ON THE NOMENCLATURE OF THE WHALEBONE WHALES OF THE TENTH EDITION OF LINNÆUS'S SYSTEMA NATURÆ.

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The present paper is intended as an introduction to an inquiry as to the identity of the whalebone whales frequenting respectively the Eastern and the Western Atlantic.

The species inhabiting European waters have been studied by many naturalists for a very long time, and may be said to be well known. Those of the American coasts and of African waters, on the contrary, have received less attention and are much less well understood. As regards North American species, some zoologists have tacitly assumed that they were identical with the European forms, while others have bestowed new names on the various specimens which have come under their observation. The whole subject is, therefore, involved in an uncertainty, which is a hindrance to the progress of cetology in many ways, and especially prevents a correct understanding of the geographical distribution of these huge animals.

As a preliminary step to the investigation of this subject, it has seemed to me desirable that the nomenclature of the European species should be thoroughly established. Taking as the starting point the Tenth Edition of Linnæus's Systema Naturæ, I have endeavored to ascertain whether the names in current use for the species are the correct ones according to accepted canons of nomenclature.

It has to be said that the species of cetaceans in the Systema are no more to be certainly determined from the diagnoses than many other Linnæan species. The main reliance has to be placed on the bibliographical references and synonymy, but even with these helps the Linnæan species are not always to be identified beyond peradventure. Nevertheless, the tendency of zoologists in the main is to adopt these names whenever at least a colorable defense of them can be made. This is, undoubtedly, on the whole, a wise course, as the tendency of all nomenclatural investigations is to go back as far as is in anywise warrantable. If one goes no farther back than the earliest fully-established name, there are always those who, taking up the matter anew, will

argue in favor of an earlier though less well-founded name. By falling back at once to the earliest name that, under rules generally accepted, can be adopted with any plausibility whatever, such discussions are cut off, and stability is on the whole promoted.

It will be a fortunate day for zoology when the names of animals are determined by common assent, without regard to history or recourse to argument.

No special originality is claimed for the conclusions reached in this paper, some of which have been hinted at by Sir William Turner and other cetologists. I believe, however, that the fact that the Linnæan names for the finback whales are based exclusively on Martens's and Sibbald's descriptions is now for the first time demonstrated.

The European species of whalebone whales (including the bowhead among the number) now currently recognized are as follows:

1. The bowhead, Greenland or Arctic right whale, known as *Balæna mysticetus.*
2. The black whale, nordcaper or Basque whale, known as *Balæna biscayensis.*
3. The common finback or rorqual, known as *Balænoptera musculus.*
4. The blue whale, known as *Balænoptera sibbaldii.*
5. Rudolphi's whale or rorqual, known as *Balænoptera borealis.*
6. The little piked whale or lesser rorqual, known as *Balænoptera rostrata.*
7. The humpback, known as *Megaptera boops* or *longimana.*

The species of whalebone whales described by Linnæus are as follows:

1. *Balæna Mysticetus.*
2. *Balæna Physalus.*
3. *Balæna Boops.*
4. *Balæna Musculus.*

It is questionable how far Linnæus was personally familiar with specimens representing the species he described.

He states in the Systema that he had access to the collections of King Adolphus Frederick and Queen Louise Ulrica of Sweden, Tessin's and De Geer's museums, and the museums of the Upsala and Stockholm academies. There is no mention of specimens of cetaceans in the catalogues of these collections published in Linnæus's time, with a single exception. In the catalogue of the Adolphus Frederick Museum (p. 51), he records a fœtus of a whale under the name of *Balæna grœnlandica.* It appears to be a Greenland whale, but as we shall presently see, Linnæus afterwards referred it to the finbacks.[1]

[1] Van Beneden remarks of the bowhead and nordcaper:

"Du Hamel, Linné, Pierre Camper, and, later Lacépède have occupied themselves successively with these giants of the sea; but Pierre Camper alone had in his hands pieces of the true 'Baleine franche' [*Balæna mysticetus*]; the others only knew them from figures, or from the accounts of explorers." (Hist. Nat. des Cétacés des Mers d'Europe, 1889, p. 52.)

THE BOWHEAD OR GREENLAND RIGHT WHALE.

The first species described by Linnæus is *Balæna Mysticetus* (p. 75). The diagnosis "*B. naribus flexuosis in medio capite, dorso impenni*" is generic, rather than specific. The habitat—"*In oceano Grœnlandico*"—points to the bowhead whale. The description is in part erroneous and for the rest consists of generic or supergeneric characters.

The bibliographic references include the works of Artedi, Willoughby, Rondelet, Ray, and Martens, and Linnæus's own writings. I discuss them for convenience in chronological order, as follows:

"Rond. pisc. 475" = **RONDELET, De Piscibus Marinus, 1554, p. 475.**

Rondelet gives the characters, though with some evident inaccuracies, of a species of right whale which occurs "on the coast of the Aquitanian Sea and in India." He states explicitly that it has no fin on the back ("*In dorso nullam habet*").

As the Greenland whale, or bowhead, was unknown to the European naturalists of Rondelet's time, it may be presumed that the species he had in mind was the black whale or nordcaper. Gervais has called special attention[1] to the following sentence, which, in his opinion, points conclusively to the nordcaper: "*Rostro est brevi, fistula caret, corio duro, nigro integitur sine pilis, cui lepades et ostrea hærentia aliquando reperiuntur.*"[2]

Rondelet cites localities and facts indicating that he was familiar with the whale fishery of the Basques in the Bay of Biscay, which had for its object, as Fischer, Van Beneden, and others have shown, the black whale or nordcaper.

Rondelet writes under the heading "De Balæna vulgo dicta sive de Musculo," and a large part of the chapter consists of a discussion as to the identity of the *Musculus* of Pliny and other writers.

"Will. icht. 35" = **WILLOUGHBY, Ichthyographia (or Historia Piscium), 1686, p. 35.**

Willoughby in this place, under the heading "*Balæna* Rondeletii, Gesneri & *aliorum*—The Whale," merely repeats the observations of Rondelet, John Faber (the expositor of Hernandez's natural history of Mexico), Polydorus Virgil (Bishop of Bath and Wells, 1502 to 1555), and others, and adds some comments of his own on the various records. These records appear to refer severally to the right whales, the finbacks, and the humpback.

