

ARTICLE VI.—*The Atlantic Right Whales: A Contribution, embracing an Examination of*

I. *The exterior characters and osteology of a cisarctic Right Whale—male.*

II. *The exterior characters of a cisarctic Right Whale—female.*

III. *The osteology of a cisarctic Right Whale—sex not known.*

To which is added a concise résumé of historical mention relating to the present and allied species.

By JOSEPH BASSETT HOLDER.

BALÆNA CISARCTICA, *Cope.*

This, the Black Whale so called of the temperate Atlantic, was lately introduced to science as a re-discovery. After a lengthy period of well nigh total extinction, the species is now manifestly increasing in numbers.

As is now well known, after a long continued confusion of specific characters and consequent misunderstanding, this Right Whale is the one which our forefathers found abundant along the Atlantic coast, from Newfoundland to Florida. It is the one first hunted by the Cape Cod and Nantucket whalers; and is not the one now and latterly captured in the Arctic seas.

At the commencement of the American Revolution, the Black Whale had been so persistently pursued, that there remained in our waters seemingly no more to capture. Indeed, the species was near extinction. It was now that the New England and New Jersey whalers pushed northward and discovered the great Arctic Right Whale. As they found a prey affording them more oil and larger baleen, they were content; leaving others to settle the question of identity. The science of cetology was not then greatly advanced; it remained, therefore, for naturalists of a later period to fairly establish the characteristics and relative position of each species.

It is assumed from the known paucity of knowledge concerning the Right Whales, and the rarity of cetological works in this country, that some degree of usefulness to students remote from scientific libraries may result by adding an outline of published

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matter relating to this subject. A summary of the history of the species is therefore placed at the close of this paper, and a short bibliography of works relating to this theme is also appended.

A complete history of the present species, so far as is known on this side the Atlantic, begins far back with the interesting paper by the Hon. Paul Dudley, F. R. S., published in the Philosophical Transactions of London.

Its first recognition by science, however, was through Prof. Cope. Its technical history, therefore, properly begins with his paper on the subject, which was published in the Proceedings of the Academy of Natural Sciences of Philadelphia for 1865.

Under the title "A Brief Account of the Osteological Characters of a Species of Whale-bone Whale, the Black Whale of our Coast," he continues: "They were formerly abundant along the mouth of the Delaware. A letter, dated 1683, from William Penn, states that eleven were taken that year. * * * A half-grown individual was taken and exhibited for some time, and its nearly complete skeleton occupies a prominent place in the Academy's Museum, in Philadelphia, and has afforded the best means of determining the affinities of the species. From examination it is evident that it is a species of the genus *Eubalæna*, Gray, therefore widely different from the *B. mysticetus*, and congeneric with the *B. australis* and *antipodarum* of the Southern seas. While differing in many points from the first, it is strongly separated from the last two, and has, no doubt, remained without proper notice up to the present time. * * * This species may readily occur on the European coast; and is no doubt allied to or the same as the species pursued by the Biscayan whalers."

Prof. Cope adds: "The skeleton will be more fully illustrated in a future publication." This, unfortunately, has never appeared; the present figures and descriptions of exterior characters are, therefore, the first that have been published relating to this Whale.

Up to the present year there were only three examples of this species known to science on this side the Atlantic; and two young specimens are in the Museums of Europe, viz.: at Copenhagen and Naples. The latter are named *B. biscayensis* by European authors, but are now regarded as identical with the *cisarctica*. All of these, five examples, are skeletons; no fair opportunity

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having occurred to examine and place on record the external characters until during the present year, 1882, when a nearly adult specimen was brought into New York harbor from off the New Jersey coast. Another specimen was examined by Dr. Manigault, of Charleston, S. C. Five of these species, therefore, are known in this country, though the New Jersey Whale was not preserved.

Of the three original skeletons in this country, one is in the Museum of Comparative Zoölogy, at Cambridge, Mass.; another is the Cope specimen, in the Philadelphia Academy, and the third is in the American Museum of Natural History, in Central Park, figured here in plate xii. A fourth is now added in the excellent and quite perfect specimen prepared by Dr. Manigault for his Museum at Charleston College.

THE PHILADELPHIA WHALE.

Dr. Cope's description and measurements are as follows :

Total length,	31½ feet.
“ “ including vertebral cartilages,	37 “
Length of head, axially,	8 “ 5 inches.
Number of vertebræ,	56
“ “ ribs, pairs,	14
Height of scapula,	23 inches.
Breadth of “	29 “
Breadth of nasal bones,	3 “
Length of “ “	9½ “
The first vertebra from the cranium, showing the vertical foramen through the diapophysis, is the	38th.
The last vertebra, counting from the cranium, that has the neural spine strongly developed, is the	44th.
The anterior zygapophysis, counting from the cranium, is first definitely separated on the	17th.

The cervicals are all united; the posterior three by the lower part of their centra only; above they form a solid crest, the atlas and the last attached by the superior part of their neural arches only.

The fourth, fifth and sixth cervical diapophyses are distinctly united on one side, while the remainder are separate; on the other side the seventh is united with the three posterior, and the

three anterior are united. The first, second and third only have inferior transverse processes.

Of the ribs, the anterior are single headed.

Of the dorsal vertebræ, the first four have slender elongate diapophyses.

The above is essentially Prof. Cope's statement, though we have taken the liberty to re-arrange the items for more convenient comparison with those of the other specimens in question.

Prof. Cope presents also considerable matter relating to the periotic region, which has less significance for our immediate purpose, our examples, unfortunately, having none of the members by which to estimate comparisons. It is matter of regret also that our specimens have no chevron bones, nor hyoid and pelvic elements.

During the preparation of this paper, a most fortunate accession to its usefulness occurred through the discovery to us by Dr. Manigault of his Charleston Whale. According to authors, the occurrence of a male Whale near shore is not frequent; the females being more subject to capture from the reason that they seek more inland waters during their breeding season. It is, therefore, fortunate that our two fresh specimens were of opposite sexes, the Jersey specimen being female. We have received from Dr. Manigault a communication, in which he records in very interesting terms the method of capture, as well as most valuable descriptions and figures relating to its osteology. The nature of this paper necessarily precludes the introduction of what otherwise would prove highly interesting. Some portions, however, that relate to characteristic habits, &c., as well as the valuable technical portion and excellent figure of the *cranium*, are regarded as important contributions, which are here gratefully acknowledged.

THE CHARLESTON WHALE.

Communicated by DR. MANIGAULT.

"*Dear Sir :*

In compliance with your request I send you an account of a Right Whale, captured in the harbor of Charleston, S. C., in January, 1880, the skeleton of which I have since prepared and mounted in the Museum of our City College.

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"A few days after the 1st of January it was observed that there was a large Whale in the harbor; several timid and ineffectual attempts were made to procure his capture, until a regular hunt was organized on the 7th of the same month. One of the crews engaged succeeded in fastening a harpoon in his body while the Whale was near Fort Sumpter. Pursuit was continued by the same boat until the Whale had worked his way to landward, in the neighborhood of Fort Johnson. He remained in shoal water during the morning, and in the afternoon about half-past one a much larger attacking force started in pursuit, consisting of four steam tugs, between fifty and sixty row boats, and a few sailing craft. The line attached to the harpoon which was thrown into him in the morning was taken on board the tug, and it was attempted to coax the animal towards the city. The steamer proved too unhandy for the work, and finally the line snapped. Repeated attempts were now made to throw harpoons at him from the tugs, and also to throw running nooses over the flukes of his tail. His struggles and manœuvres at this time were surprising. Occasionally he seemed to stand on his head, apparently for several minutes, with several feet of his tail projecting above water. After several hours of chasing, including repeated blows from the bows of the tugs, he expired.

"The animal displayed great strength in his plunges and other movements. At one time he got beneath the bows of one of the tugs, lifting it almost clear of the water; and a stroke of his tail wrenched off one of the cabin doors that stood open.

"This Whale was exhibited during the two following days, and was then turned over to me. I contented myself with removing the baleen from the mouth. The blubber was in so thin layers that the process of boiling it down was not a paying one to the original owners.

"I removed the eyes, and presented them to a medical friend, to whom they were of service in his lectures on the eye. They were two and three-quarter inches in diameter, with a very thick sclerotic coat; and the pupils were oval in shape.

"I was able to ascertain with certainty that the creature was a male.

"I closely inspected all the work so that nothing should be left
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behind. I was particularly careful when the bones were being cut out of the flippers to see that every one was taken out, and kept them entirely separate during maceration. If the results are the same in other Whales of the same age, it must be taken as conclusive that the carpal bones are developed only when the animal is approaching adult years, for there were none in this specimen and but few phalanges.

"The only bones that are wanting, and which were probably lost, are two small undeveloped ones of the rudimentary pelvis.

"I consulted Prof. Cope about the identity of this Whale, and we agreed that it is the Black Whale, similar to the one described by Prof. Cope under the name *Eubalæna cisarctica*.

"The Charleston Whale differs somewhat in some of the minor details of its osteology, but these are trifling, and cannot be considered as vitiating its identity.

"This Black Whale is now sufficiently abundant off the coast of South Carolina and Georgia for its fishery to be carried on to a limited extent. One or two schooners have been fitted out in the harbors of Port Royal, S. C., and Brunswick, Georgia, for this purpose, and several captures have been made. A few weeks after the capture of the Charleston specimen, a Whale sixty feet in length was cast ashore on the beach at Sullivan's Island, which had already been stripped of its blubber and baleen at sea.

"One of the sailors who plied the harpoon with the most skill in the above-mentioned chase, who had some experience in the whale fishery, told me that a few nights before the whale was seen in this harbor, he had remarked while on deck at night at anchor off the harbor, the peculiar odor of whale feed, with which he had become familiar in his voyages.

"I enclose with this a drawing which I have had carefully made of the head of our Whale.

"With great respect,

G. E. MANIGAULT, M. D.,
Curator of Museum,
CHARLESTON COLLEGE, S. C."

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DESCRIPTION AND MEASUREMENTS OF THE CHARLESTON

WHALE :

By DR. MANIGAULT.

Total length in the flesh,	40 feet 4 inches.
“ “ in the skeleton,	35 “ 7 “
Length of cranium,	9 “ 8 “
“ “ mandible, axially,	8 “ 9 “
“ from muzzle to axilla,	10 “ 2 “
“ of fore limb,	6 “ 7 “
Girth in front of fore limb,	22 “ 4 “
Space between fore limbs on abdomen,	6 “ 5 “
Baleen, longest,	4 “ 2 “
“ number of plates on each side,	180
Vertebrae, number,	57
Ribs, pairs,	14
Scapula, height,	21 inches.
“ breadth,	35½ “
Nasal bones, long,	10½ “
“ “ wide,	4 “
The first vertebra from the cranium showing the vertical foramen through the diapophysis, is the	38th.
The last vertebra, counting from the cranium, that has a neural spine, is the	45th.
The anterior zygapophysis, counting from the cranium, is first definitely separated on the	16th.

The seven cervical vertebrae are united ; the posterior four in the lower part of their centra only.

Above, the only ones that are united, and thus form a solid crest, are the first six, the seventh or last being entirely separated from the others in every part except the lower centrum.

On the right side, the diapophyses of the third, fourth, fifth and sixth are all united, the first and seventh being separate.

