mr. Sowerby's Museum in Mead Place, Lambeth.

The figures of the skull in Cuvier and Schlegel show it is a *Steno*. The skull in Paris is very like *Steno frontatus* of India.

2. DELPHINUS.

Beak of the skull rather depressed, convex above. Dorsal fin medial.

Delphinus, Gray, Spic. Zool. & Zool. E. & T. 36; Cat. Cetac. 105; P. Z. S. 1863.

a. *Head longly beaked; nose of skull slender, light, rather depressed, especially in front, much larger than the brain-cavity.*

Teeth $\frac{40}{40}$ to $\frac{60}{60}$. *Delphinus*.

* *Skull roundish; triangle just to the tooth-line; palate with a deep groove on each side, and a high central ridge behind.*
Delphis.

DELPHINUS DELPHIS. Dolphin.

Beak once and a half the length of brain-cavity. Teeth $\frac{42}{42}$ to $\frac{50}{50}$.

Dolphin, Borlase, Cornwall, 264, t. 27. f. 1; Hunter, Phil. Trans. 1787, p. 373, t. 18.

Delphinus delphinus, Pliny, Belon.

Delphinus antiquorum, Ray, Pisc. 28, t. a 1. f. 1.

Delphinus delphis, Linn. S. N.; Schlegel, Dieren, 82, t. 10; Turton, B. F. 17; Flem. B. A. 35; Jenyns, Man. 40; Bell, Brit. Quad. 463, fig.; Nilsson, Scand. Faun. 591.

Delphinus vulgaris, Lacép. Cét. 250, t. 14.

Hab. North Sea; coast of England, procured at Billingsgate Market; three specimens in the British Museum, presented by Messrs. J. & C. Grove.

According to O. Fabricius, it is not uncommon as far north as Greenland.

"They come on the Cornish coast in considerable numbers, more especially when the Pilchards and Mackerel abound; and not unfrequently are taken in the drift-nets, in the meshes of which they become entangled by the teeth. In the month of September 1845, eight or ten in a day were brought on shore in Mount's Bay for many days in succession."—*Couch, Cornish Whales*, p. 39.

Prof. Rapp (Cetac. t. 4) has described and figured the skeleton. The scapula with a broad dilated coracoid process, and a broad dilation on the front edge of the condyle. Fingers five, short; the fourth longest; the third rather short; the fifth shorter; the first very short, shorter than the second. The spinal processes of the dorsal vertebræ with a distinct subbasal anterior process; the caudal vertebræ with a similar process on the hinder part of the spinal process; but the greater part of the lumbar vertebræ are without them; the lateral process of the lumbar vertebræ slender.

** *Skull flattened behind; triangle to the tooth-line; palate flat, not grooved on the side. Clymene.*

DELPHINUS EUPHROSYNE. The Euphrosyne.

Delphinus euphrosyne, Gray, Cat. Osteol. Spec. B.M. 147; Zool. E. & T. 40, t. 22 (skull); Cat. Cetac. 117.

Delphinus holböllii, Eschr. Nat. Mol. Kopenh. 1847, from Nilsson.

Delphinus delphis, Cat. Mus. Coll. Surg. 161. n. 1117.

Hab. North Sea; coast of England. Skull in Norwich Museum. Skull in Mus. Coll. Surg.

b. *Beak short; nose of skull thick, conical, convex above, half as long as the brain-cavity.* Tursio, Gray, Zool. E. & T. 37; Cat. Cetac. 109.

DELPHINUS TURSIO. Bottlenose Dolphin.

L'orque (Orca), Belon, Aquat. f. 6.

Bottle-nose, Hunter, Phil. Trans. lxxxvii. t. 18.

Delphinus tursio, O. Fab.; Wright, Mag. N. H. 1838, ii. 609; Gray, Zool. E. & T. 37, t. 10; Cat. Cetac. 109; Schlegel, de Dieren, 86, t. 12 (var. *obtus*, t. 13); Fleming, B. A. 35; Jenyns, Man. 41; Bell, Brit. Quad. 469. fig., 472. fig.; Nilsson, Scand. Fauna, 602.

Delphinus nesarnak, Lacép.

Tursio truncatus, Gray, List Mam. B. M. 104.

Delphinus truncatus, Montagu, Wern. Trans. iii. t. 5. f. 3 (aged).

Hab. Mediterranean and North Sea. Coast of South of Ireland, Nov. 1828 (*R. Templeton*). Mouth of the Thames, Nore, June 1828 (*Howslip*); skull, Mus. Coll. Surg. no. 1125. Orwell, May 10, 1849. Devonshire, River Dart (*Montagu*): skull Brit. Mus. Frith of Forth: skeleton, Mus. University, Edinburgh, beak flat; skeleton in Surgeons' Hall, Edinburgh, teeth acute. Holland; skeleton, Leyden. North Coast of France; skeleton at Paris. Belgium; skeleton, Ghent. Denmark; skeleton, Mus. Copenhagen.