No attempt is made to formulate a diagnosis of any particular species.

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[1] Comptes Rendus, 5 June, 1871, pp. 666, 667. See also Van Beneden, Hist. Nat. des Cétacés des Mers d'Europe, 1889, p. 7.

[2] *Translation:* It is provided with a short beak; the blowhole is wanting; it is covered with a hard black skin, without hairs, to which barnacles and oysters are sometimes found adhering.

"Raj. pisc. 6" = RAY, Synopsis Methodica Piscium, 1713, p. 6.

The nomenclature in this work is polynomial, and we find instead of a specific name the usual brief diagnosis, consisting, however, of generic and supergeneric characters. This is followed by an extended account of the supposed species compiled from early writers. From the localities given it is evident that the bowhead and black whale or nordcaper are confounded. Thus the author mentions a specimen reported by Faber as being stranded in 1624 not far from the maritime fortress of St. Severus, about 30 miles from Rome; of another near Corsica in 1620, and a third stranded in 1532 (according to Polydorus Virgil) at Tynemouth, England. These, if they refer to right whales at all, were the black whale and not the bowhead. On the other hand, Ray quotes from Martens, who observed the bowhead at Spitzbergen.

"Art. gen. 76" = ARTEDI, Genera Piscium, 1738, p. 76.
"Syn. 106" = ARTEDI, Synonymia Nominum Piscium, 1738, p. 106.

Artedi in the two works cited gives a brief diagnosis without genuine specific characters, and describes a specimen which he himself examined in London, November, 1734. It is highly probable that his description, which appears to indicate clearly that he had before him a right whale or true *Balæna*, relates to the black whale or nordcaper. In the Genera Piscium, however, he cites among his bibliographical references Marten's "*Balæna Spitsbergensis*," which was the bowhead or Greenland whale. He also gives "Greenland whale" as the English name of his species, and "Grönlands Hualfisk" as the Swedish name. It is evident that Artedi did not distinguish between the black whale and the bowhead.

"Faun. suec." 264 = LINNÆUS, Fauna Suecica, 1746, No. 264 (p. 98).

This work is polynomial, and at the place cited we find only what is really an attempt at a brief diagnosis, consisting, however, of generic characters, followed by citations of numerous early authors, such as Gesner and Jonston, and the remarks "*Grönlands walfisk* of the Swedes;" "inhabits the Atlantic Ocean, feeding on medusæ."

"Syst. nat. 39, n. i."

I understand this to refer to the ninth edition of the Systema Naturæ. The matter, however, is not on page 39 but on page 40. Under No. 1 we have the same references to the Fauna Suecica and Artedi's Synonymia which we find in the tenth edition of the Systema Naturæ, now under consideration. The entire matter is as follows: "1. *Balæna fistula in medio capite, dorso caudem versus acuminato.* Art. syn. 106, Fn. 264. *Mysticetus.* la Balaine."

No new or independent information will be looked for here.

It will be perceived from the foregoing examination of Linnæus's authorities that these writers had no clear notion of the distinction between the black whale and the bowhead, or even in some cases between the different types of whalebone whales, and that it is conse-

quently impossible to arrive at any definite conclusion as to the applicability of Linnæus's name *mysticetus* from a study of their works. We must therefore get what satisfaction we can from Linnæus's own words, and it would seem that even here the only certain indication is to be found in the phrase "lives in the Greenland Ocean." This, as already mentioned, may probably be considered as a sufficient warrant for attaching the specific name "mysticetus" to the bowhead. There is, so far as I know, no record of the occurrence of the black whale in Greenland waters, and, furthermore, it is well known that there was an extensive fishery for the bowhead in those waters in Linnæus's time.

THE FINBACK AND HUMPBACK WHALES.

We pass now from the bowhead to the consideration of the other whalebone whales mentioned by Linnæus. These are three in number—*Physalus*, *Boops*, and *Musculus*.

1. BALÆNA PHYSALUS.

Linnæus's diagnosis of this species is as follows: "A whale with the nostrils in the middle of the head; an adipose fin at the end of the back."[1] The only other bit of information is—"lives in the European Ocean."

It is evident that these data, though they suffice to indicate a finback whale, are insufficient to enable us to associate the name *Physalus* with any one of the four European species, and if the matter is to be resolved at all it will be through the help of the authorities cited by Linnæus. Taking these in chronological order, the first we meet with is Rondelet. The citation is as follows:

"Physeter. Rond. pisc. 485"=RONDELET, De Piscibus marinus, 1554, p. 485.

The whale which Rondelet describes under the name of *Physeter*, in the work above mentioned, is probably the sperm whale, though the figure which heads the chapter represents an animal having teeth in both jaws and the blowhole on the top of the head, somewhat as in *Orca*. In any event, it can not be counted among the whalebone whales, and Linnæus was in error in citing it under this or any other of his species of *Balæna*.

"Physalis bellua s. Physeter. Gesn. pisc. 723."

I understand this to refer to Gesner's Historia Animalium, Liber IV, and possibly the edition of 1620. I have seen only the first edition of 1558, in which, on page 851, begins a chapter entitled "De (Physalo bellua, seu) physetere, rondeletius." The description here given is quoted verbatim from Rondelet, and the figure which heads the chapter is also from that author. So far as the present species is concerned, therefore, Gesner's work can not be cited as an independent source of information.

[1] "B. naribus in medio capite dorso extremo pinna adiposa" (p. 75).

"Finfisch. Martens. spitsb. 125. t. q. f. c." = MARTENS, Spitzbergische oder Grönlandische Reise Beschreibung gethan im Jahr 1671. Hamburg, 1675, p. 125, pl. Q, fig. c.

In chronological order, Martens comes next after Rondelet and Gesner among the authors cited by Linnæus. Martens visited Spitzbergen[1] in 1671, and his Beschreibung includes an account of the various marine animals found in the waters thereabouts.

These descriptions are very full for the time in which they were written, and are of especial interest, both because they represent the source from which many later authors drew their information, and because they appear to have been based largely on personal observation.

Martens's description of the "Finfisch" is as follows:

The finfish is equal to the whale [*Balæna mysticetus*] in size.