On the left side the fourth, fifth and sixth are united, the others being separate ; the second, third and fourth alone have inferior transverse processes.

The first rib has but one articulating surface, which joins to the transverse process of the first thoracic vertebra. The next eight ribs are joined to the vertebrae by two articulating surfaces, one junction being to the transverse processes, and the other to the bodies of the vertebrae. The remaining *five*, floating ribs, have one attachment, which is to the bodies of the vertebrae.

THE NEW JERSEY WHALE.

This Whale was captured off the New Jersey coast by a crew of experienced Egg Harbor whalers, by the usual method of harpooning. It was exhibited during several weeks of the spring of 1882, the body being preserved with tolerable success by injections of poisonous liquids into its muscular tissue. Meantime opportunity was offered us, under some restrictions, to examine the exterior. At this time the extraordinary value attached to the carcass precluded all chance of securing any prospective interest in the skeleton.

A general view of the exterior shows most graceful proportions of a comparatively slender and mobile form, terminating caudally in a festooned expansion of the most pleasing contour; in this respect contrasting strongly with the massive and homely outlines of some others of the larger forms.

The skin was a dense "ivory black," having but few molluscan parasites; those being confined to the lower lip. Most notable features are the graceful and characteristic outlines of the produced muzzle, the great depth through the frontal orbital region, and the rearward aspect of the spiracles.

A closer examination shows the head to be about one-fourth the entire length; the depth, or perpendicular diameter of the head to be about the same dimensions as that of its length from the orbit forward.

The spiracles are, in form and relation with each other, much like those of *mysticetus*, but are situated on an inclined plane, presumably formed by elevation of the frontal where its suture closes with the nasals.

If this is correct, the highest point of the cranium must be at that juncture. The short exposure of the frontal, instead of being directed horizontally or forwards, faces quite rearward, continuously with the occiput. This will account for the striking relative position of the spiracles with features of the cranium in profile.

The recurved *riktus*, so well indicated by the old authors—"*Rictu amplo forma litteræ S curvato*"—was strongly marked in our whale; the border of the maxillary forming an elegant curve

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under and around the orbit. One would look to find the zygomatic portion inclined forwards considerably to produce this sharp deviation from the bow outline seen on its perpendicular aspect. Whatever it may have been in reality (for there was no opportunity to examine in this case), the Charleston cranium does not exhibit such a form, but the outer border of the maxillary approaches so nearly an arc, that a circle described by sweeping the dividers from the lower and deepest borders of the baleen comes surprisingly near being in perfect relation to it.

The high, upright, and intensely solid under lips have an edge of about eight inches breadth; the superior and anterior aspects having a crenulated appearance, produced by irregular transverse sulcations of about three inches depth; the inner surfaces being lighter in color or nearly white.

The baleen at its longest measured five feet nine inches, and seven inches at the greatest width. Its appearance is much like that of *mysticetus*, apparently not coarse, as is often said of the "second species" of older authors.

Along the front of the muzzle, and extending backwards about three feet, where it is lost in the general contour, is a low sharp *carina*, which outlines the base of the nasal protuberance. This is shown in Plate X, and in Plate XI, fig. 2. The latter figure is from a photograph (kindly loaned by Mr. Daniel Beard), and verified by drawings and measurements taken from the fresh animal. The peculiar and graceful roof-like muzzle, the baleen, and the great mass of tongue, are well shown here.

The extraordinary depth of head in this Whale, compared with figures of *mysticetus*, is surprising, particularly when it is remembered that during a long period the two were regarded as one and the same species.

The mucous membrane of the mouth was of a delicate pale pink hue; that of the tongue being considerably lighter in color.

The region of the symphysis of the mandibles is so strongly developed, as seen in fig. 2, Plate XI, as to give the effect of a development like that on the muzzle; but unlike that, which is wholly due to adipose deposit, they are produced *termini* of the mandibles.

MEASUREMENTS OF THE NEW JERSEY WHALE :

Total length in flesh,	48 feet.		
Length from muzzle to orbit,	12	"	
From highest cranial eminence to orbit,			
axially,	9	"	4 inches.
Depth through the same to abdomen,			
about	12	"	
Length of fore limb,	7	"	
Width of fore limb,	3	"	10 "
External ear, above the horizon of the			
eye,		7	"
External ear, distant from the vertical			
axis of the eye,		16	"
Distance between the anterior face of			
the axilla and the eye,		29	"
Circumference of the caudal terminus,			
or "small" of body,	6	"	8 "
From the "small" to caudal bifurca-			
tion,	4	"	
Extreme expanse of flukes,	17	"	
Length of each fluke, axially, . . .	10	"	
Breadth " " " " " " " " " " " "	3	"	11 "
Spiracles, length, axially,		12	"
" divergence posteriorly, . . .		16	"
Baleen, longest,	5	"	9 "
" width,		7	"
Nasal prominence, width,		16	"
" " height,		22	"

THE NEW YORK WHALE.

This specimen is represented by a skeleton of a whale which came ashore several years since on Long Island.

The Hon. Peter Cooper, with an eye, as is his habit, to benefiting some educational institution, purchased the bones. They were found too cumbersome for use at Cooper Institute, and were stored until the American Museum was organized, when Mr. Cooper presented them to the latter institution. The skeleton was skillfully mounted in the old Arsenal, and formed nearly the first object around which the present fine collections were gathered.

Several of the caudal vertebræ are missing, as well as the chevron bones, the periotic and the hyoids. The zygomatic

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portion of the maxillary is also wanting, and what there may possibly exist in this species of the pelvic elements. Most of these portions of the skeleton are lost in the preparation through ignorance of their presence or value. As this paper is likely to fall into the hands of individuals familiar with its subject on our shores, some information on the importance of these small elements, and the great desirability of preserving them when a carcass is being cut up, may be in order here.

The rudimentary hip bones and the attached bits of bone that represent the thighs in the great Northern whale are now well known to ceteologists. Whatever then may be in other whales of this character, as well as the ear bones, bones at the root of the tongue, small bones on the skull that are so easily detached during decomposition or maceration, should be carefully preserved. When the hip or pelvic bones are present they float in the flesh just under the vertebræ, about over the vent.

A portion of the baleen of this whale is attached to it, though, from rough usage, it has become frayed at the edges, and shows but little of the compact and smooth aspect seen in the fresh New Jersey specimen, and also in the Charleston one.

MEASUREMENTS OF THE NEW YORK WHALE :

Total length, including intervertebrals,	35 feet.
Length of mandible,	10 " 3 inches.
Distance from frontal eminence to orbit, axially,	3 " 2 "
Distance from frontal eminence, axially, to angle of mandible,	5 " 2 "
Nasal, long,	9 "
" broad,	5 "
Baleen, extreme length,	4 " 6 "
" width at proximal end,	6 "
Scapula, height,	30 "
" breadth,	37½ "
Ribs, number of pairs,	14
Vertebræ, probably	57

The seven cervicals are all united in their centra, forming practically one piece; the intervertebral substances and spaces being nearly obsolete. In the seventh the intervertebral space

is somewhat more marked, though only as a more or less shallow sinus.

Viewed on the right side, the atlas and axis coalesce at their neural spines.

The axis, third and fourth cervicals, have their neural arches massed in one.

The neural arch of the fifth cervical is united to that of the fourth by the neural spine only.

The neural arches of the sixth and seventh cervicals are united by their neural spines only.

The diapophyses of the atlas, axis and third cervical coalesce at their distal ends.

The diapophyses of the fourth, fifth and sixth cervicals coalesce at their distal ends.

The diapophysis of the seventh is free.

On the left side, the neural arches of the atlas and axis are united at their neural spines.

The neural arches of the axis, third and fourth cervicals are massed in one.

The neural arches of the fifth and sixth cervicals are united by their neural spines only.

The neural arch of the seventh cervical is free.

The diapophyses of the atlas, axis and third cervical coalesce at their distal ends.

The diapophyses of the fourth, fifth and sixth coalesce at their distal ends.

The diapophysis of the seventh cervical is free.

The members of the fore limb below the radius and ulna are missing, with the exception of a few phalanges.

The first rib has a perfectly simple and smooth proximal terminus; its body being a thin curved blade, seven inches in width at the distal end.

On making a comparison of the three skeletons, we find the same number of vertebræ in each, counting from the cranium, and allowing the loss of several terminal caudals from the New York example. The first vertebra from the cranium showing the

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vertical foramen enclosed by the diapophysis is the thirty-eighth in each.

There is correspondence between the Charleston specimen and the New York one in that the last neural spine stands on the forty-fifth vertebra. In the Philadelphia Whale it is seen on the forty-fourth, or as Prof. Cope says: The neural spine is strong on the forty-fourth, therefore, possibly the forty-fifth may exhibit the same amount of development in his specimen as is seen in the two others.

So with the anterior zygapophysis, which is developed on the tenth vertebra, and on the ninth in the two others in question.

An agreement exists in the number of ribs in each—there are fourteen pairs.

Considerable discrepancy is seen in the sums of measurements of the scapulæ.

The three skeletons are so nearly alike in length as to be regarded as practically the same. Adding a caudal to the Charleston Whale, which is due, and several to the New York one, also due, we have for lengths: thirty-six feet, thirty-six to thirty-seven feet respectively, and thirty-seven feet given for the Philadelphia Whale. Thus for three examples of the same length, we have the scapulæ exhibiting the following measurements:

	In. high.	In. broad.
Scapula of Charleston Whale, . .	21	$\times 31\frac{1}{2}$
“ “ Philadelphia Whale, . .	23	$\times 29$
“ “ New York Whale, . .	30	$\times 37\frac{1}{2}$

The scapulæ of the Charleston and Philadelphia Whales agree very nearly in proportions; but the sums of measurements in that of the New York Whale are strikingly greater. The acromion is not mentioned in the descriptions of the two former. In the New York example it is well developed: nine inches in length, and of uniform width of two and a half inches.

The crania in the Charleston, Philadelphia and New York specimens agree nearly in proportions.

Though we are not able to produce exact measurements of the bones of the cranium of the New Jersey Whale, yet a near approximation may be assumed.

In the Charleston Whale the length of mandible is eight feet 1883.]

nine inches, and the depth of cranium from frontal to orbit, is axially, three feet and ten inches, or the entire depth through, perpendicularly, five feet.

In the New York Whale the length of mandible is ten feet three inches; the depth from frontal to orbit, axially, is three feet two inches; and the entire perpendicular diameter of the cranium is five feet.

The Philadelphia Whale has an axial length of mandible of eight feet five inches; the perpendicular diameter of cranium is not given.

Compared with the above, the New Jersey specimen in the flesh exhibits the following sums of measurements:

Length of mandible, axially, twelve feet; depth of cranium, from frontal to orbit, nine feet four inches; perpendicular diameter of body through the cranium, twelve feet.

The respective sums are then:

Charleston Whale, . . .	5	feet by	8	feet 9	inches.
New York Whale, . . .	5	"	10	"	3
Philadelphia Whale, . . .	—	"	8	"	5
New Jersey Whale, . . .	12	"	12	"	

Something may be allowed for the latter being in the flesh, although the condition of the carcass was such that the rami of the mandibles rested very closely to the ground. The measurements are therefore nearly accurate.