3. LAGENORHYNCHUS.

Beak of the skull depressed, expanded. Head shelving in front. Dorsal fin rather posterior.

Lagenorhynchus, Gray, Zool. E. & T. 34; Cat. Cetac. 94; P. Z. S. 1863.

* *Beak short; beak of skull only as long as the brain-cavity; teeth nearly to the notch.*

LAGENORHYNCHUS LEUCOPLEURUS. White-sided Bottlenose.

Delphinus tursio, Knox, Cat. Prepar. Whales, 29; Ann. & Mag. N. H. 1864, xiv. t. 3.

Delphinus leucopleurus, Rasch, Nyt Mag. for Naturv. iv. 97; Mag. Zool. 1843, p. 363; Nilsson, Scand. Fauna, 598.

Lagenorhynchus leucopleurus, Gray, Zool. E. & T. 34, t. 3, t. 12, t. 26. f. 3; Ann. & Mag. N. H. 1864.

Hab. North Sea. Orkney, May 1835 (*Knox*); skeleton, Mus. University of Edinburgh.

Lagenorhynchus? nilssonii. Nilsson, in the 'Scandinavian Fauna,' records a species under the name of *Delphinus obscurus*, and refers it with doubt to the description and figure of the skull, and the species under that name, in the 'Zoology of the Erebus and Terror,' and equally with doubt to *D. superciliosus* of Schlegel. Both these species are described from the same specimens, which were procured at the Cape of Good Hope, and therefore very unlikely to be of a species found also in the North Sea. Nilsson's species may very likely be found in the British Seas; so I have referred to it to draw zoologists' attention to the description. It is the only Swedish species that has not hitherto been observed here.

** *Beak moderate; beak of skull only as long as the brain-cavity; teeth not quite to the notch in the beak.*

LAGENORHYNCHUS ALBIROSTRIS. White-beaked Bottlenose.

Delphinus tursio, Brightwell, Ann. Nat. Hist. 1846, p. 21, t. 1, 9.

Delphinus albirostris, Gray, Ann. & Mag. N. H. 1846; M. Clausius, Dissertat. de Lagenorhynchis, Kiliæ, 1853.

Delphinus ibsenii, "Eschricht, 1847;" Nilsson, Scand. Fauna, 600.

Lagenorhynchus albirostris, Gray, Zool. E. & T. t. 10.

Delphinus pseudotursio, Reichb. Cetac. t. 24. f. 7, from Brightwell.

Delphinus (Lagenorhynchus) albirostris, Van Beneden, Nouv. Mém. Acad. R. Brux. xxxii. t. 1, 2 (animal, skeleton, and viscera).

Hab. North Sea, Faroe Islands. Yarmouth, 1846 (*Brightwell*); skeleton in British Museum; skull figured in Zool. E. & T. 11. Ostend, July 1851, female. Winter 1852, female (*Van Beneden*, l. c. p. 20).

Bladebone broader than high, with long acromion and a prominent articulation (t. 2. f. 9). Arm-bones very short; fingers four, short, outer longest, second rather shorter, third and fourth very short. Ear-bones large (see Van Beneden, l. c. t. 1. f. 7 & 8).

Vertebræ 90 or 94. The atlas and axis only anchylosed; the rest of the cervical vertebræ free. Scapula large. Thumb without a phalange.

Skeleton, Mus. Bruxelles; Louvain; at Mus. Copenhagen, Kiel, and Berlin.

*** *Beak moderate; beak of the skull longer than the length of the brain-cavity; teeth not reaching the notch.*

LAGENORHYNCHUS ACUTUS. Eschricht's Dolphin.

Delphinus (Grampus) acutus, Gray, Spic. Zool. 2 (1828).

Lagenorhynchus acutus, Gray, Zool. E. & T. 36, t.; Cat. Cetac. 101.

Phocæna acutus, Gray in Brook's Cat. 39, 1828.

D. leucopleurus, var., Nilsson, Scand. Fauna, 598.

Hab. North Sea.

Delphinus (Lagenorhynchus) eschrichtii, Van Beneden, Nouv. Mém. Acad. R. Brux. xxxii. 31.

Delphinus eschrichtii, Schlegel, Abhand. 122, t. 1, t. 2. f. 4, t. 4. f. 5; M. Claudius, Dissert. de Lagenorhynchis, 4to, Kiliae, 1853; Eschricht, Compt. Rend. Acad. Sci. 1852, 12 July.