As to thickness, the whale is, however, three or four times as thick as the finfish.

The finfish is recognized when in motion by the "Flossfedern" or fins, which stand on the back, near the tail.

It is distinguished also by the strong spouting from the right whale, which does not blow so powerfully.

The eminence on its head is divided longitudinally, and this is its blowhole, out of which it blows the water higher and stronger than the whale.

The eminence, however, is not so high as in the whale, and the back is likewise not so deeply furrowed.

The lips of the finfish are of a brownish color and diversified with plaits (*Krausen*), like a line or streak.

On the upper lip hangs the so-called whalebone, as in the whale, but whether it opens and shuts its mouth is variously believed. Some hold that it can not shut its mouth. It is not so, however. It moves (but not always) with open mouth. Its whalebone, like that of the right whale, does not hang out on the sides outside the lips. It can shut its mouth completely when it will.

The inside of the mouth between the whalebone is entirely rough with hairs, like horsehair, which are situated on the inside of the whalebone and on the little whalebone, which develops first, and is blue in color.

The other whalebone is brown in color; also dark brown, with yellow streaks, which is considered the oldest.[2]

The blue is found in young whales and finfish

In color it [i. e., the finfish] is not velvet black, like the whale, but like the fish called "Schley" [the tench, *Tinca vulgaris*].

The form of the body is long, round, and slender, and has not so much blubber as the whale, on which account one does not particularly care to catch the finfish, as it does not repay one for the trouble.

It is much more dangerous to kill than the whale, because it can move and turn much quicker, for it strikes about it with his tail and from it (*von sich*) with its flippers, called fins, so that one can not come near it with boats, when the lances help most to kill it.[3]

This description is accompanied by a figure which shows with considerable fidelity the characteristic form of a finback whale, but the furrows of the throat are wanting, a peculiarity which has attracted the attention of many zoologists.

[1] Or East Greenland, as it was then frequently called.

[2] In describing the Greenland whale, he refers to the whalebone as being "sometimes yellow in color, with parti-colored streaks, like that of the finfish" (p. 99).

[3] Spitzbergische oder Groenländische Reise, Beschreibung, 1675, pp. 125, 126.

Martens's description of the form, color, etc., of his finfish, and especially also of the whalebone, corresponds with the common finback, usually known as *Balænoptera musculus*. With the other three species of finbacks known to frequent the waters of northwestern Europe it shows less close agreement. In the present state of knowledge we may, I think, on the basis of the color of the whalebone alone, decide that Martens's description applies to the common finback.

Martens states in his Beschreibung[1] that all the illustrations are from sketches of his own from life. We may believe, therefore, that his description and figure of the finfish are based on direct observation of specimens. As above mentioned, it is somewhat singular that he neither describes nor illustrates the throat furrows, which are so characteristic of all finback whales. F. Cuvier accounts for this on the ground that Martens did not regard the furrows as an essential character, but this seems hardly sufficient. It is possible that the figure was made by Martens from memory and not with the whale before him.

"Balæna edentula, corpore strictiore, dorso pinnato, Raj. pisc. 9" = **RAY, Synopsis methodica Piscium, 1713, p. 9.**

The description accompanying this polynominal is nothing more than a Latin translation of Martens's account of the "Finfisch," somewhat abbreviated and paraphrased. It has in itself therefore no independent value as a means of determining to what species Linnæus's name *Physalus* is to be applied. Ray's species is simply Martens's "Finfisch" under another name.

"Will. icht. 41" = **WILLOUGHBY, Historia Piscium, 1686, p. 41.**

On the page cited Willoughby merely quotes the first part of Rondelet's account of the *Physeter*, leaving out a few words here and there. He adds a few critical remarks regarding the *Physalus* of Oppian and the *Pristis* of Rondelet and Bellon, but nothing of the slightest service in connection with the present inquiry.

Willoughby appears to have known nothing of Martens's Beschreibung.

"Art. gen. 77" = **ARTEDI, Genera Piscium, 1738, p. 77.**

Two species of whales are described by Artedi in the place cited. The one referred to by Linnæus in the citation quoted above is No. 2—"*Balæna fistula in medio capite, tubere pinniformi in extremo dorso.*"

Artedi merely cites Ray and paraphrases and abbreviates his description, without giving any new information. Ray, as we have seen, copies Martens, and hence we have to fall back again on the latter author in determining with what species Linnæus's name is to be associated.

"Art. Syn. 107" = **ARTEDI, Synonymia Nominum Piscium, 1738, p 107.**

Under the heading "*Balæna fistula in medio capito, tubero pinniformi in extremo dorso,*" Artedi cites Ray, pp. 9–10, as the principal

[1] Page 93.

synonym, and adds references to ten early authors, Ælian, Pliny, Gesner, etc., with the remark, "These synonyms are seen to pertain to the same species with 'a'" [i. e., Ray].

We have already considered Ray's description, and have concluded that it was copied from Martens, and refers to the common finback.

The descriptions of the earlier authors are for the most part indeterminable, so far as species are concerned, and some relate to entirely different classes of animals. Ælian's *Physalus*, for example, is a small fish of the Red Sea, which has the power of inflating itself and floating on the waves. This was probably a globefish, or *Tetrodon*.

The *Physeter* of Rondelet was very probably the sperm whale, as we have already stated.

"Faun. suec. 265" = LINNÆUS, Fauna Suecica, 1746, p. 99, No. 265.

Linnæus in this place copies Artedi's diagnosis, which the latter in turn took from Ray, and he from Martens. He cites some six of the early authors—Gesner, Jonston, etc.—where whales called "Physeter" are mentioned, but some of them at least, as we have already seen, treat of the sperm whale.

Linnæus adds this independent information: "Lives in the Norwegian sea and is eaten by the natives; tastes nearly like the sturgeon, which was eaten daily by the natives while it migrated by northern Finmark to the highest part of Norway."

As four species of finback whales are known to frequent Norwegian waters, the one particularly referred to in this item can not, of course, be discriminated, though very probably it was the "common" finback.

Here, then, as in the case of Ray and Artedi, we are obliged to turn back to Martens as the only means of determining the proper use of the specific name *Physalus*. We have already decided that Martens's "Finfisch" was the common finback, usually called *Balænoptera musculus*.