This is, certainly, a remarkable difference in proportions, especially between the New York and New Jersey specimens. In the absence of other examples of different sexes for comparison it is not possible to determine the significance of this variation.

We have submitted this point, among some others, to the notice of Prof. Flower, of the Royal College of Surgeons of London, who is inclined to regard the difference as due to either age or sex. We have seen that the ages are too uniform for any peculiar features to be due to such agency. The Whale under consideration was a female; if, therefore, this example is specifically one with the others herein treated, the short head may be a sexual character.

Dr. Manigault saw nothing on his male specimen that corre-

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sponds at all to the beautiful fleshy development of the muzzle in our female Whale.

It is a matter of regret that no opportunity was offered to dissect the region of the spiracles, as the rearward aspect of those organs is quite striking as compared with other examples. In the cranium of the New York Whale the nasals are situated seemingly much farther forward than those of the fresh New Jersey specimen. In the latter a line drawn along the straight face of the orbital portion of the frontal will intersect the spiracles. A line along the same region in the New York cranium leaves the nasals a considerable distance anteriorly, and forward of the cranial eminence; while in the other case the spiracles face backwards on inclined ridges. Seen in Plate XI, fig. 3.

The skeleton of the New York Whale was lithographed from three separate sections of photographs, hence it should be regarded as three parts placed in juxtaposition; the apparent errors will then be understood. The cranium was taken at so low elevation that the nasal profile is not well shown; we have, therefore, presented a view separately, fig. 7, Plate XI, to show the relative situation of parts. A view is also given of the nasals as seen from above, fig. 8, Plate XI.

Figures representing the cervical vertebræ, and one each of the lumbar and caudal, are seen on Plate XI.

In the figure of the Charleston cranium, Plate XIII, the upward curve of the mandible is so great that we regarded it desirable to verify the artist's work. Dr. Manigault, therefore, kindly replies:

"It is possible that the artist was a little inaccurate in drawing the outline of the lower jaw. Of course I recognize the fact that a photograph of the head would be more accurate than a drawing, but before sending you the latter I examined it with a skull in view, and was tolerably satisfied with it. I have since examined the profile of the skull, with the drawing in hand, and consider the whole quite correct. There is an undoubted bend upwards in the lower jaw."

A communication in *Canadian Naturalist* for 1871, Vol. VI, No. 2, entitled "The Whale of the St. Lawrence," by Dr. J. W. Anderson, exhibits some facts pertinent to our subject.

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It relates that two Right Whales were found far up the St. Lawrence River, and gives some measurements that would seem to be of importance as coming from what we must infer is a most reliable authority. The writer says: "Early in August of this year, (1871) two whales were seen sporting near the shores of the Gulf. A Mr. Chabot, who claimed to have invented a gun harpoon, discharged his piece at the whale. As the rope returned without the harpoon it was thought that the whale had been struck. Some days afterwards a whale was discovered on the beach at St. Joachim. I was not prepared to see so huge an animal. It was supposed that the two had been a female and young. It turned out to be an aged male, apparently the species *Balæna mysticetus*. I measured it as accurately as I could, and satisfied myself that it was sixty-five feet in length. The back was black, the belly furrowed, presenting the appearance of a clinker built boat, and each furrow alternately black and dingy white. The baleens were quite perfect, and I secured some plates. I concluded, after a careful examination, it answered fully the description given by Dr. Dekay for the *mysticetus*. According to my measurements, corroborated by Mr. Gregory, as the whale lay upon the beach, he was sixty-five feet long. The fluke of his tail twelve feet; his jaw, fifteen feet. When the skeleton was brought to the city I had an opportunity of verifying to my own satisfaction the correctness of the first measure. The jaw bone measures exactly *fourteen feet six inches*. A whale of this size ordinarily would yield sixty barrels of oil; this gave only *six*. This may well be accounted for by his being aged, diseased and worn out. No wound was found on his body, hence the harpooner could not claim the prize. It is likely the great creature had long been suffering for proper food, and now encompassed in a close bay or river he quickly succumbed."

This is interesting in several points. It is pretty certain if the creature was really a *Balæna* and not a *Balænoptera*, it was an example of unusual size. But what more concerns us are the proportions represented in the measurements of the head and body. The length of the baleen, unfortunately, is not given; a most surprising circumstance, as the flakes must have been (if it was *mysticetus*) at least fifteen feet long.

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The furrows on the belly naturally suggest the *Balenoptera*s, but it is inferred that there was no dorsal fin. The great age and extreme emaciation may have produced folds and wrinkles on the abdomen.

The whole length, we have seen, is given as sixty-five feet, and that of the head as fifteen feet. According to our present knowledge the *B. mysticetus* has the head near one-third the total length of the body. It is also known that the male of this latter species has a longer head than the female. Scoresby was convinced that there were other species of Arctic Whales, and judged evidently from this difference between the sexes constantly appearing before him in his numerous seasons of capture. The proportions of this whale are more those of *B. cisarctica*. The great length again suggests the *mysticetus*, as even for that species it is five feet longer than is usually seen.

This example is valuable for record—

- 1st. As a specimen of unusual size.
- 2d. As one of great age.
- 3d. As one out of its usual habitat in so far as to be quite within fresh water.

The author relates the facts concerning another whale which was stranded in the St. Lawrence in 1823. It is extracted from the *Canadian Magazine*, Vol. I, and is as follows:

"About the middle of September, 1823, a large whale found its way up the St. Lawrence till nearly opposite the village of Montreal where it continued to play itself for several days—not being able to navigate down the river. * * * * After a week's exertion it was harpooned. It was found to measure forty-two feet eight inches in length, and seven feet deep.

Prof. Flower, in his admirable edition of Eschricht and Reinhardt's work, in considering the probabilities of the Arctic Whale having once penetrated so far south as the mouth of the St. Lawrence River and entered the fresh water, refers to an account of a whale being found in the St. Lawrence River in the year 1823, and expresses the opinion that it was "one of the White Whales, *Beluga*, that are so common at the mouth of that river." This account in the *Canadian Naturalist*, (probably the same referred to) would seem to set the matter aright; and the 1883.]

second example, much more singular in its features, shows that the largest of the Right Whales have really found their way as far up a fresh water stream as Quebec and Montreal.

The larger of the two whales was definitely ascertained to be a male. The circumstance of a male *mysticetus* being sixty-five feet in length, gives color to the possible existence of females even larger, if we are to conclude that the sexes differ essentially in length. Here, however, it may be fair to admit the qualifying influence of extreme age.

There is no mention of a nasal protuberance. The Charleston Whale, a male *cisarctica*, had none. So far, therefore, there is nothing to discountenance the assumption that this St. Lawrence Whale was the latter species, excepting, perhaps, the great size. The most suggestive fact is in the proportionate size of the head to the body, which is more in accord with the *cisarctica*. The assumed fact that the male *mysticetus* has a larger head than the female, lends strength to this proposition. Eschricht and Reinhardt say: "The male, though somewhat smaller than the female, will nevertheless be found to have a much larger head, even absolutely speaking." They also add: "The length of a Right Whale cannot, by itself, excepting in rare cases, be of use in determining to what species it belongs."

Prof. Flower, in his Appendix to Eschricht and Reinhardt's work, already quoted, says: "About fifty feet is the average length of the Greenland whale of either sex." Concerning the differences of proportion, he adds: "Such difference as exists is certainly in favor of the males, * * * and there can be no question that age leads to important modifications, especially to a great increase of development of this part of the body. It is possible that the arch of the upper jaw, and consequently the length of the baleen, is generally greater in the male than in the female." In the examples we have seen and compared, the New Jersey specimen (female) and the Charleston specimen (male), the baleen was about the same length in each.

THE RIGHT WHALE OF EUROPE.

Balæna biscayensis. Escht.

The identity of this and the *Balæna cisarctica*, Cope, is now pretty well established. Prof. Flower, while acknowledging the receipt of a proof impression of our figure of *B. cisarctica*, adds of Cope's type: "As far as I can make out it is the same as *B. biscayensis*," and continues, referring to our figure, "I cannot help remembering, in passing, that it most closely corresponds (allowing for inevitable difference of drawings made under difficult circumstances) with figures of the Southern Right Whale, given by Dieffenbach, and of the Japanese by Siebold, and also, in a native drawing in my possession."

Prof. Cope has expressed himself satisfied that the two are identical.

Prof. Allen, of Cambridge, Agassiz Museum, alluding to our figure of the New Jersey Whale, says: "Your drawing of the recent specimen agrees well with figures of *B. biscayensis* of southern Europe, which I believe to be identical with Cope's *B. cisarctica*."

Eschricht and Reinhardt have given their convictions of the same, regarding the "Sarde" of the Basques, the "Nordcaper" of the old Dutch and North German whalers, as most probably the Right Whale of the Anglo-Americans, from the coast of Nantucket and New England."

The figure in VanBenedin and Gervais, *Osteographie des Cétacés*,⁵⁰ being of some young individual, cannot of course be compared so satisfactorily. Yet it exhibits something of the strong characters of the *rietus* and other portions of the head. The upper jaw and lip are singularly small compared with the lower, which may be due to the immature age, although its length, 26 feet, would seem to indicate an individual large enough to have reached somewhat more of adult form.

The figure of Capellini's specimen, in Southwell's work,⁵⁵ has more of the appearance of *mysticetus* than of *biscayensis*. It is quite like Scammon's⁵³ figure of the Northwest Right Whale (*B. Sieboldii*), having none of the sharply recurving *rietus*, but the same long sigmoid outline seen in the latter. Its head, also, is much too bulky to represent the Nordcaper, being one-third the
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total length. The length and other measurements of this whale are not given. Of the skeleton of this, the Taranto specimen, now in the Museum of Comparative Anatomy of the University of Naples, Prof. Gasco says: "Both the Taranto Whale and that of Philadelphia (*B. cisarctica*, Cope,) belong to the species *B. bis-cayensis*, of Eschricht.

We have here an epitome of the history of the species and a seemingly satisfactory understanding of the characters and mutual relations of the two forms, viz.: the Atlantic Right Whale of Europe and the Atlantic Right Whale of America; and a nearly uniform decision establishes their identity. Fischer, however, dissents, and regards them as distinct species. (See VanBenedin and Gervais, *Osteographie*, &c.⁵⁰).

The figure in *Fauna Japonica*,⁵¹ *La Baleine des mers Australis*, (*Balæna antarctica*) being that of an adult, is of interest in comparison with our New Jersey specimen, as it is much more like the latter than any other figure extant. It is probable that the caudal region, flukes and pectorals are represented as too stout. Otherwise the figure is a close copy of the latter whale. The nasal hood, and the short, sharply recurved *rictus* are well expressed. Even the exceedingly crude wooden model of Chamisso will impress any one that has seen the Atlantic Whale as having several of the characteristic features of the second species, which are wholly absent in more pretentious works.

Scammon's figure of *Balæna Sieboldii*⁵² in the absence of any description, is scarcely comparable. It does not bear the peculiar curve of the mouth, but, far from it, exhibits an elongate sigmoid outline. The species is said to bear a "bonnet" on its snout, which is represented in the plate by an irregular bunch, seemingly covered by parasitic molluscs.