Hab. North Sea; skeleton, Mus. Louvain. Faroe Islands (*Schlegel*); skeleton, Mus. Copenhagen, Leyden, Frankfort. Orkney (*Brooks*); skull in Mus. Leyden.

The peculiar character of this species is, that there are 82 or 83 vertebræ; the muzzle is narrower, the shoulder-blade narrower, a phalange to the thumb, the atlas and axis are anchylosed to the third and fourth cervical vertebræ by the spinous apophysis, and the sixth cervical alone has an inferior transverse process. Teeth $\frac{30-30}{30-30}$ (Van Beneden, *l. c.* 31).

Nilsson thinks my *L. acutus* may be only a variety of *L. leucopleurus*: the skulls are very unlike.

b. *Pectoral fins small, low down, and rather close together on the middle of the chest; upper jaw toothless; lower jaw with few teeth, sometimes deciduous.*

* *Maxillary bones elevated into a crest on the sides behind; teeth two or four, anterior conical; eyes close to the gape.* Hyperodontina.

4. HYPERODON.

Forehead convex. Gape short, only as long as the short beak. The eyes near and the ears far behind the gape. The crest of the maxillary bone thin and wide apart above. The beak of the skull descending downwards. The hinder edge of the skull as high as the crest. Lower jaw rather curved.

Bladebone triangular, with a long acromion and a posterior mar-

ginal prominence (Cuvier, Oss. Foss. 318, t. 24. f. 23). The bones of the arm short; fingers short (Cuv. 318). The opening of the blower is transverse, linear, slightly convex, forward in the middle, and slightly bent back at the ends; and this explains, I suspect, the different accounts that authors have given of this part, some looking at the middle and the others at the ends only.

It is curious that both O. Fab. and Turton should have reversed the head, or, by misprint, that each should state, in two places in the text, the teeth to be in the *upper* jaw; and Illiger's genus is founded on this error of the press.

HYPERODON BUTZKOPF. The Bottlehead.

The Bottle-head or Flounder Whale, Dale, Hist. Harwich, 411, t. 149.

Beaked Whale, Penn. Brit. Zool. t.

Delphinus bidens, Turton, B. Fauna, 17.

Hyperoodon bidens, Flem. B. A. 36; Jenyns, Man. 44; Thompson, Ann. & Mag. N. H. 1854, xiv. 347.

Bottle-nose Whale of Dale, Hunter, Phil. Trans. lxxvii. t. 19.

Delphinus hunteri, Desm. Mamm. 520.

Cetodiodon hunteri, Jacob, Dublin Phil. Journ. 1825.

Hyperoodon, Thompson, Mag. N. H. 1838, 221.

H. butzkopf, W. Thompson, Ann. & Mag. N. H. 1846, p. 150, t. 4 ♂, iv. 375; Gray, P. Z. S. 1862; Bell, B. Quad. 492. fig., 493. fig., 496. fig.

Delphinus hyperoodon, Schlegel, de Dieren, 94, t. 18.

Hyperodon borealis, Nilsson, Scand. Fauna, 622.

Hyperoodon butzkopf et *H. rostratum*, Gray, Cat. Cetac. 63, 64.

Whale, Illustrated London News, 18 Nov. 1860.

Nebhvalen, Eschricht, K. Dansk. Vid. Selsk. xi. 327, 328. fig., with details of anatomy.

Hyperodon hunteri, Gray, Ann. & Mag. N. H.

Hyperoodon rostratum, Wesmael, Nouv. Mém. Acad. Roy. Bruxelles, xiii. t. 1, 2 (very good).

Hab. British Seas, ascending rivers. Harwich (*Dale*). Mouth of the Thames, above London Bridge, 1783 (*Hunter*); skeleton, Mus. Coll. Surgeons. Whitstable (*Beardsworth*); skull and bones in British Museum. The Humber, near Hull, 1837 (*Thompson*); skeleton in Mus. Hull Phil. Soc. Mouth of the Dee; skeleton, Mus. Royal Institution, Liverpool. Dublin (*Jacob*); skeleton, Mus. Coll. Surg. Skull, Royal Dublin Society and Museum School of Anatomy. Belfast Lough, 29 Oct. 1845; skeleton, in Belfast Museum, of *male* 20 feet long (Ann. & Mag. N. H. 1846, xvii. 151), with four teeth in lower. Frith of Forth, 29 Oct. 1839; skeleton in Edinb. University Museum: *female* 28½ feet long, in company with young suckling female 9 feet long. Coast of Holland (*Wesmael, l. c.*).

I formerly thought there might be more than one British species of this genus, the figures and the description being so different; but I have not been able to find any specimen to establish this idea.