To sum up the matter, then, it seems necessary to bestow on the common finback the name of *Balænoptera physalus* (Linnæus).

This is more important than would at first appear, because, as I shall hope to show, the specific name *musculus*, now in common use for this whale, is misapplied. Unless the Linnæan name *physalus* is accepted, it will be necessary to apply some other cognomen. I am of the opinion, however, that *physalus* should be considered applicable.

2. BALÆNA BOOPS.

Linnæus's diagnosis of his *Balæna Boops* is as follows: "*B. fistula duplici in rostro, dorso extremo protuberantia cornea.*" (A whale with a double blowhole in the snout; a horny protuberance at the end of the back.)

This diagnosis is in no wise specific, but, as we shall see presently, was taken from a description in Sibbald's Phalainologia. Linnæus adds

nothing further but certain synonyms (which we shall consider in order) and the remark "lives in the Northern Ocean."

It is clear that Linnæus's diagnosis is not sufficient for the identification of the species, and if the proper use of the name *boops* is to be ascertained at all it will be through the synonyms, which are as follows:

"Art. gen. 77" = ARTEDI, Genera Piscium, 1738, p. 77.

Upon turning to the place cited, we find the following:

3. *Balæna fistula duplici in rostro, protuberantia corniformi in extremo dorso. Art. Syn. 107.*

Balæna tripinnis, nares habens, cum rostro [acuto] & plicis in ventre. Sibbald. Ray p. 16.

Anno 1690. d. 17. Novembris in sinum quendam portus Bruntisland, in latare æstuarii Forthæ Boreali in Scotia, ejecta fuit.

Rostrum respectu ad congeneres acutum. Plicæ in ventre adsunt. Longitudo 46 pedum.

Fistulæ nasiformes ab apice rostri 6 pedes & 8 pollices longæ & septo divisæ. Oculi exigui.[1]

It is evident that this entire matter was extracted from Sibbald's Phalainologia. The whale "stranded on the 17th of November, 1690," is one figured and described in detail in that work.

Art. "syn. 107" = ARTEDI, Synonymia Nominum Piscium, 1738, p. 107.

The species here referred to is described in full, as follows:

3. *Balæna fistula duplici in rostro, protuberantia cornuiformi in extremo dorso.* Art.
Balæna tripinnis nares habens, cum rostro acuto & plicis in ventre. Sibbald.
Raj. p. 16.

It is evident that this is merely a repetition of the diagnosis given by Artedi in the Genera Piscium, and which he extracted from Sibbald's work.

"Balæna tripinnis nares habens cum rostro acuto & plicis in ventre. Raj. pisc. 16" = RAY, Synopsis Methodica Piscium, 1713, p. 16.

The account given in the place cited above begins thus:

8. Balæna tripinnis, nares habens, cum rostro acuto & plicis in ventre.

Anno 1690, *Novemb.* 17, in sinum quendam ad occasum Portus *Bruntisland* dicti, in latere æstuarii *Forthæ* Boreali ejecta fuit hujusmodi Bellua.

This is likewise an abbreviation, with some paraphrasing, of the account by Sibbald of the whale stranded on November 17, 1690, in the Firth of Forth. Artedi, in turn, in 1738 copied the description of this same whale from Sibbald, as we have seen.

[1] *Translation.*—3. A whale with a double blowhole in the snout; a horn-shaped protuberance at the end of the back. Artedi, Synonymia Nominum Piscium, p. 107.

A whale with three fins, having nostrils; with [an acute] snout and with folds in the belly. Sibbald. Ray, p. 16.

This was stranded on the 17th of November, 1690, in a certain bay of the harbor of Bruntisland, on the north shore of the Firth of Forth, in Scotland.

The snout, in comparison with its congeners, acute. Folds present on the belly. Length, 46 feet.

Nariform blowholes 6 feet from the tip of the snout and 8 inches long and divided by a septum. Eyes small.

"Mus. Ad. Frid. I, p. 50" = LINNÆUS, Museum Adolphi Friderici Regis, 1754, p. 50.

Through the kindness of Dr. A. W. Keppel, librarian of the Linnæan Society of London, I have received a transcript of the pages in this work which contain matter relating to cetaceans. It is all on pages 51 and 52, and this reference must therefore be regarded as a false one. Whatever the species of which Linnæus found a specimen in the Adolphus Frederick Museum, it is not likely to have been his *boops*. Furthermore, he makes a correct reference to the work under *musculus*, the species which comes next after *boops*.

This exhausts all of Linnæus's synonyms and bibliographical citations, and all of the matter referred to[1] has been shown to have its origin in Sibbald's Phalainologia. It remains, therefore, to examine this work.

The original edition of Sibbald's Phalainologia, published in 1692, is a very rare book. Indeed, I do not know that there is a copy in the United States. It was reprinted in 1773, under the editorship of Thomas Pennant. There is a copy of this reprint in the library of Harvard College, which I have had the pleasure of examining, through the courtesy of the superintendent of circulation, Mr. Thomas J. Kiernan. Another copy is in the library of the Academy of Natural Sciences, Philadelphia.

The full title of the reprinted work (translated) is as follows: "Phainologia Nova: or, observations on certain of the rarer whales recently stranded on the coast of Scotland: In which whales recently observed are divided among genera and species according to characters impressed by Nature herself; some now described for the first time; errors in descriptions also disclosed; and brief dissertations given on teeth, spermaceti, and the origin of ambergris."[2]

Excluding the passages relating to writings of classical authors and those containing the description of certain anatomical details, chapter three of this work, beginning page 68, may be translated as follows:

Chapter III. *De Balaena hujusmodi Tripinni quæ rostrum acutum habet, & plicas in Ventre.*

On the seventeenth day of November, 1690, the following whale was cast up in a certain bay to the west of the harbor called Bruntisland, on the north shore of the Firth of Forth: * * *

This remarkable kind of animal was distinguished by the very shining surface of the body (as if it were cast from the most refined brass), which was very long,

[1] With the exception just mentioned.