As these several examples of Right Whale are regarded as, if not the same species, certainly of one group, having peculiar features which distinguish them from the species *mysticetus*, it is pertinent to determine what those characters are. The graceful outlines of the produced snout in the New Jersey Whale are certainly not represented by the figure of *B. Sieboldii*. The mouth of the latter varies but little from that of *mysticetus*, and the head bears the same proportion to the body as obtains in the latter.

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Capt. Scammon's description of his *B. Sieboldii* corresponds with his figure. He says: "Its average adult length may be calculated at sixty feet—it rarely attains seventy—and the two sexes vary but little in size. Its head is very nearly one-third the length of the whole animal. So far one would be led to recognize a variety of *mysticetus* rather than one of the "second sorte" for only one of the external characters of the latter are shown, and that, the "bonnet," as shown in this figure, is not by any means what it is on the *cisartica*, and unfortunately no description is given of it. Judging of the figures extant there seems to be a most remarkable confusion of external characters. Scammon's *Balæna Sieboldii* is credited to Gray. The latter author—*Catalogue of the British Museum, Seals and Whales*—records it as synonymous with *B. australis*, Temminck, *Fauna Japonica*,²⁷ plates 28 and 29 (from Japanese model). The latter, we have seen, is a good figure of *cisartica*, and the former, entirely lacking the external characters of *B. australis*, does exhibit very nearly the characteristics of *B. mysticetus*.

We do not propose to attempt to harmonize the conflicting elements, but as we have presented a faithful delineation of the Right Whale of our Atlantic side, with certain figures and facts relating to the osteology of the species, we hope to lessen the confusion by directing the attention of cetologists to such as are absolutely correct, and of certain value.

It is to be hoped that the long lost Black Whale will find a resting place in systematic cetology, for it exhibits characters equally at variance with recorded generic values, whether it be *Balæna* or *Eubalæna*. Gray's *Eubalæna* calls for "first pair of ribs broad at vertebral end, and a coracoid process on a scapula as long as broad." This certainly does not accord with *cisartica*, which has the first rib very narrow at the vertebral end, rapidly widening to the distal terminus. The scapula of the latter is strongly broader than high, and has no trace of a coracoid. Prof. Flower's record of *Eubalæna* calls for 57 to 58 vertebræ in lieu of the 52 of *cisartica*, and one more pair of ribs; the type being *E. australis*, Desm.

The scapula standard set up in Gray's family *Balænidæ* seems faulty in that three of our specimens of Atlantic Right Whales
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exhibit the scapulæ as much wider than high, instead of as in Gray, "scapula higher than wide."

Some variations in the relative proportions of the cranial elements are noticeable. It occurs that possibly the greater length of head in the male may be due in some measure to the very considerable elongation seen in the occipital region of the latter as compared with the same in the other examples. In the female *B. australis*, as we see it in a photograph of the specimen in the *Jardin de Plantes*, and also as figured by VanBenedin and Gervais, the angle formed by the posterior face of the occipital bone and the nasal plane is about 120° . The same on the "New York Whale" is 145° . As the sex of the latter is not known it is impossible to form any definite conclusions. We know however that the several female specimens have uniformly short heads. The occiput of *B. antipodarum* and of the *B. australis*, as above, is nearly perpendicular to the plane of the nasal region, giving a shortened, truncated aspect to the brain case. The same is no doubt the case with our New Jersey Whale, judging from its short head.

In the Charleston Whale, a male, the occipital region exhibits the same elongated outline that is seen in the New York Whale. We have, therefore, what may be regarded as a basis for comparison :

B. antipodarum and *B. australis*, females, having the short head, with a truncated aspect of cranium ; the occiput forming, with the nasal plane, an angle of 120° . *B. cisarctica*, the New Jersey specimen, female, has the short head, and probably had the same angle as above.

The *B. cisarctica*, male, Charleston specimen, and the New York Whale, sex unknown, have the elongate head, with occipito-nasal angle 145° . The striking difference seen in the relative situation of the spiracles in the several examples, will, probably, be found to be due to the more or less production of the supraoccipital.

HISTORICAL.

The occurrence of a Right Whale on our coast, though something of great frequency—as is now known—in the earlier days

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of the Republic, has, after a century of nearly an entire absence of the species, recently come to notice through its occasional capture.

The circumstance that this whale became, through well known causes, nearly extinct before the time of Cuvier, when less attention was directed to essential points of structure, readily accounts for the meagre knowledge we find recorded.

When the great French anatomist came to review the field of cetological literature, his entire confidence in Scoresby's¹ views blinded him to all others.

Scoresby, through his great experience in the whaling service, made it possible to record most valuable information concerning the great Arctic Whale, but his inability to portray the subject pictorially was a misfortune.

Had he omitted his drawings, which were evidently ill-considered and taken at second hand, and had he confined his opinions to the experiences of the Arctic Circle, where his observations were exclusively limited, a very different record would have been established as the basis of the history of Right Whales.

It is known that from an early date, a Right Whale, differing from the Arctic form, was familiar to the various seafaring peoples of the European seaboard as inhabiting the more temperate waters, and that many ancient authors record accounts of such.

In 1808, Scoresby¹ published in the Wernerian Society's Journal the results of his observations; and later, in his more pretentious work on the Arctic regions.

His antecedents and present standing naturally claimed for him an especial degree of confidence in his statements. Cuvier was now preparing his great work, *Recherches sur les Ossements Fossiles*,² and had in this and in his first edition of *Regne Animal*, 1817, introduced the "Second Species" under the title "Nord-caper" (*Balæna glacialis*), Klein. He now, however, became fully convinced that Scoresby should be credited with the only exact knowledge; and on the strength of an assurance from the latter that the "Second Species" was no more than a "Fin-back," or at most an emaciated *mysticetus*, he abandoned it, with certain criticisms on the validity of the alleged species, in "*Sur la Determination des diverses especes de Baleines vivantes*." For example, 1883.]

the author says : " The only document furnished of such authority that one may believe, consists of figures made by Backstrom, and sent by Sir Joseph Banks to Count La Cepede,³ which he has engraved in his '*Hist. Naturelle des Cétacées*.' The figures would appear to be different from that of the Right Whale as long as one takes only [in comparison] the last of Marten's;⁴ but to-day we have of this whale a recent and exact representation in the work of Captain Scoresby.¹ It is sufficient to compare it with that of Backstrom to be convinced that the two are one and the same species."

Now, curiously enough, the eminent whaling captain was, unwittingly, a stumbling block here. Secure, in his own opinion, he went astray to criticise La Cepede's figures, yet had failed most essentially in his own. Had Scoresby omitted his illustrations, the descriptions and measurements would have stood as undoubted, reliable matter for comparison. But he furnished to science an incorrect figure, at second hand, thereby making as gross an error, as he charged on La Cepede.

Nearly every book published to this day, having an illustration of *B. mysticetus*, shows a manifest copy of Scoresby's figure. This is the more to be deplored as the figure is incorrect in several essential features, the relative size of head being a notable one. Several prominent works on Natural History of the latest issue repeat the same error.

No doubt Scoresby's figure resembles *B. mysticetus*, and so does La Cepede's figure, the *Nordcaper*; but they are about equally possessed of certain misproportions; the former of too short a head, and the latter having too short a body. So far, then, the authors are at quits. But little more exaggerated is *B. franche* of La Cepede. Though it may not have its "counterpart in nature," as Scoresby sneeringly said, if we remove a portion of its diameter the figure will give a tolerable representation of *mysticetus*, which it is intended to be. The latter figure is either the original or copy of others which are seen in nearly all the old authors on the subject. Had Scoresby copied some one of the old copper plate etchings, and toned it in accordance with his own observations and measurements, he would have given to science a more reliable and truthful standard of comparison, and left Cuvier the oppor-

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tunity to establish two well marked species of Right Whale, aside from *Baleine du Cap*.

We may now see how well justified was Cuvier in his conclusions from premises supplied by Scoresby, which resulted in the rejection of a "Second Species." The figures of Marten's,⁴ which he refers to, being like those of Zordrager,⁵ quite good representations of *B. mysticetus*, he naturally notices that "they would appear to be different" from those of La Cepede representing the Nordcaper. So they were, despite the want of a longer body in the latter; they were for all that sufficiently characteristic of each species for general purposes. But Cuvier, unfortunately, is diverted from the correct course by accepting the figure of Scoresby, as we have seen, instead of relying on the description, and of which he says in continuation: "But to-day we have of this whale a recent and exact representation in the work of Capt. Scoresby," &c., &c.

It is a singular commentary on the utter confusion of the subject at that time, and lack of good modern descriptions and drawings, when we find, in spite of Cuvier's adverse criticism on Marten's and Zordrager's accounts, that figures by the latter of *B. franche* are really better than any other extant to-day, excepting, perhaps, Capt. Scammon's late drawing. It is quite evident that they were drawn from the fresh animal by an artist, and etched on copper in a style diversified by pleasing artistic accessories. The proportions are well shown, and the baleen accurately exhibited, with the exception that it has the appearance of being continuous over the symphysis of the maxillaries.

We see in these several errors adequate cause for misapprehension, and may not, perhaps, greatly wonder that most authors since Cuvier's day up to within a few years, have ignored a "*Second Species*."

It is seen that through certain untoward circumstances a well defined and somewhat widely known species of Right Whale had not only come to be denied its place in the Atlantic fauna, but had been well nigh lost to science.

In our search for a complete history of the "*Second Sorte*," so quaintly alluded to by one or more of our ancient authors, we find that the earliest record bearing mention of the Right Whale is 1883.]

that of *Orosius Voyages*,⁷ written by Alfred the Great in A. D. 890.

In the 12th century an old Icelandic clergyman published in *Konigspeil* (Mirror of Royalty),⁸ a list of Cetacea, in which the "Nordcaper" is enumerated as a "Second Species."

It is thought to be doubtful whether the Basques possessed any records of the Whale fishery. The old writer in *Konigspeil* refers to "*Sletbag*," which means a Whale without a fin on its back. "It is almost as big in the body as the last mentioned (*B. mysticetus*), but those who travel much on the sea fear it, as its nature is to play much with vessels." This reference indicates a characteristic which is noticed by all subsequent writers on the subject. His description of the North Whale (*B. mysticetus*) is very accurate; and he adds, absurdly: "It is said not to take any other food than the fog and the rain, and what falls from the air on the surface of the water."

In 1553 Belonius⁹ described the whalebone known in his day as eight feet in length, and absurdly refers to its uses as eyebrows.

Bartolini¹⁰ in 16— printed, at the suggestion of an Icelandic priest, a list of Cetaceans. From it is gathered that the "*Sletbag*" is the Whale caught near the shores of Iceland by the French and Spanish sailors, and that it was very different from the North Whale. This account was accompanied by drawings of all Cetaceans then known. Most unfortunately these were lost.

In 1671 Martens,⁴ a Hamburg surgeon, issued figures of the "*Second Species*," and speaks of those of the North Cape being not so large as the others (Greenland species); and that they are more fleet and more dangerous. He designates the species as "Nordcaper." This author, it will be remembered, is the one criticised by Cuvier.

In 1624, Schondevelde¹¹ introduced the name "*Sarde*" as a designation of the "Second Species." This is the earliest mention of this term we have met with.