5. LAGENOCETUS.

The crests of the maxillary bones very thick and close together, especially above, where they are flat-topped. The beak of the skull horizontal. The hinder edge of the skull lower than the top of the crest. Lower jaw straight.

Lagenocetus, Gray, P. Z. S. 1863.

Hyperoodon, Gray, Cat. Cetac. 69.

This animal has been considered by Eschricht as the male of the preceding genus; but in the 'Proceedings of the Zoological Society' for 1860, p. 425, I have shown that both sexes have been observed of each genus.

LAGENOCETUS LATIFRONS.

Hyperoodon latifrons, Gray, Zool. E. & T. 27, t. 4; Proc. Zool. Soc. 1860, p. 424.

Hyperoodon butzkopf (male), Eschricht, Ann. & Mag. N. H. 1852.

Hab. British seas. Moreton Bay; skull in good condition. Orkney (*Warwick*); skull in British Museum. Frith of Forth; skeleton and skull in Mus. Coll. Surgeons, Edinburgh; female accompanied by a young male (*Thompson*, Ann. & Mag. N. H. 1846, p. 153).

** *Maxillary bones simple; teeth, on the sides of the lower jaw, compressed. Ziphiina.*

6. ZIPHIUS.

Lower jaw gradually tapering. Teeth on the sides of the jaw of the males large, compressed; and female small, conical.

Ziphius, Gray, Cat. Cetac. 70.

♀? *Delphinorhynchus*, Gray, Cat. Cetac. 72.

Tympanic bones large, very thick, free edge open, and much twisted (see Van Beneden, Mém. Acad. Brux. 8vo, xvi. fig. at p. 41; and Dumortier, Mém.).

ZIPHIUS SOWERBIENSIS.

Male. *Physeter bidens*, Sowerby, Brit. Misc. t. 1, 1806, male; Turton, B. Fauna, 17.

Diodon bidens, Bell, Brit. Quad. 497. fig. (cop. fr. Sowerby).

Delphinus sowerbii, Desm. Mam.; Jardine, Nat. Lib. t. 12 (cop. fr. Sow.).

Delphinus sowerbiensis, Blainv. in Desm.; Eschricht, Ann. & Mag. N. H. 1852.

Delphinorhynchus bidens, Gray, Ann. & Mag. N. H. 1840.

Heterodon sowerbyi, Lesson, Man. Mam. 419.

Ziphius sowerbiensis, Gray, Zool. E. & T. t. 5. f. 3, 4, skull; Cat. Cetac. 71.

Mesodiodon sowerbyi, Duvernoy, Ann. d. Sci. Nat. xv. 55, t. 2. f. 2.

Diplodon sowerbyi, Gervais.

PROC. Zool. Soc.—1864, No. XVI.

Diodon sowerbæi, Bell, Brit. Quad. 497. fig.

Diodon sowerbi, Jardine, Whales, 192. f. 13.

Female. *Mesoplodon sowerbiensis*, Gervais, Zool. et Paléont. Franc. t. 40. f. 1; Van Beneden, Mém. Acad. Brux. xvi. t. 4.

Dauphin de Dale, Blainv. N. Bull. Soc. Phil. 1825, p. 139; F. Cuv. Mam. Lithog. t.

Mesiodon micropterus, Duvernoy, l. c. 55, t. 2. f. 3.

Nodus dalei, Wagler, N. S. Amph. 34.

Delphinorhynchus micropterus, Dumortier, Mém. Acad. Brux. 1839, xii. t. 13; F. Cuv. Cétac. 114, t. 9. f. 1, t. 7; Gray, Cat. Cétac. 73.

Delphinus micropterus, Cuv. Règn. Anim. i. 288; Schlegel, De Dieren, 93, t. 17.

Heterodon dalei, Lesson, Man. Mam. 419.

Anodon dalei, Lesson, Ouvr. Buffon, i. 155, t. 3. f. 1.

Hab. Male, Elginshire (*Brodie*, 1800); skull in Museum at Oxford; casts in many museums. Female, Havre, 9 Sept. 1825 (*Blainv.*); mouth of the Orne, Calvados, 1828; head, Mus. Faculty of Sciences, Caen. Ostend, 1835 (*Dumortier*); skeleton in Museum at Ostend; and head, Mus. Paris.

In my paper "On the British Cetacea," in the 'Annals of Nat. Hist.' xvii. 82, 1846, I proposed to unite *Physeter bidens* of Sowerby with *Delphinus micropterus* of Cuvier. The French naturalists have since almost universally come to the same conclusion. The difference in the size of the teeth, which they believe to be sexual, at one time made me revise my first opinion. I now think it probable that they are the same; at any rate it is a subject that wants further examination, for at present only one male and two females of the two presumed species have been observed by naturalists.