[2] PHALAINOLOGIA NOVA; | SIVE | OBSERVATIONES | DE | RARIORIBUS QUIBUSDAM BALÆNIS | In SCOTIÆ LITTUS nuper ejectis: | IN QUIBUS, | nuper conspectæ BALÆNÆ per Genera & | Species, secundum Characteres ab ipsa | Natura impressos, distribuuntur; | quædam nunc primum describuntur; errores etiam | circa descriptas deteguntur; & breves de Dentium, | Spermatis Ceti, & Ambræ Grisæ ortu, natura & | usu, dissertationes traduntur. | — | [quotation] | — | EDINBURGI | Typis Joannis Redi, MDCXCII. | Veneunt apud M. ROBERTUM EDWARD, verbi divini ministrum, in | vico dicto, *The Bishop's Land Closs.* | Iterum impressi, LONDINI, | apud BENJ. WHITE, in Vico *Fleet street*, MDCCLXXIII.

8°. pp. 1–4 (unnumbered), 1–105. pls. 1–3.

and appeared more slender in form by the proportion of the thickness to the length. From the extremity of the snout to the tail was 46 feet; near the lateral fins, where the body was thickest, the circumference measured with a cord was 20 feet. It had two fins on the sides, and besides these also on the back toward the tail a certain protuberance like a horn, which Bellon calls a fin, but our sailors *ane pyke*—that is, a spine. The tail was bifurcated, and placed parallel to the horizon. The whole skin of the body was very smooth; black and pellucid in color on the back, white on the belly. On the belly from the navel to the lower jaw and all the way to the lateral fins were very many plicæ or ridges, prolonged to that length which was between the lower jaw and the navel. They were similar to those which we see in that kind of woman's cloak called *Mantoua-gown*. In this animal these folds were 1 inch broad, and the furrows between them in breadth and depth less than an inch, and it appeared to me that the learned Bartholinus knew of this corrugated belly. A fin was located on the breast on each side; the anterior part of the same was 5 feet from the eye. The real fin of the back was 8½ feet from the tail; the girth of the body in the neighborhood of this was 12 feet. The vent was 14 feet from the extremity of the tail. The penis was situated between the umbilicus and the anus, and a little of it hung down; cut out and drawn out by a weight suspended, it attained scarcely 2 feet in length; the sheath from which it hung down was a foot long in the middle; from the penis to the navel was 5½ feet; the aperture of the anus equaled one-half a foot. From the navel to the extremity of the lower jaw was 24½ feet; the navel was the size of a fist. The tail was 9½ feet between the outer points; where narrower (*contractior*), 2½ feet. The tail was placed transversely. The skin, as remarked, was black; the cuticle was like the silk cloth called *taffeta*, very thin, but the skin equaled in thickness the Imperial coin called a dollar, and everywhere black.

The head in this animal held the due proportion to the rest of the body, and was oblong in form, curving gradually to a certain narrowness back of the snout; the snout was of a form between acute and obtuse, neither extended as in *Delphinus* and *Orca*, nor obtuse as in *Phocæna*. This animal had no spiracle in the head, but nostrils in the snout, of which more below. The form of the back was like an inverted ship, and the summit of the back was like a keel, with the body receding from this running out into the greater breadth. It was possible to see the whole body, which, floating on the waves, was turned now on one side, now on the other. The breadth of the lower jaw near the middle was 4½ feet, and had such a margin as John Faber describes in the place cited above; indeed, the bony, black, obrotund, thick lip of the jaw corresponded to those garlands with which the summits of walls are crowned. Above the lower jaw the tongue reclined, which could be contracted, and was 5 feet long, and near the roots 3 feet broad; in substance, color, and figure clearly like that of an ox, and almost of equal thickness with the breadth. In the upper jaw the nostrils were situated in the higher part of the snout, distant 6 feet 8 inches from the extremity of the upper jaw. They were also 8 or 9 inches long, and divided with a septum, and were shut up against the septum. Further, beginning from the broader basis and gradually contracting to the narrow extremity, the broadest part at the base, with the septum closed, was 6 inches; the extremity was 1 inch narrower. The inside of the aperture was lined with a rugose membrane of a black color, like that seen in the nostrils of a horse. The length of the opening of the mouth was 10 feet; the breadth of the opening was 4 feet 2 inches, in which a fish was lying.

* * * * * * *

The lateral fins situated in the breast were 5 feet long and 1½ feet wide.

* * * * * * *

The third or dorsal fin consisted of a certain peculiar glandular substance like that of which the mammæ are composed in quadrupeds, but firmer and harder; the spine traversed the middle of this, and it was covered with a black skin.

From the foregoing description we are able to extract the following characters:

Body very long and slender.
Head oblong and neither very acute nor very obtuse.
Color black on the back; white on the belly.
The following measurements are stated:

	Feet.	Inches.
Extremity of snout to flukes	46	0
Circumference of body near insertion of pectoral fins	20	0
Breadth of the ridges of the throat		1
From the eye to the pectoral fin	5	0
From the dorsal fin to the flukes	8	6
Girth of the body near the dorsal fin	12	0
From anus to flukes	14	0
From penis to the navel	5	6
From extremity of the lower jaw to the navel	24	6
Breadth of the flukes	9	6
Breadth of lower jaw near the middle	4	6
Length of tongue	5	0
Breadth of tongue near the roots	3	0
Blowhole to extremity of snout	6	8
Length of blowhole		8 (or 9)
Length of mouth	10	0
Breadth of mouth	4	2
Length of pectoral fins	5	0
Breadth of pectoral fins	1	6

We learn from these characters and measurements that the body was "very long and appeared more slender in form by the proportion of the thickness to the length;" that the dorsal fin was placed very far back, according to the measurements even posterior the commencement of the last fourth of the length of the body; that the pectoral fins were quite short, or about as 1 to $9\frac{1}{5}$, compared with the length of the body; that the lower jaw was moderately long, or about as 1 to $4\frac{3}{5}$, compared with the length of the body.

All these characteristics, especially the emaciated form, point very strongly to the common finback, usually called *Balænoptera musculus*.

From *B. rostrata* it is distinguished by size (total length, 46 feet), backward position of the dorsal fin, longer jaws, and many other characters.

From *B. borealis* it is distinguished also by the backward position of the dorsal fin and by the larger pectoral fins.