An important record is that of one John Smith in his "Annals of Salem, Mass."¹² He says: "The whaling business began on the New England coast prior to 1614, guarantied by royal authority to Massachusetts Bay."

In 1625 Purchas¹³ refers to the Bearded Whale (*B. mysticetus*) and the "*Sarda*." The same author later alludes to a "*Grand*

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Bay Whale," so called because the first were captured in that locality in Newfoundland. The "*Sarda*" and "*Grand Bay Whale*" are regarded as identical and one with "*Nordcaper*."

In certain directions given to Mr. Edge in 1611, regarding his whaling projects, published in Purchas,¹³ the "*Sarde*" is mentioned as follows: "The second sorte is called "*Sarda*," of the same color and fashion as the other (*B. mysticetus*), but somewhat lesser, and the finnes [baleen] not above one fathom long."

In 1690, according to Smith's Annals,¹³ "Whales were occasionally killed in Cape Cod harbor. Nantucket first sent boats from shore this year; and in 1700 they began to fit out small vessels to whale out in the deep sea. In 1712 small vessels were sent to Newfoundland and southward along the Gulf. In 1748 whales became so scarce that they were pursued in larger vessels, an hundred sail being sent out from Boston alone."

New Bedford first commenced the whaling business in 1755; their boats going as far south as the Capes of Virginia.

In 1770 the business had culminated. Much larger vessels were now required, and sent across the ocean.

In 1760 some vessels from Sag Harbor voyaged to high northern latitudes, the Right Whale being now exceedingly scarce in the temperate latitudes.

In 1719 the Hon. Paul Dudley, F. R. S.,¹⁴ prepared an essay for the Philosophical Transactions of London, in which he says: "Our New England people used to kill the Whale near the shore, but now go off to the sea in sloops and whaleboats, in the months of June, July, August, between Cape Cod and Bermuda, where they lie up at night." In this essay the important statement is made that the "baleen sometimes attains the length of six or seven feet. Thus by the latter the species is clearly indicated as distinct from *mysticetus*."

Pontoppidan¹⁵ records a similar statement concerning the length of the baleen, and the species was called an "East Coast Whale;" that "it was different in shape of its body from the Greenland species, having as it were a hump on its neck behind, and that the whalebone was much thicker."

About the middle of the 18th century was published a Danish work,¹⁶ which gives a figure of the "*Slethag*" being hunted by Basques.

In 1740 Klein²⁴ in his *Historiæ Piscium Naturalis, &c.*, fairly introduces the "Second Species" to science, and adopts it as *Balæna glacialis*, or "Ice fish." He also introduces three other varieties: the "West Fish," ("*B. occidentalis*,"), "Northcaper," ("*B. borealis*,"), and "Weis Fish" (*B. albicans*). Klein's work is profusely illustrated with large and expensive copper plate etchings of fishes, and some anatomical parts, but has no figure of the "Second Species."

In 1746 Linneus¹⁷ enumerated the *B. mysticetus*, but ignores the other Right Whales.

Anderson,¹⁸ in 1771, describes the "*Slethag*" "with baleen coarse, brittle and fragile."

Egede¹⁹ mentions an "east coast whale" with "baleen five feet in. length." The five foot baleen so frequently mentioned by these old authors, being so strikingly in contrast with the twelve or fifteen foot bone of *mysticetus*, clearly indicates a "Second Species."

Chamisso²⁰ presents a series of figures from models made in wood by native Aleutians—"Exactissimus iconibus ternis, a latere, a dorso, a ventre, ad amussim adumbratus"—one of which represents the several characteristic features of the "Second Species."

In 1782, M. St. Johns²¹ writing from New England, mentions a Right Whale, or "Seven-foot-bone-Whale;" fairly indicating the "Second Species."

In 1789, L'Abbe Bonaterre²² published a copper-plate etching of *B. franche* of great size, which is evidently a copy of that of the older authors. He also describes "Nordcaper" at length; and adds that in Norway it is called "Sildqual" and "Lilie Hual." The latter term literally means Little Whale, which is in accordance with facts, the species being constantly referred to as smaller than the *mysticetus*.

Hans Egede¹⁹ records two forms; the second he calls "North Caper," from its place of abode, the North Cape of Norway. He also names the baleen "barders."

Brisson,²³ in 1762, following Klein, enumerates a long list of

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synonyms of *B. mysticetus*, and introduces "*B. islandica*," "*La baleine du Islande*," synonymous with "Nordcaper," ("*B. glacialis*,") Klein.

Willoughby²⁵ ignores the "Second Species."

Pallas²⁶ quotes in *Zoo. Rossica Asiat.* the *B. culammak* of Chamisso.

Schlegel,⁴⁴ Schreber,⁴⁵ Wagner,⁴⁶ Van der Hoeven,⁴⁷ and Siebel,⁴⁸ each introduce the "Nordcaper" as a second species.

The foregoing citations represent pretty fully the history of a second form of Right Whale as it stood at the time of Cuvier.

In "*Regne Animal*" of this author, edition of 1817, as we have seen, the "Nordcaper" was introduced; and in a subsequent work, 1823, he rejected it, regarding the matter satisfactorily settled, adversely to the existence of a second form of Right Whale in the North Atlantic.

In a memoir published by M. De Seibold²⁷ in "*Fauna Japonica*," plates 28-29, are figured two views of a Whale which he denominates *La baleine des mers Australes* (*Balæna antarctica*). This is said to inhabit the waters of the coast of Japan. M. De Seibold procured a model of this Whale in porcelain, the work being done under his own supervision from a fresh specimen by an experienced whaler captain.

The author adds: "It is after this model that our figures have been copied. The great exactness which is known to characterize the Japanese, may be regarded as giving credit to the correctness of the model. It is evident on comparison with Scoresby's figure that there are two species, and that this belongs to the Australian Seas, observed at the Cape by Delalande, and of which the skeleton has been described by Cuvier under the name of Cape Whale."

The author alludes to the fact that this Whale is subject to cirripeds, and is tinted with white on portions of the head. "Characters," he says, "that exist on our Japanese specimen."

Desmoulins,²⁸ in *Dic. Class. Hist. Naturelle*, Tome II, p. 161, asserts, according to Delalande: "The Cape Whale presents a head more depressed than that of the Arctic Seas. The pectoral 1883.]

fins are longer and terminate more pointedly. The lobes of the tail are separated by a deeper slope, and the color is a uniform black." "We recognize," says M. De Seibold, "in our Japanese specimen all of these characters with the exception of the last, which is of little moment. The great breadth between the region of the eyes, a larger mouth, but above all because the margin of the upper jaw curves towards the eyes strongly below and outwards, these prove the identity of this and the Cape species. The diameter from one eye to another is much more considerable, and there is on the muzzle a strong prominence.

The line which determines the border of the upper jaw is, towards the extremity, a little less curved than in the Arctic; behind, on the contrary, it forms a curve extremely strong, and so directed below and backwards as to recurve just behind the eye. The line of the under jaw presents a different curve; its horizontal part is much shorter than in the Arctic Whale, and before inclines insensibly towards the extremity of the jaw instead of descending abruptly, as in the last species. The baleen appears to be a little shorter than that in the arctic species. The pectorals are longer and are more prolonged in point. The lobes of the tail are separated by a curve much less deep also, and there are a few white spots on the belly."

In the figure of the *B. antarctica* is the first example we have seen of a drawing of the peculiar prominence of the snout so eminently characteristic of the "Second Species." Although this figure is said to have been taken from a model in porcelain, it is much more important and correct probably than some authors would seem to regard it.

The drawing has every appearance of having been done from the carcass or some medium that bore accurately the characteristics. The pectorals and flukes of the tail are evidently too bulky, and the "small" of the body has possibly too great a diameter, but the head is well done. The whole figure is so nearly like ours of Plate X, that it might well have been intended for the same species.

The Aleutian figure of Chamisso has a globular process on the snout, which is probably an imperfect representation of the nasal prominence.

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The Count de La Cepede³ in his *Histoire Naturelle des Cétacés* presents figures of "Nordcaper," which he asserts were obtained from Sir Joseph Banks, just before the publication of his work in 1804, with the information that he obtained them from Greenland, where they were drawn by one Backstrom in 1779. The latter, it appears, was a sailor in one of the northern ships. Of five editions of La Cepede before us, the figure of "Nordcaper" is found in three only. The text of the subject is, however, in each. In the quarto edition, the figures are imperfect, having no tails, and appear to have been drawn from wooden models. In the edition of 1826, edited by M. Demarest, the same figures occur, with the caudal extremities entire. Both exhibit the characteristic abrupt recurving of the *rictus*, before and under the eye; but no appearance of a protuberance is visible on the snout. The figures on Plate II very well represent the *mysticetus*, though intended for views of "Nordcaper."

An English work on whales, by Dewhurst,³⁹ copies La Cepede's figures of "Nordcaper;" adding the absurd obliquity to the eye. The figure given in this work of *mysticetus* is not better than those of the ancient authors. Most of the engravings are disgracefully incorrect and ancient.

Another English work on Zoölogy, lately published, perpetuates Scoresby's effigy. Brehm's great work also bears a full page of excellent wood engraving to represent the species and its surroundings, wherein Scoresby's figure is but too apparent.

Harlan's *Fauna Americana*,³⁰ 1825, recognizes "Nordcaper" (*B. glacialis*, Klein) and *B. islandica* as a synonym.

Godman³¹ gives a lengthy account of the *mysticetus*, with an amount of anatomical and physiological knowledge on the subject quite unusual; but he ignores, strangely enough, a "Second Species."

Desmarest,³² in 1820, treats of the "Nordcaper" (*B. glacialis*, Klein) with *B. islandica*, Brisson, as synonym.

Col. Hamilton, in Jardine's Naturalist's Library,³³ while treating exhaustively of whales of the British waters, unaccountably omits any consideration of a second species. His figures of *B. mysticetus* are evidently constructed on the model of Scoresby's.

Gray³⁴ in his Catalogue for 1850 presents "Nordcaper" as a 1883.]

synonym of *B. mysticetus*, and the several forms named by Klein as referring to "Nordcaper" he gives similar relationship.

In this edition of Gray's Catalogue is a figure, in lithography, which was evidently drawn from a fresh animal. It is labeled simply *Balæna*, and like others on the plate is used to serve as a generic form. Now this figure can scarcely have been appreciated by the author, as it is an excellent example of the several peculiar characters of the "Second Species," and not at all like the typical form *B. mysticetus*. The author does not describe this figure, nor is there any mention made of it further than that it is a *Balæna*. It is a Second Species, or positively it is not the first. It exhibits the head as one-fourth the length of the body; it has the recurved *rostrum* and slender body, with spiracles situated directly over the eyes, all presenting a group of characters clearly recognized as peculiar to the "Second Species."

To complete the exhibit of characteristic features, we find on Plate 2 a figure of a cranium entitled *Balæna*, which shows a black outline to indicate the fleshy portions in place. This sketch shows the almost perpendicular position of the posterior aspect of the maxillary, but, also, a perfect outline in profile of the nasal "bonnet" or protuberance. In short the whole cranium with its external appendages, as well as the former figure on Plate 1, all without doubt were drawn from one and the same, a fresh example of a Right Whale differing essentially from the Arctic form. Indeed, instead of being as Gray intended, a type figure of *Balæna*, it exhibits many of the essential features of Gray's *Eubalæna*. It is evident that the latter author has been influenced by Scoresby's figures, as, had he kept in mind the comparative size of parts in the two species, such errors as are seen in this edition would not have occurred. It is not strange then that he here ignores the "Nordcaper," claiming it as synonymous with *mysticetus*.