The male was found near Brodie House, Elginshire, by James Brodie, who sent a figure and the skull to Mr. Sowerby, who figured it in the 'British Miscellany' under the above name. It was 16 feet long.

Dr. Fleming and Mr. Jenyns have most oddly confounded it with the Bottlehead of Dale (*Hyperoodon bidens*) (see Brit. Anim. p. 36, and Manual B. V. A. p. 44).

In the Mediterranean there is a species belonging to this tribe, which has been noticed under several names. It forms a genus, which may be named *ALIAMA*. The head is conical, tapering; upper jaw toothless; the lower jaw rather the largest, bent up at the top, with two large conical teeth in front, and sometimes a few small ones on the side just behind them. Dorsal fin falcate, three-fourths the entire length from the nose.

ALIAMA DESMARESTII.

Delphinus desmarestii, Risso, Eur. Mérid. iii. 24, t. 2. f. 3; F. Cuv. Cétac. 19.

Epiodon desmarestii, Bonap.

Diodon desmarestii, Lesson.

Orca desmarestii, Wagler.

Hyperodon doumetii et *H. desmarestii*, Gray, Cat. Cet. 68, 69.

Hyperodon, sp., Doumet, Bull. Soc. Cuvier. 1842, p. 207, t. 1. f. 2.

Delphinus philippii, Cocco, Erichson, Arch. 1846, p. 204, t. 4. f. 6.

Ziphius cavirostris, Gervais, Ann. Sci. Nat. xix.

Hyperoodon gervaisii, Duvernoy, Ann. Sci. Nat. xv. 49, 1851.

Hab. Mediterranean; Corsica (*Doumet*); Nice (*Risso*).

Grey, white streaked. Length 15 feet.

B. *Head rounded in front, not beaked; beak of the skull scarcely as long as the brain-cavity.*

a. *Pectoral fins falcate, elongate, low down, near together on the chest; head very swollen; intermaxillary bones very wide, covering the maxilla above; teeth conical; side of maxilla expanded horizontally.* Globiocephalina.

7. GLOBIOCEPHALUS.

Globiocephalus, Lesson; Gray, Zool. E. & T. 32; Cat. Cetac. 86.

* *Palate of skull flat, or rather concave in the middle.*
Globiocephalus.

GLOBIOCEPHALUS SVINEVAL. The Pilot Whale.

Petit cachalot, Daub. Acad. Sci. 1782, t. 1.

Cachalot svineval, Lacép. Cétac. 216.

Narwal edente, Camper, Cétac. t. 33, 34.

Delphinus melas, Trail, Nichol. Journ. xxii. 21. t., 1809; Fleming, B. Anim. 341; Jenyns, Man. 42; Schlegel, Dieren, 92, t. 16.

Ca'ing Whale, Neil, Orkney and Shetland, 221, 1836.

Delphinus globiceps, Cuvier, Ann. Mus. xix. t. 1. f. 2 ♀ (1812); Nilsson, Scand. Fauna, 608.

D. deductor, Trail, Scoresby, Arct. Reg. i. 496, t. 13. f. 1, 1820.

Grampus globiceps, Gray, Spic. Zool. 2, 1828.

Delphinus grampus, Owen, Cat. Osteol. Mus. Coll. Surg. n. 1137.

Globiocephalus svineval, Gray, Zool. E. & T. 32 (fig. skull); Cat. Cetac. 87.

Phocæna melas, Couch, Ann. & Mag. N. H. ix. 371, t. 6; Bell, B. Quad. 483. fig.

Large Grampus, Hunter, Cat. Mus. Coll. Surg. n. 1137.

Black Whale, Howling Whale, Social Whale, Bottlehead.

Hab. North Sea. Orkney (*Trail*); skull in Brit. Mus. Huyst, Belgium, Nov. 1859, female 20 feet long, with fœtus 5 feet long (*Van Beneden*) (N. Mém. Acad. Brux. xxxii. 5).

Van Beneden notes, the fœtus was coloured exactly like the adult; and Eschricht observes that a fœtus only a foot long has the pectoral fins of the shape so characteristic of the genus. The teeth were present, but had not cut the gums; they were 10/10, and they are evidently permanent, and not replaced.

Very common at the Faroe Islands, and called *Grindewal*. Very

many are taken annually on their passage from the Polar Seas to the Atlantic.—*Eschricht*.

GLOBIOCEPHALUS AFFINIS.

Delphinus grampus, Cat. Mus. Col. Surg. 169. n. 1138; Hunterian Coll. n. 686.