In some features, especially the position of the dorsal fin, it coincides closely with the blue whale, *B. sibbaldii*, and might be thought to represent a young individual of that species, but the slender form, the decidedly smaller pectoral fins, and somewhat shorter jaw militate against that identification. Furthermore, Sibbald describes another whale, which, as will be seen presently, is much more likely to have been the blue whale, and is quite different from the present one.

In the matter of color there is an apparent deviation from the common finback, since Sibbald describes his specimen as black on the back

and white on the belly, while Collett, Cocks, and others who have had abundant opportunities to study this species, describe it as "grayish slate," or brownish, on the back. Sibbald's specimen, however, had been dead for at least a day when he saw it, and it is well known that in cetaceans of all kinds grays rapidly turn to black after life is extinct.

Taking into consideration all the facts presented, there is apparently little reason for doubt that Sibbald's specimen was an immature common finback. At all events, the description tallies much more closely with that species than any of the other whalebone whales known to frequent European waters. This being granted, it is obvious that Linnæus's name, *boops*, which is based entirely on Sibbald's description and the later paraphrases of it by other authors, must be regarded as one of the specific appellations of the common finback, and, as such, a synonym of Linnæus's *physalus*.[1]

European authors, beginning with Rudolphi,[2] have been disposed to regard Linnæus's species, *boops*, as representing the humpback (*Megaptera*), but it is entirely certain that the name can not be applied to any species of that genus.

3. BALÆNA MUSCULUS.

The last of Linnæus's species of whalebone whales is *Balæna musculus*. His diagnosis is as follows: "*B. fistula duplici in fronte, maxilla inferiore multo latiore.*" ("A whale with a double blowhole in the forehead, and with the lower jaw much the wider.")

His only comments are: "Lives in the Scotch sea" and "provided this is sufficiently distinct from *Mysticetus*; Mus. Ad. Fr., 51, should be compared."

He cites three works, which will be considered in turn. The first is:

"Art. gen. 78" = ARTEDI, Genera Piscium, 1738, p. 78.

The diagnosis here given is the same as that of Linnæus, the latter having copied it verbatim. Artedi also cites "Ray," page 17, and adds the following remarks: "It was cast up on the southern shore of the Firth of Forth in the month of September, 1692. Length, 78 feet. Lower jaw the wider and of a semicircular form. Blowhole pyramidal in form and divided with a septum toward the forehead. For the rest, see Sibbald."

These statements show conclusively that Artedi has taken his information from Sibbald, who, as we shall see presently, described a whale cast up on the shore of the Firth of Forth in this month and year.

[1] Sibbald published a figure of his specimen in the Phalainologia, pl. 1, but as, like other figures on the same work, it is obviously inaccurate, it can not be used in a critical examination of species.

[2] Abhandl. K. Akad. Wissensch. Berlin, 1829, p. 133, pls. 1–5.

Art "syn. 107" = ARTEDI, Synonymia Nominum Piscium, 1738, p. 107.

The whole matter found under this citation is as follows:

4. *Balæna fistula duplici in fronte maxilla inferiore multo latiore.* Art. *Balæna tripinnis, maxillam inferiorem rotundam, & superiorem multo latiorem habens* Sibbald. Raj. p. 17.

It will be observed that the first diagnosis, or polynominal designation, is the same as in the Genera Piscium and in Linnæus's Systema Naturæ.

The second is copied verbatim from Ray's Synopsis Methodica Piscium, page 17.

"Raj. pisc. 17" = RAY, Synopsis Methodica Piscium, 1713, p. 17.

Ray in this place has only the diagnosis just mentioned, and a paragraph of description condensed from Sibbald, beginning, "In September, 1692, this [whale] was cast up on the southern shore of the Firth of Forth, near the ancient fortress of Abercorn," and ending, "For the rest, see the author" [i. e., Sibbald].

From the foregoing it is clear that Linnæus obtained his information as to *musculus* solely from Ray and Artedi, who in turn obtained theirs from Sibbald. The name *musculus* must, therefore, be applied to the species (if it can be identified) which Sibbald saw in 1692 and described in his Phalainologia.

The description which occurs on page 78 of the reprint of his work is very long. It may be summarized as follows:

Chapter IV. *Of the whale with three fins, which has the lower jaw round and much broader than the upper.*

In the month of September of this year (1692), on the south shore of the Firth of Forth, near the ancient fortress of Abercorn, was cast up a male whale 78 feet long. * * *

It was believed that its girth exceeded 35 feet. * * *

It was seen to be of that kind which Purchas (Vol. III, where he treats of whales) called *Gibrata*, except that it had horny plates on the palate, that the color of the back was black, and that it had a fin on the back; but the form of the mouth in this whale was peculiar. The lower jaw was much broader and larger than the upper, and of semicircular shape; whence the head appeared obtuse and rounded. * * *

The length of the lower jaw was 13 feet 2½ inches, and the shape of the opening of the mouth approached an equilateral triangle. From the middle of the palate to the opposite part of the lower jaw the distance was 13 feet 2 inches. * * *

The upper jaw was narrower, and toward the extremity contracted and terminated more to a point, and so was received within the circuit of the lower, which, as already said, was broader and larger. * * *

In the upper jaw the whole palate was seen to be covered with black hairs, or rather bristles, which hung above the tongue, with which, at the sides, equally separated, appeared black, horny plates; and in this particular whale the longest were 3 feet; 1 foot broad where they emerged from the gum of the palate, becoming gradually narrower where they touched the tongue, finally terminating in a filamentose point; in the lower part (which was narrower), furnished throughout their whole length with hairs, the color of which was also black. Where the beak was most slender and narrow, these laminæ were scarcely half a foot long and scarcely an inch broad. They were arranged in a bundle (*fasciculus*) and contained in a sort of sheath of the same substance with themselves. * * *

The eye in this beast was located not far from the place where the opening of the mouth began; from this (the eye) to the end of the beak the distance was 13 feet 2 inches. Freed from the cartilaginous substance with which it was covered as with an involucre, and from the muscles surrounding the same, the diameter was 5 inches; but the pupil of the eye was 1½ inches in diameter, and in size and color the inside was like the eye of an ox.

No blowhole was present in this beast, but toward the forehead were to be seen two large apertures approaching a pyramid in shape. Their base was toward the forehead, and toward the narrow part of the beak they were gradually contracted very closely. They were divided by a septum, but the turmoil [of the water] which prevailed did not permit of anything further being noted.