In Gray's Supplement to the Catalogue, &c., 1871, the following are recorded:

1. *B. mysticetus*.
2. *B. mediterranea*, Gray. Annals and Mag., N. H., 1870.
Syn. *B. biscayensis* (part) Van Benedin, Osteog. Cet., tab. 7,
fig. 1, (animal) Hab. Mediterranean.
3. *B. angulata*, variety of *mysticetus*, Gray (ear bones).

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4. *B. nordcapæ*, Bonnaterre.

5. *B. nordcapæ*, Brisson.

Syn. *B. biscayensis*, Eschricht.

B. mysticetus, var. Brown. Proc. Zoo. Soc., 1868. Hab. Iceland; called "Sletbag."

Gray quotes from Brown, enumerating all the important characters which so clearly separate the species, and thus at last seems clearly to identify the second species of North American Right Whale as such. He also adds Cope's variety of *mysticetus*, the "Bow-Head" of Scammon's book; and *B. kuliomock* of Chamisso, known only from the wooden model made by Aleutians.

Eschricht and Reinhardt,⁶ in an exhaustive memoir on the Greenland Whale, recognize a second species of Right Whale. The essay of Paul Dudley¹⁴ is alluded to by them as one of the early and reliable evidences of its existence in the temperate Atlantic.

Belonius⁹ describes a whalebone or baleen, which the authors regard as applying to this form. They also review the directions given to Edge in 1611, in which two species of Right Whale are distinctly indicated: the "Bearded" and "Sarda." Certain inquiries lead the authors to decide that the Arctic Whale (*mysticetus*) could not have been known to Europeans before the sixteenth century; or rather, that as late as the sixteenth century it was unknown to them, with the exception of the Norwegian settlers in Iceland and Greenland. It is said that the descriptions in "*Konigspeil*," 12th century, are the first after Aristotle, and the only ones in the middle ages in which Cetaceans have been described from personal observation. The description of the Greenland Whale is better than some later.

Eschricht and Reinhart,⁶ alluding to these figures, say: "We must confess that, as to proportion, we confide more in these drawings" (referring now especially to Martens⁴) "than Scoresby's, which certainly represents the Greenland Whale (*B. mysticetus*) as more slender than it really is."

The authors continue in relation to the existence of a second form of Right Whale, and assert that "it may be said to be so certain that it is much more surprising that it ever should have been omitted in the zoölogical system, than that it has now, as we 1883.]

hope, regained its place in it. The reasons why Scoresby, and afterwards Cuvier, would not acknowledge it as a separate species, were because an insufficient knowledge of its history, partly the fact of the former not having seen anything of it in his whaling expeditions, and partly the great resemblance to the Greenland Whale so evidently seen in the only picture given in the "Nordcaper."

The authors now come to the question, to what species does this "Nordcaper" truly belong, or to what is it most closely allied by its entire structure.

Since Cuvier had established the "Cape Whale" (*B. australis*), habitat Cape of Good Hope, as distinct from the *mysticetus*, nearly all authors agree in referring all Southern Right Whales to this group (or species in some instances). The authors say: "The 'Nordcaper' is to be placed in the group with the Southern Whales; but it is not likely to prove identical with either, not even with the *Baleine du Cap*. But when we consider it to be different from the latter, it is more on account of the common laws affecting the geographical distribution of animals, than because the scanty information we have about the 'Nordcaper' contains anything that positively contradicts the contrary supposition."

They refer to the "Nordcaper" as being nearly extinct since the close of the last century; but that the species is not now infrequent on the coast of the New England States.

Pontoppidan³⁹ states that the whalers were instructed to seek the "Nordcaper" when circumstances did not favor their hunting the North Whale; and he adds: "The American whalers occasionally caught the 'Nordcaper' in Brede Fiord and Taxe Bay, in Iceland."

In 1854 a Right Whale, accompanied by its young, appeared in the Bay of Biscay. The cub only was caught, and its skeleton was carried to Pampeluna. A lithograph was executed of this under direction of Dr. Monedero. The head presents the same relative proportion to the body as seen in "Nordcaper," and the same inflection of upper lip. The authors, Eschricht and Reinhart, agree that it corresponds to the "Nordcaper," and is undoubtedly the same. They add: "Our researches have de-

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terminated the fact that the 'Nordcaper' is a distinct species from any of the Southern Sea forms, though belonging to the same group.

In 1865 Professor Cope,⁴² we have seen, introduces the "Second Species" fairly to notice as a *re-discovery*, when the fact becomes clearly patent that a form of Right Whale had been abundant on the coast of North America in temperate waters; that it became through well known causes extremely uncommon; that it never was recognized by science; and that during a long period succeeding the abandonment of its capture in our waters the species has multiplied, and is now reclaiming its original habitat.

It seems well established that this is the same as described by Dudley in Philosophical Transactions of London, and, as we have seen, authors pretty well agree that it is "Nordcaper," or the "Second Sorte" of old authors, and probably *B. biscayensis* of Eschricht.

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DESCRIPTION OF PLATES.

PLATE X.—FIGURE OF THE ATLANTIC RIGHT WHALE (*Balæna cisarctica*,) Cope. Drawn from the recently captured example called the "New Jersey Whale."

PLATE XI.—FIGURE OF THE SAME, AS IN PLATE X., seen from above.

Fig. 2. Open mouth, seen in front.

Fig. 3. Spiracles, exterior portion.

Fig. 4. Cervical vertebræ of the "New York Whale," (*Balæna cisarctica*), Cope.

Fig. 5. First lumbar vertebra, or the twentieth from the cranium of the same.

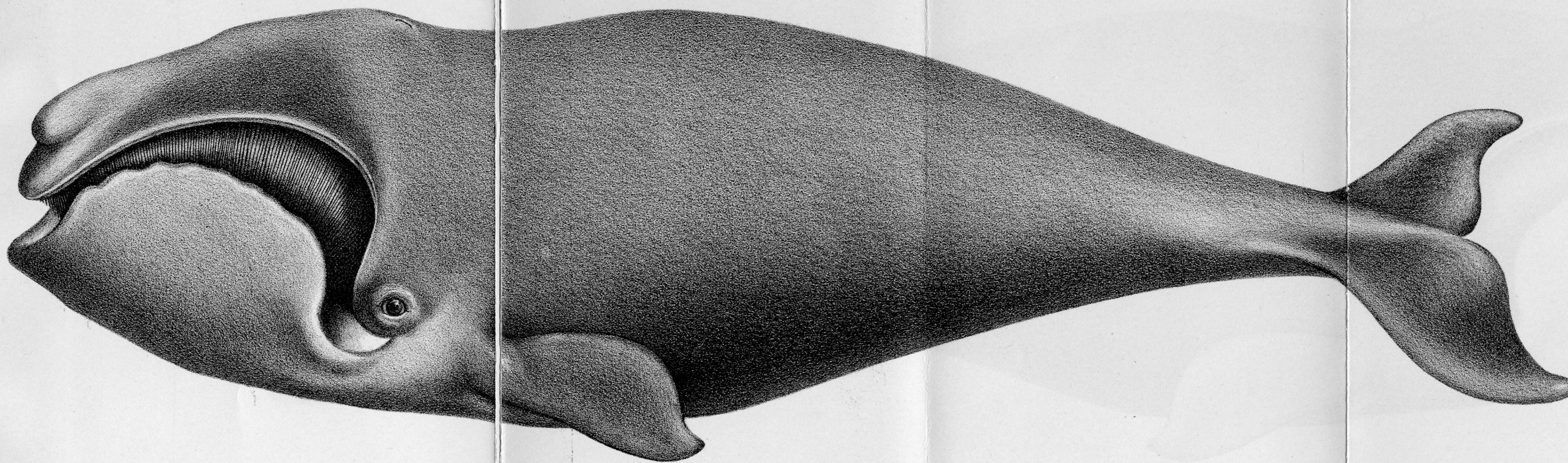
Fig. 6. Caudal vertebra of the same.

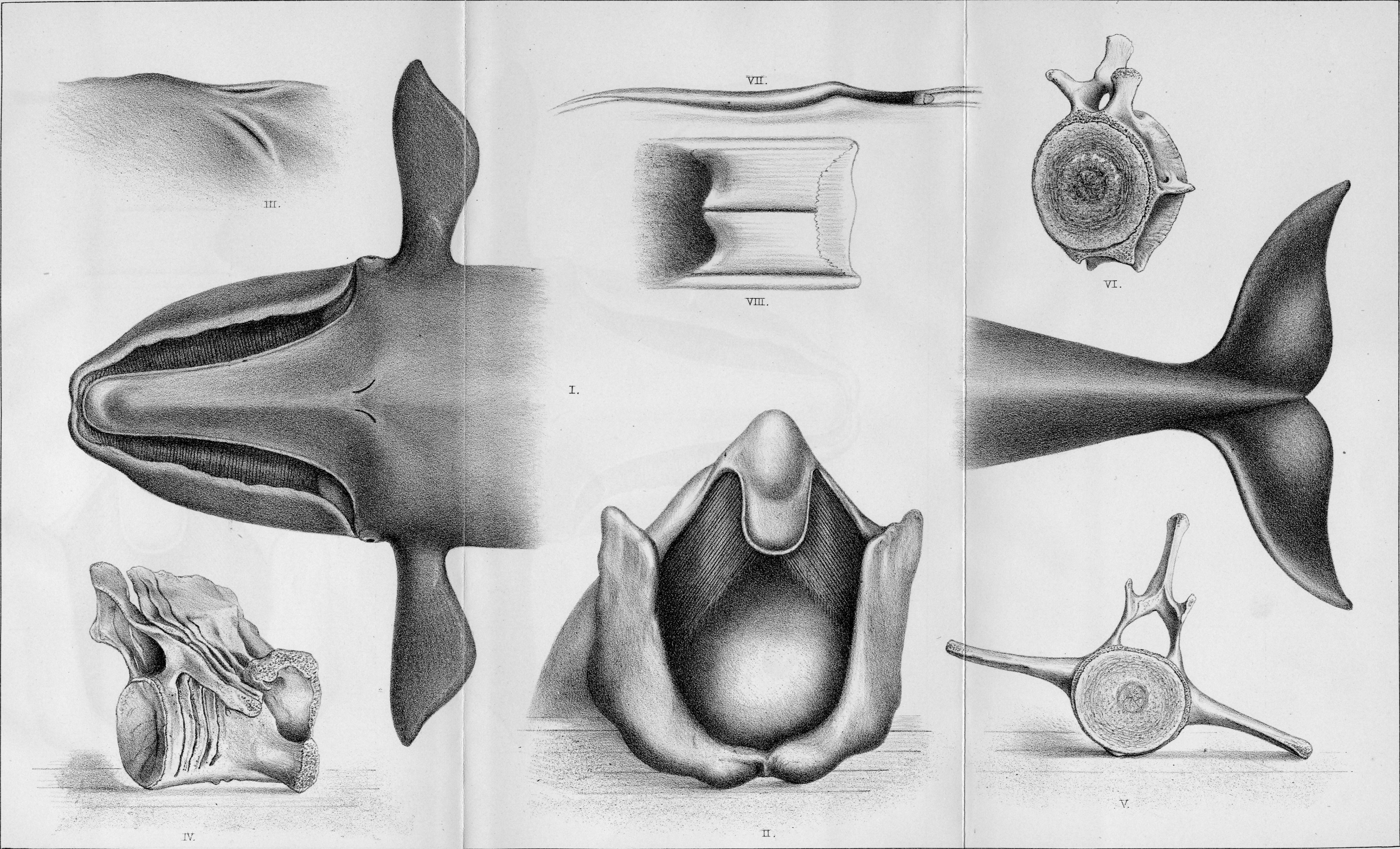
Fig. 7. Profile of the nasal region of the same.