Delphinus melas, Owen, Cat. Osteol. Col. Surg. n. 2518; British Fossil Mammalia.

Globiocephalus affinis, Gray, Zool. E. & T. 32; Cat. Cetac. 89.

Hab. North Sea. Skull Mus. Coll. Surg.

** *The palate convex, shelving on the sides.* Sphærocephalus.

GLOBIOCEPHALUS INCRASSATUS. Thick-palated Pilot Whale.

Globiocephalus incrassatus, Gray, Proc. Zool. Soc. 1861 (skull, fig. 3).

Hab. British Channel, Bridport, Dorsetshire (*Beecham*), 1853; skull in British Museum.

b. *Pectoral fins ovate, wide apart, lateral; intermaxillary bones moderate.* Phocænina.

† *The lateral wing of the maxilla horizontally produced over the orbit; dorsal fin distinct; teeth conical.*

8. ORCA.

Teeth large, conical, acute, permanent. Intermaxillaries moderately wide.

Orca, Rondel.; Gray, Zool. E. & T. 33; Cat. Cetac. 92.

ORCA GLADIATOR. The Killer.

De Balænis minoribus, &c., Sibbald, Bal. 6, t. 2. f. 3, tooth.

Orca, Rondel. 483. fig.

Delphinus orca, Linn. S. N.; Mag. N. Hist. iv. 329. f. 2; Schlegel, De Dieren, 87, t. 14 (good); Turton, B. F. 17; Fleming, B. A. 34; Jenyns, Man. 42; Bell, B. Quad. 477. fig. (bad); Nilsson, Scand. Fauna, 603.

Grampus, Hunter, Phil. Trans. 1787, t. 16.

Delphinus grampus, Desm. Mam. 517, from Hunter; Owen, Cat. Osteol. Coll. Surg. n. 1136.

Cachalot d'Anderson, Duhamel.

Delphinus duhamelii, Lacép. Pisc. 314, t. 9. f. 1.

Delphinus gladiator, Lacép.

Hab. North Sea. Greenwich (*Hunter*); skull Mus. Coll. Surg. n. 2515. Coast of Essex; skull in British Museum. Weymouth (*R. Pearce*); skeleton in British Museum. Lynn Harbour, Nov. 1830; skull in Mr. Bell's Museum (see Loudon's Mag. N. Hist. iv. 329). A school of ten in the Parrett, near Bridgewater, 24 March, 1864 (*J. Clark*), varying from 11 to 22 feet long. Young specimen in

the Thames at Greenwich, 1793 (*Banks in Pennant*), length 31 feet; skeleton in British Museum and Museum of the College of Surgeons. Ostend, adult male and female and two years' adult skeleton; Mus. Louvain. Holland, 1841, 16 feet long; skeleton, Mus. Leyden.

ORCA CRASSIDENS. Lincolnshire Killer.

Phocæna crassidens, Owen, Brit. Fossil Mam. 516, f. 213, 214, 216, skull and united cervical vertebræ.

Orca crassidens, Gray, Zool. E. & T. 33; Cat. Cetac. 94.

Pseudorca crassidens, Reinhardt, Danish Transactions, fig.

Hab. North Sea, in schools. Lincolnshire (*Owen*); cervical vertebræ anchylosed (*Owen*, f. 214).

9. GRAMPUS.

Teeth conical, early deciduous. Intermaxillaries broad.

Grampus, Gray, Spic. Zool. 2; Zool. E. & T. 30; Cat. Cetac. 82.

GRAMPUS CUVIERI. Cuvier's Grampus.

? *Grampus*, Hunter, Phil. Trans. 1787, t. 17.

? *Delphinus ventricosus*, Lacép. Cét. 311, t. 15. f. 3 (from Hunter).

Delphinus griseus, Cuv. R. A. i. 290; Ann. Mus. xix. t. 1. f. 1.

Grampus griseus, Gray, Spic. Zool. 2.

Grampus cuvieri, Gray, Ann. N. H. 1846; Zool. E. & T. 31; Cat. Cetac. 83.

Delphinus globiceps, var.?, Nilsson, Scand. Fauna, 608.

Hab. North Sea. Isle of Wight (*Rev. C. Bury*), 1845; skull in British Museum.

The animal is black, and not grey; hence the inappropriateness of the name of Cuvier.

†† *The lateral wings of the maxilla shelving down over the orbit.*

* *Teeth permanent, compressed, sharp-edged.*

10. PHOCÆNA.

Teeth compressed. Dorsal triangular, central.

Phocæna, Rondel. Pisc. 474; Gray, Spic. Zool. 2; Zool. E. & T. 30; Cat. Cetac. 81.