The lateral fin was 10 feet long, 2½ feet broad where widest, and was narrowed up toward the extremity, being there but 3 inches broad. From this (the fin) to the opening of the mouth the distance was 6 feet 5 inches.

Besides the two lateral fins there was a third and smaller fin on the back, about 3 feet long and 2 feet high. From the lower part of this fin, that part of the tail where the bifurcation begins, the length was 12 feet 10 inches. * * *

From the lower jaw to the navel the belly was full of folds or ridges, which were 2 inches broad, and the elevated part and excavated part of these were of equal measure.

The penis, which hung from the body not far from the navel, was 5 feet long, where thicker it was 4 feet in girth, and it gradually diminished to a very narrow extremity. It was placed in an oblique position.

At 5 feet below the penis, opposite the dorsal fin, was placed the anus, distant about 12 feet from the bifurcated tail; the margin was 1 foot long. The tail, from that part in which it was divided into two flukes to the upper extremity, was 10 feet long; the distance between the two extremities of this (the flukes) was 18½ feet.

The blubber on the side was as much as 4½ inches thick, and in the head and in the neck where it was thickest did not exceed 1 foot. The skin was one-half inch thick. The belly was whitish in color.

From this description we extract the following measurements of Sibbald's whale:

	Feet.	Inches.
Total length	78	0
Length of lower jaw	13	2½
From the eye to the end of the beak	13	2
Length of pectoral fin	10	0
Greatest breadth of pectoral fin	2	6
From pectoral fin to angle of mouth	6	5
Height of dorsal fin	2	0
Length of dorsal fin (about)	3	0
From posterior insertion of dorsal fin to bifurcation of flukes	12	10
Breadth of flukes from tip to tip	18	6
Length of longest whalebone	3	0
Breadth of longest whalebone	1	0

We learn from the description and measurements that Sibbald had before him a finback whale 78 feet long, with the dorsal fin very far back, the pectoral fin about one-seventh the total length, the whalebone having a maximum length of 36 inches, and both the plates themselves and the bristles black.

This combination of characters belongs to the blue whale (*Balænoptera sibbaldii* Gray), the largest of the known European finback whales. The black whalebone with its black bristles is especially characteristic.

Sibbald mentions the color explicitly and in such a manner as to leave no doubt as to the correctness of his observation. No other finback whale of European waters possesses this peculiarity. In the coalfish whale or Rudolphi's rorqual (*Balænoptera borealis* Lesson) the whalebone itself is black, but the bristles are white.

The fact can not be ignored that Sibbald's description contains some discrepancies. Thus, for example, the lower jaw is shown in the measurements to barely exceed one-sixth the total length. In the blue whale, according to Collett,[1] the length is 1 to 4½. There is, indeed, no European finback in which the jaw is as short as is indicated by Sibbald's measurement. The nearest is the little piked whale, *B. rostrata*, but in this species the total length rarely exceeds 30 feet. The whalebone is white and the external coloration peculiar.[2]

We may now consider for a moment Linnæus's question,[3] whether his *musculus* may not be the same as his *mysticetus*, and his reference to the "Museum Adolphi Friderici Regis" (p. 51). In the latter work he describes a fœtus which is clearly a right whale, and probably the Greenland whale. Indeed, he names it *Balæna grœnlandica*. In his diagnosis he states that the lower jaw is much the broader. Now, this is also the principal character of *musculus*, and was derived by Linnæus through Ray and Artedi from Sibbald's Phalainologia. Had he but read Sibbald's description he would have found that the whale therein characterized had a relatively short mouth and a fin on the back, which his own *Balæna mysticetus* (and probably identical *B. grœnlandica*) had not.

CONCLUSIONS.

As a result of this inquiry I am brought to the following conclusions:

1. That the Linnæan names can without violence to the evidence be applied to certain of the European species.

2. That the specific name *mysticetus* should be applied to the bowhead or Arctic right whale, as is now the current practice.

3. That the specific name *physalus* should be applied to the common finback, currently denominated *Balænoptera musculus*.

4. That the whale named *Balæna boops* by Linnæus was an immature specimen of the common finback, and that the Linnæan names *physalus* and *boops* are, therefore, synonymous.

5. That the specific name *musculus* relates to the blue whale, currently called *Balænoptera sibbaldii*.

[1] Proc. Zool. Soc. London, 1886, p. 265.

[2] It is true that in Sibbald's figure the jaw is represented as longer, or about as 1 to 4$\frac{9}{10}$. While this is nearer the proportion for the blue whale, it can not be denied that Sibbald's figures are in many respects so inaccurate that they can hardly be brought forward as proof in doubtful points.

It is interesting to note that the figure shows the under side of the pectoral fin white, which is characteristic of the blue whale.

[3] Syst. Nat., 10th ed., 1758, p. 76.

The list of species will, therefore, stand as follows:

1. *Balæna mysticetus* Linnæus.
   The bowhead or Arctic right whale.
2. *Balænoptera physalus* (Linnæus).
   The common finback or rorqual.
   Synonyms:
   Balæna physalus Linnæus.
   Balæna boops Linnæus. (Young.)
   Physalus antiquorum Gray.
   Balænoptera musculus auct.
3. *Balænoptera musculus* (Linnæus).
   The blue whale.
   Synonyms:
   Balæna musculus Linnæus.
   Balænoptera sibbaldii (Gray).

While three of the European species of whalebone whales are thus believed to be provided with their proper Linnæan names, four others not included in the Systema Naturæ are yet to be considered. These are the black whale, or nordcaper; the lesser rorqual, or little piked whale; Rudolphi's rorqual; and the humpback.

The first of these passes currently under the name of *Balæna biscayensis*, but this appellation was not used in print by Eschricht until 1860.[1] Subsequent to 1758 the first Latin name for this whale, accompanied by a description, appears to be *Balæna glacialis*, which occurs in Bonnaterre's Cetologie, 1789.[2] Comparing it with the bowhead, this author remarks: "This species only differs from the preceding by the color and by the dimensions of the body. * * * It lives in the seas of the North, near the coasts of Norway and of Iceland." In a footnote he remarks: "In France it is called *Nord-Caper*, *Baleine de Sarde;* in Germany, *Nordkaper ;* in Norway, *Sildqual*, *Lilie-Hual*, *Nordkaper*."