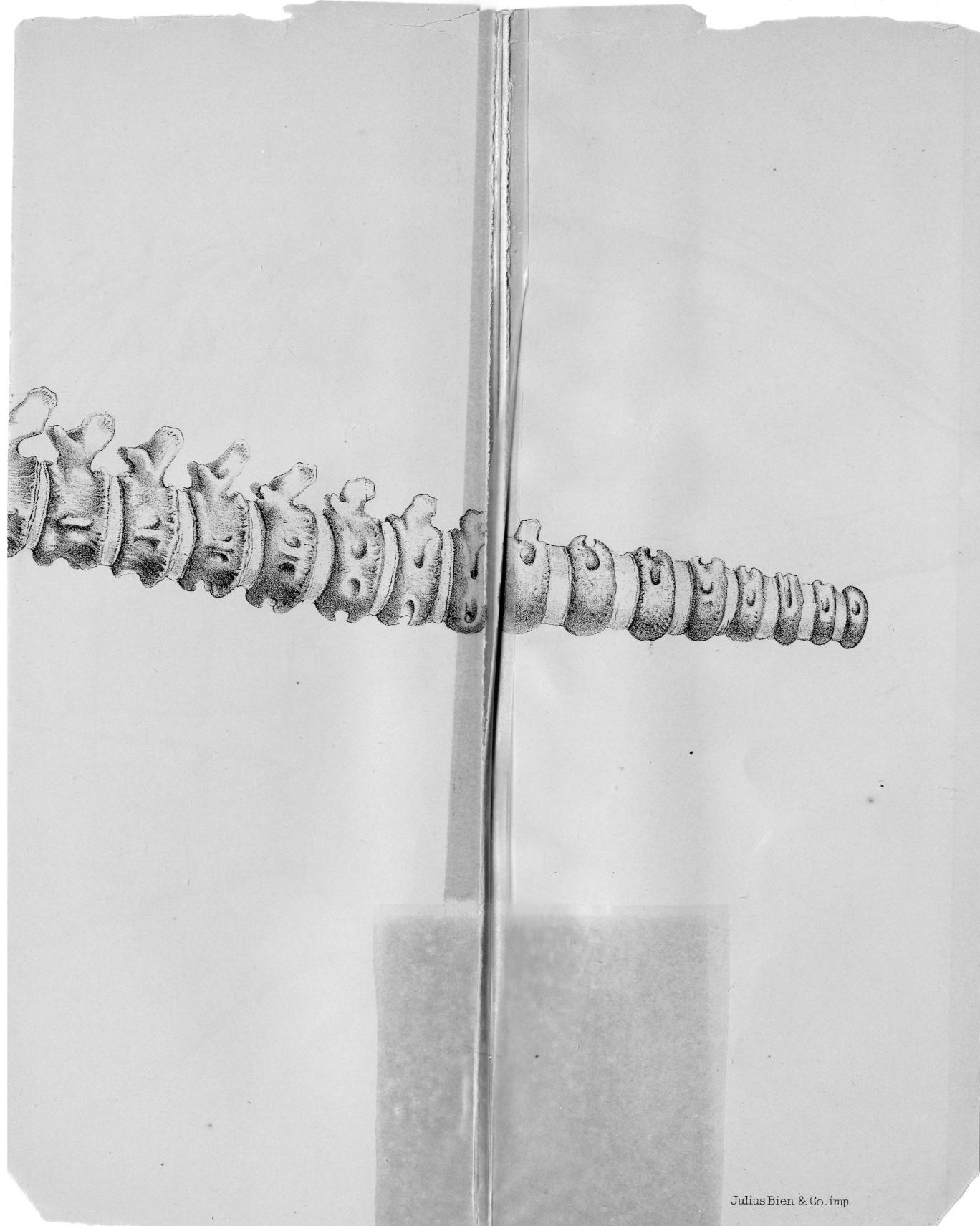
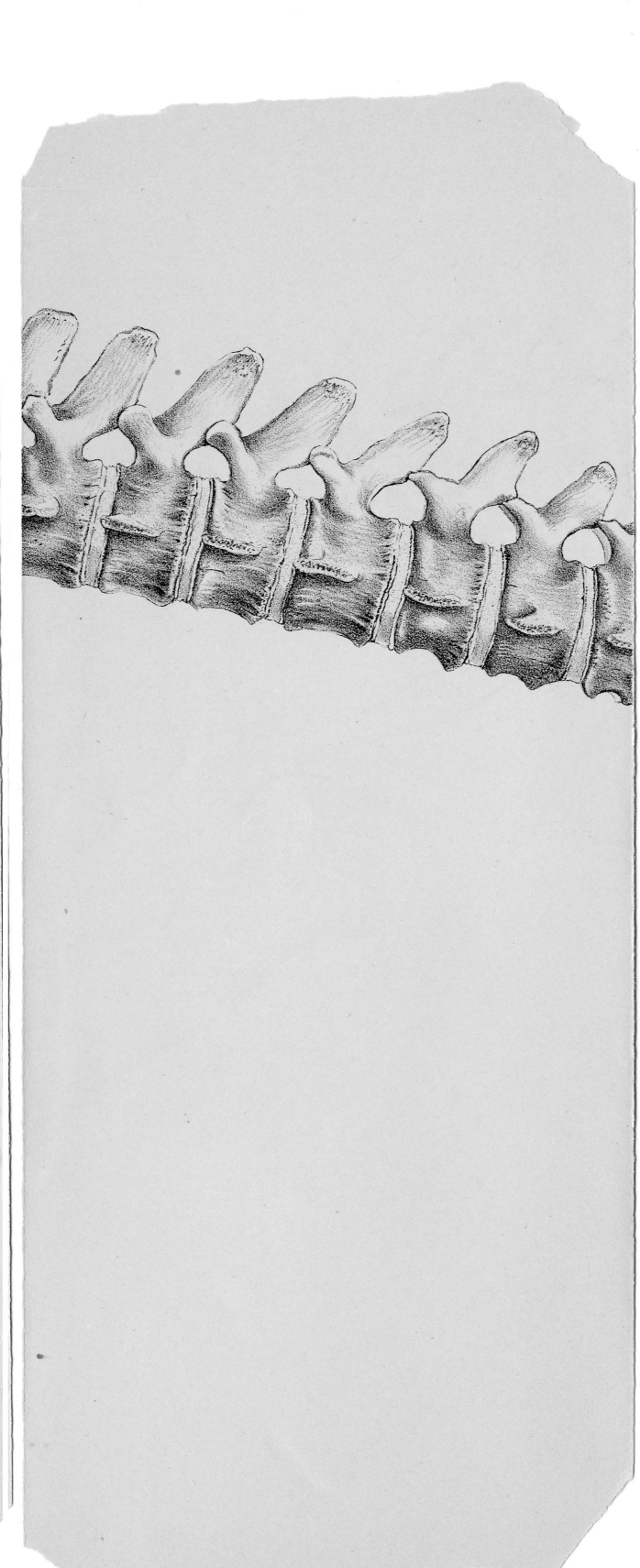
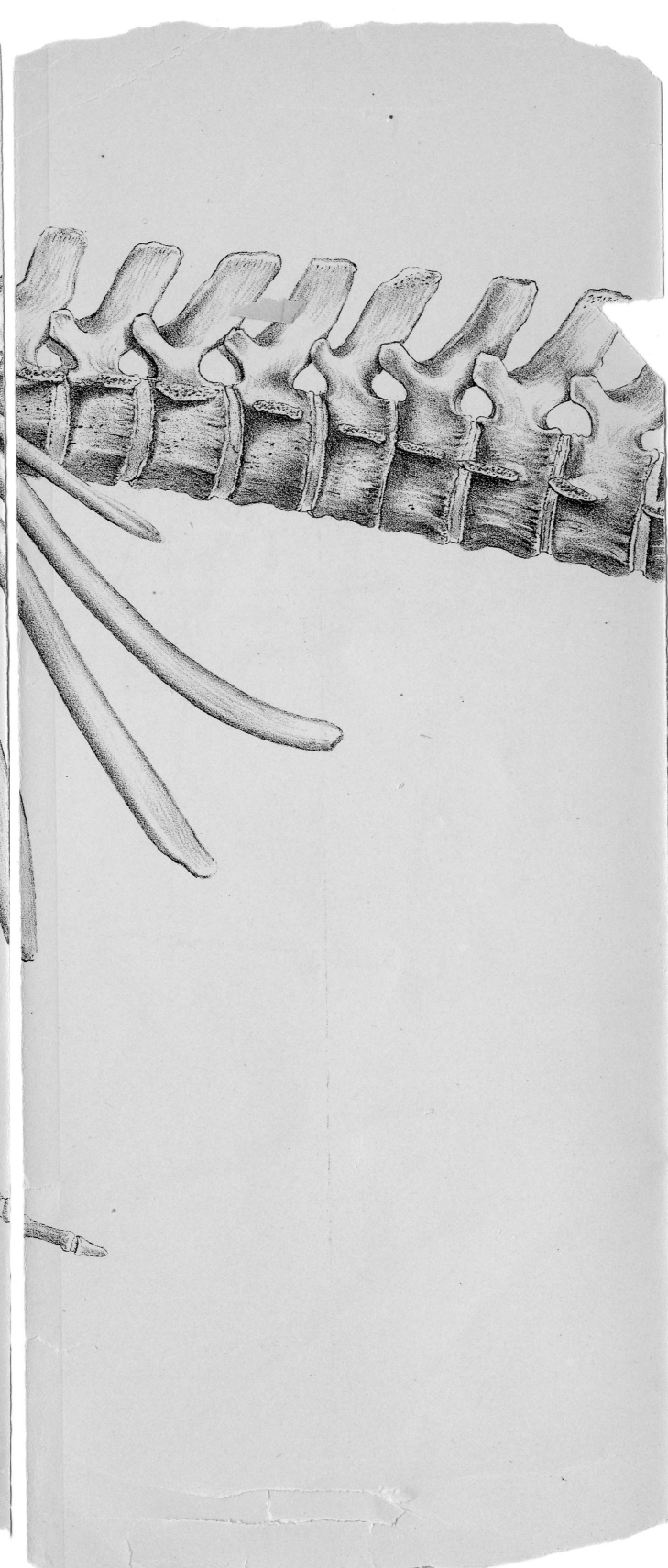
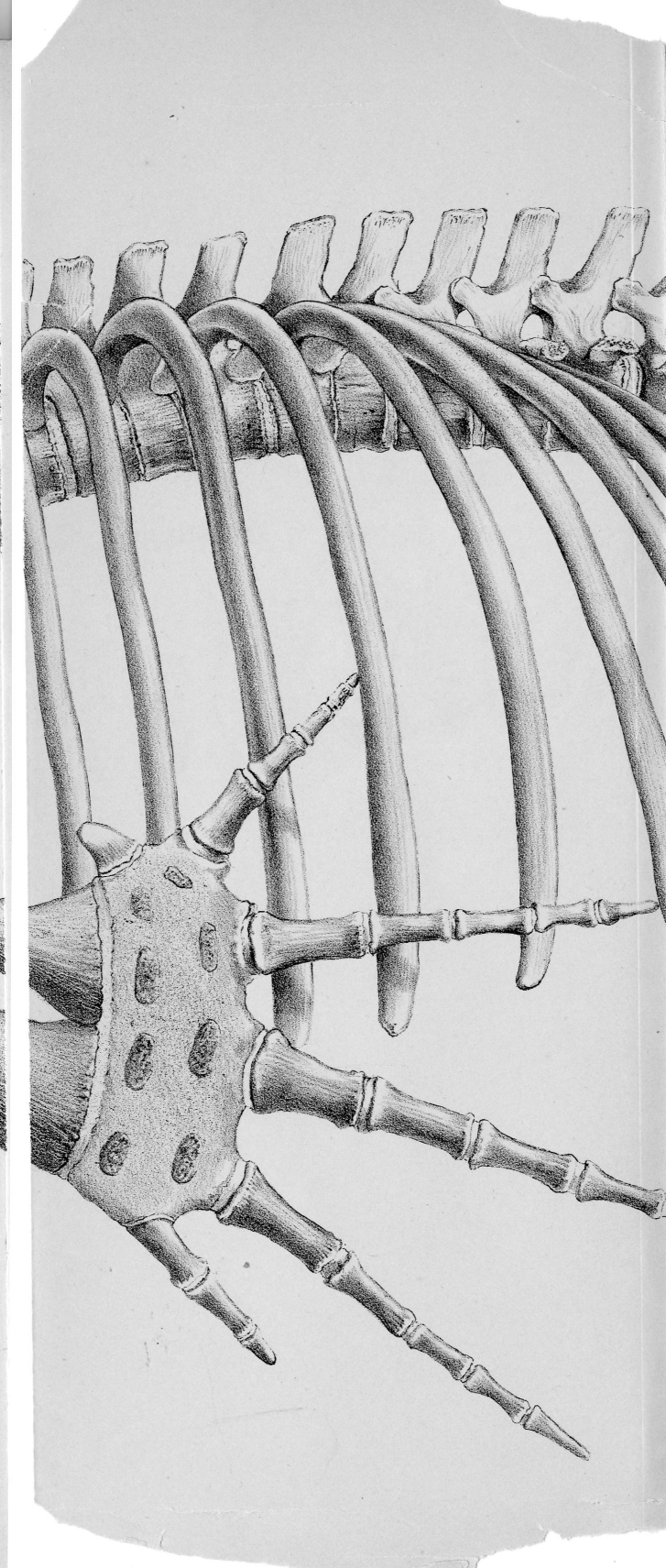
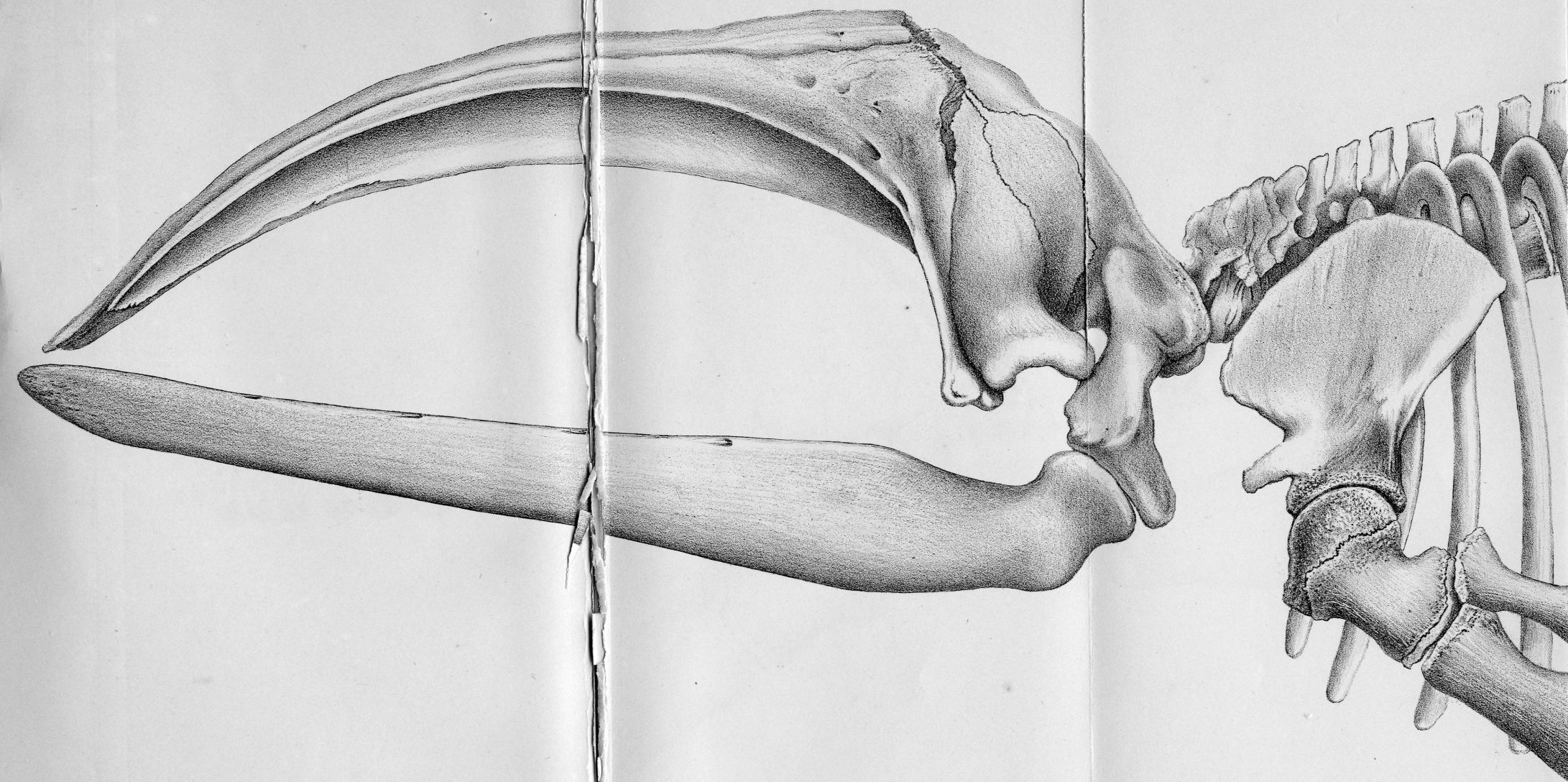
Fig. 8. View of the nasal bones, from above, of the same.