PHOCÆNA COMMUNIS. Common Porpoise.

Phocæna, Rondel. Pisc. 473.

Phocæna rondeletii, Willughby, Pisc. 31. t. A 1. f. 2.

Ph. communis, Lesson; Gray, Spic. Zool. 2; Zool. E. & T. 30; Cat. Cetac. 81; Bell, Brit. Quad. 473. fig., 476. fig.

Delphinus phocæna, Linn. S. N.; Schlegel, Dieren, 89. t. 15; Turton, B. Fauna, 17; Fleming, B. A. 33; Phil. Zool. ii. 209, t. 1. f. 4; Jenyns, Man. 41; Nilsson, Scand. Fauna, 616.

Porpoess, Borlase, Cornw. 264, t. 27. f. 2; Monro, Phys. Fishes, 45, t. 35.

Hab. North Sea. Near the shore in all seasons, and ascends rivers.

"A season seldom passes without their appearance at Greenwich and Deptford, and they occasionally pass much higher up" (C. Collingwood, 1858); Battersea, Gray, 1815.

"The Porpoise enters the Baltic by the Sound in large numbers in the spring, in pursuit of the Herrings, and leaves it by the Little Belt in December and January" (Eschricht).

Professor Rapp (Cetac. t. 5) figures the skeleton of *Delphinus phocaena*. "The scapula with a broad, dilated coracoid process. Fingers five, short; the first longest; the third scarcely shorter; the second shorter; the fourth and fifth very short; the fifth slender. Spinous processes of the dorsal and lumbar vertebræ with a distinct subcentral anterior process on each side. The lateral processes of the lumbar vertebræ short and broad" (Rapp, *l. c.*).

** *Teeth early deciduous, conical; dorsal fin none.*

11. BELUGA.

Teeth in both jaws early deciduous.

Beluga, Gray, Spic. Zool. 2; Zool. E. & T. t. 29. f. 3; Cat. Cetac. 77.

M. Van Beneden observes that he has seen skulls varying from $\frac{8-8}{8-8}$ to $\frac{10-10}{10-10}$, and all intermediate combinations; 9/8 seem the most frequent (Nouv. Mém. Acad. Brux. xxxii. 16).

BELUGA CATODON. Beluga or White Whale.

Balæna minor in inferiore, &c., Sibbald, Bal. 9; Ray, Syn. Pisc. 15.

Physeter catodon, Linn. S. N. (from Sibbald); Turton, B. Fauna, 16; Jenyns, Man. 45.

Delphinus leucas, Pallas, Mem. Wern. Soc. iii. 17, t., ♂; Bell, Brit. Quad. 491; Nilsson, Scand. Fauna, 614.

Catodon sibbaldi, Fleming, B. A. 39.

Beluga leucas, Gray, Spic. Zool. 2; Bell, B. Quad. 488. fig., 491. fig.

Beluga catodon, Gray, Zool. E. & T. 29.

Delphinus albicans, O. Fab. F. G. 50; Jenyns, Man. 43.

Delphinapterus albicans, Fleming, B. A. 36.

Hab. North Sea. Scotland (Sibbald).

Two males were cast ashore on the beach of the Pentland Frith, some miles east of Thurso, in August 1793 (Colonel Murie). A specimen was killed near Sterling in June 1815, and described by Dr. Barclay and Mr. Neil in 'Wern. Mem.' iii. 371. t. 27. It is gregarious, entering large rivers.

12. MONODON.

Teeth very early deciduous. Male with a projecting spiral tusk in the upper jaw.

Monodon, Artedi; Linn. S. N. i. 17; Gray, Zool. E. & T. 29; Cat. Cetac. 75.

Monoceros, Charlet; Gray, P. Z. S. 1863 (misprint).

Ceratodon, Brisson; Illiger.

Diodon or *Diodonta*, Storr.

Oryx, Oken.

MONODON MONOCEROS. The Narwhal.

Monodon monoceros, Linn. S. N.; Fleming, Mem. Wern. Soc. i. 146; Gray, Zool. E. & T. 29; Cat. Cetac. 75; Turton, B. Fauna, 15; Fleming, B. A. 37; Jenyns, Man. 43; Bell, B. Quad. 500. fig., 505. fig.; Nilsson, Scand. Fauna, 619.

Sea Unicorn, Sow. Brit. Misc. t. 9.

Hab. North Sea; skeleton in Museum of Hull Phil. Soc.