This would seem to be sufficient for purposes of determination, and the name *Balæna glacialis* should hold, unless discarded on the technical ground that *glacialis* is not a suitable name for a whale which does not live in the ice, or because it may cause the species to be confounded with the bowhead, which lives only in the arctic ice. Those who discard the name for these reasons, will probably adopt Kerr's term *islandica* (1792).[3]

The little piked whale bears currently the name of *Balænoptera rostrata*. The name *Balæna rostrata* is given for the first time with a

[1] Revue and Mag. de Zool., 2d ser., 1860, p. 229.

[2] Tableau Encycl. and Méthod. des Trois Regnes de la Nature, Cetologie, 1789, p. 3. The name *Balæna glacialis* occurs earlier (but subsequently to 1758) in Müller's Zool. Dan. Prodromus, 1776, p. 7, but it is a *nomen nudum*.

[3] Kerr, Animal Kingdom, 1792, p. 357. Kerr divides the "Common Whale," *B. mysticetus*, into three subspecies: 1, *B. mysticetus grœnlandica;* 2, *B. mysticetus islandica;* and 3, *B. mysticetus major*.

diagnosis by Müller.[1] The diagnosis is merely "*B rostrata minima rostro longissimo et acutissimo.*" This might apply to a toothed whale. It appears to have been taken from Egede, who gives, under the heading of swordfish, a description which seems to relate partly to that fish, partly to the sawfish, and partly to the orca or killer whale.

The figure which he gives does not accord at all with the main part of the description, as Fabricius long ago pointed out; but as far as it resembles any known animal, appears to represent the killer. It is not worthy of serious consideration.[2]

The figure of Pontoppidan, which is cited by Müller, is that of a toothed whale and probably *Hyperoödon*, while the common names cited "Nebbe-Hval," "Anderne-Fia," "Dogling," etc., refer also to that genus.

Fabricius, in 1780, introduces under the same name, *Balæna rostrata*,[3] a whalebone whale, which in all probability is the species under consideration. As the name is preoccupied in Müller's work, however, it can not be used.

We find our species again under another name for the first time in Lacépède's Histoire Naturelle des Cétacés.[4]

It is here called *Balænoptera acuto-rostrata*, and it would appear that this name must hold. The description is very full and fairly accurate, and the figure is unmistakable.

[Since the foregoing was written an article by Mr. Oldfield Thomas on the technical names of British mammals has appeared in the Zoologist (March, 1898), in which I observe that he accepts *Balænoptera acuto-rostrata* as the proper name for this species.]

The European humpback is currently designated *Megaptera boops*. We have observed, however, that the *Balæna boops* of Linnæus (1758) is not this animal. On the other hand, the *Balæna boops* of Fabricius (1780) is undoubtedly of the present genus, and if the Greenland animal is the same would be applicable; but in any case, as the name is preoccupied, we shall have to search the later literature for a valid cognomen. This would appear to be found in Bonnaterre's *Balæna nodosa*.[5] This species, however, is founded on Dudley's account of the whales of New England, and if there is a difference between the humpback of the eastern and that of the western Atlantic, this name would belong to the latter rather than the former.

The next name in chronological order is Rudolphi's *Balæna longimana*, published in 1829 (?).[6] This was based on a specimen thrown up

[1] Zoologiæ Danicæ Prodromus, 1776, p. 7.

[2] Egede, A Description of Greenland, 1745, p. 73, pl. 6 (English translation). I have not seen the original work.

[3] Fauna Grœnlandica, 1780, p. 40.

[4] Vol. I, An XII (1803–4), p. 197, pl. 8.

[5] Cétologie, 1789, p. 5.

[6] Abhandl. K. Akad. Wissensch. Berlin, 1829 (1832?), pp. 133–144, pls. I–V. See also Brandt and Ratzeburg, Medizinische Zoologie, 1829–33, pp. 122–124, pl. 16, figs. 5–8.

at Vogelsand at the mouth of the Elbe in 1824, and the name is thoroughly valid. For the present purposes, therefore, the European humpback will be styled *Megaptera longimana* (Rudolphi).

The generic name *Megaptera* was bestowed by Gray in 1846.[1]

The earliest name for Rudolphi's rorqual is *Balæna rostrata*, employed by Rudolphi in 1822.[2] This was preoccupied by Müller in 1776, as we have already seen. Cuvier described and figured Rudolphi's specimen in his Recherches sur les Ossemens fossiles, under the name of "Rorqual du Nord." Lesson in 1828 copied the description under the Latin name *Balænoptera borealis*.[3]

Though Lesson's work is almost entirely a compilation, the name will hold.

The generic name *Balænoptera* originated with Lacépède in 1803–04.[4]

The complete list of European whalebone whales as now recognized will stand as follows:

1. *Balæna mysticetus* Linnæus.
   The bowhead, or Arctic right whale.
2. *Balæna glacialis* Bonnaterre.
   The black whale, or nordcaper.
3. *Balænoptera physalus* (Linnæus).
   The common finback, or rorqual.
4. *Balænoptera musculus* (Linnæus).
   The blue whale.
5. *Balænoptera borealis* Lesson.
   Rudolphi's rorqual.
6. *Balænoptera acuto-rostrata* Lacépède.
   The little piked whale, or least rorqual.
7. *Megaptera longimana* (Rudolphi).[5]
   The humpback.

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[1] Zoology of the voyage of the *Erebus* and *Terror*, 1846.

[2] Abhandl. K. Akad. Wissensch. Berlin, 1820–21 (1822), pp. 27–40, pls. 1–5. (*Fide* Allen.)

[3] Histoire Naturelle des Mammifères et Oiseaux. Cétacés, 1828, p. 342, pl. 12. The plate is copied from Hunter, and represents *B. acuto-rostrata*.

[4] Histoire Naturelle des Cétacés, An XII (1803–04), I, p. LIV.

[5] If the humpback of New England waters is the same species, then *Megaptera nodosa* (Bonnaterre) is the correct name. This can not be taken for granted in the present paper.