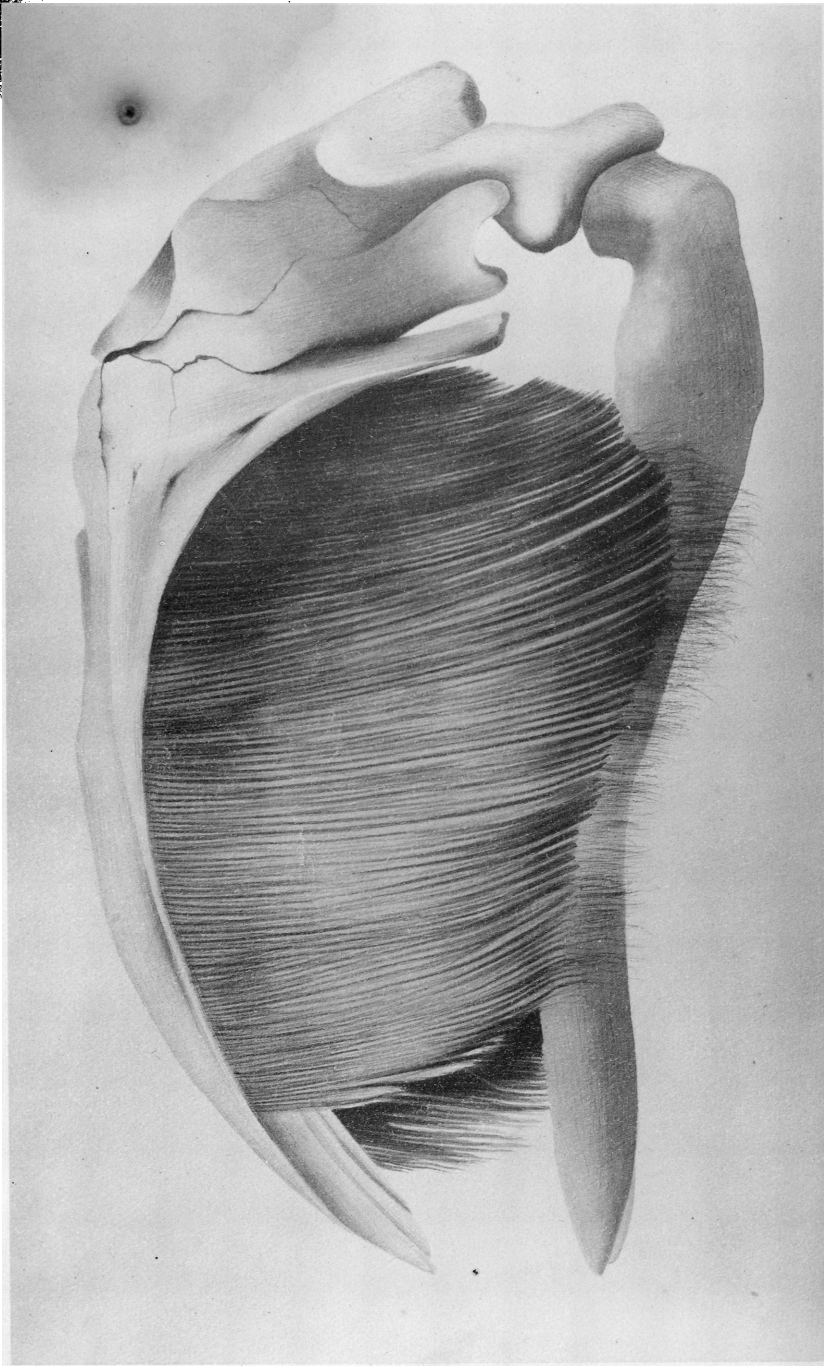
PLATE XII.—SKELETON OF THE "NEW YORK WHALE" (*Balæna cisarctica*, Cope).

PLATE XIII.—CRANIUM OF *Balæna cisarctica*, Cope, from a drawing of the "Charleston Whale," by Dr. Manigault.









ARTOTYPE,

E. BIERSTADT, N. Y.

Fig. I. *Balaena Ciszarctica*, Cope.