First recorded as found in Britain by Vulpus (Obs. Med. 376, t. 18) near the Island of May (insulam Mayam) in June 1648. One was observed on the 15th of February, 1800, near Boston, Lincolnshire (see Lacépède, Hist. Nat. Cét. 159, t. 5. f. 2, and Mem. Wern. Soc. i. 147; Fleming, B. A. 37). A young male was found, on the 27th of Sept. 1808, at the Sound of Weesdale, Zetland, and described by Fleming, Wern. Mem. i. 131, t. 6.

"The tooth is characteristic of the male. Instances, however, occur, though seldom, in which the female has a tooth; one is mentioned in Linn. Trans. xiii. 620" (Flem. B. A. 28).

Suborder II. SIRENIA.

Body rather hairy. Muzzle bristly. Nostrils two, separate, apical, lunate, valvular. Fore limbs arm-like, clawed; hinder depressed, expanded, tail-like. Teats two, pectoral. Teeth of two kinds, cutting and grinders (see Gray, Cat. Cetac. B. M. 138).

Fam. 1. MANATIDÆ.

Manatidæ, Gray, Cat. Cetac. 138.

1. MANATUS.

Tail rounded. Grinders tubercular.

? *MANATUS AUSTRALIS*. Manatee.

Manatus, Rondel. Pisc. 490.

Trichecus manatus, Linn. S. N. i. 49.

Manatus australis, Tilesius, Jahrb. i. 23.

M. americanus, Desm. Mam. 517.

M. borealis, Flem. B. Anim. 29.

Mermaid of the Shetland Seas, Edinb. New Phil. Journ. vi. 57, 1829; Steward, Elem. Nat. Hist. i. 125.

Hab. Estuaries of Tropical America; Shetland (*Steward* and *Fleming*).

The animal mentioned by Steward and Fleming is most probably the American Manatee, which may, under extraordinary circum-

stances, be brought by the Gulf-stream to the coast of Shetland. I have seen no specimens ; but the size precludes it being the *Rhytina*, to which Fleming refers it.

“The carcase of one of these animals was, in 1785, thrown ashore near Leith : it was much disfigured ; and the fishermen extracted its liver and other parts, from which a considerable quantity of oil was obtained ” (Stewart, Elem. N. H. i. 125).

“Zetland Mermaid. Animal 3 feet long ; upper part resembling a Monkey with short arms, and distinct, not webbed, fingers ; lower part like a fish ; skin smooth, grey, without hairs or scales ; breast pectoral !! ”—Laurence Edmondstone in Edinb. Magaz. Sept. 1823, p. 343, copied in Fleming, Brit. Anim. 30.

2. CHARACTERS OF A NEW SPECIES OF FALCON, DISCOVERED BY THE LATE DR. DICKINSON, OF THE CENTRAL AFRICAN MISSION, ON THE RIVER SHIRÉ. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

The collections of the late Dr. Dickinson, who was Surgeon to the Central African Mission until his death at Chibisa's, on the River Shiré, on the 17th March 1863, have been kindly submitted to my inspection by his brother, Mr. R. Dickinson, of Jarrow-on-Tyne.

Amongst them are three examples of a Falcon allied to *Falco ardesiacus*, Vieill., which appears to be new to science, and which I propose to name after its discoverer.

FALCO DICKINSONI, sp. nov.

♂. *Cineraceo-niger ; capite undique pallide cinereo, hujus plumis medialiter nigro striolatis : uropygio albicante, cinereo tincto : cauda albicanti-cinerea nigro frequenter transvittata, fascia subterminali lata nigra, rectricum apicibus ipsis cinereo-albicantibus ; ventre nigricante, brunneo tincto ; tibiis et crisso cinerascentibus : alarum pogoniis internis albis, nigro frequenter transvittatis : rostro nigro, cera et pedibus flavis : remigibus 2^{ndo} et 3^{tio} æqual. et longissimis, cauda rotundata.*

Long. tota 13·5, alæ 8·2, caudæ 5·2, tarsi 1·4 poll. Angl.

♀. *Mari similis, sed major, et abdomine brunnescentiore.*

Long. tota 14·5, alæ 9·1, caudæ 6·0, tarsi 1·5.

Hab. In ripis fl. Shiré in Africa orientali.

Obs. The general form of this bird is completely that of *Falco ardesiacus* (Vieill.) of Western Africa. Together with that bird and *Falco zoniventris*, Peters, of Madagascar, it evidently forms a distinct section among the Hobbies (*Hypotriorchis*), for which I suggest the subgeneric name *Dissodectes**, indicating thereby the peculiarity of their doubly-toothed mandible—a feature in which they resemble the *Harpagi* of South America.

* δισσοῦς, duplex, et δῆκτης, mordicator



Gray, John Edward. 1864. "On the Cetacea which have been observed in the seas surrounding the British Islands." *Proceedings of the Zoological Society of London* 1864, 195–248.

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