

Observations upon a fin-whale (*Physalus antiquorum*, Gray) recently stranded in Pevensey Bay / by William Henry Flower.

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(From the PROCEEDINGS of
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WILLIAM HENRY J
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[From the PROCEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON,
November 28, 1865.]

OBSERVATIONS UPON A FIN-WHALE (*PHYSALUS ANTIQUO-*
RUM, GRAY) RECENTLY STRANDED IN PEVENSEY BAY. BY
WILLIAM HENRY FLOWER, F.R.S., ETC., CONSERVATOR OF
THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS.

On the evening of Monday, November 13th, 1865, during a strong south-easterly gale, the body of a large Whale was thrown upon the beach in Pevensy Bay, Sussex, about 10 miles to the west of Hastings. It was claimed by the Hon. Board of Admiralty, and sold by public auction on the 15th, for the sum of £38, to a company of fishermen residing at Hastings and Eastbourne. I visited the spot, for the purpose of examining the animal, on the 16th, and also on the 20th and 21st, when the body was cut up by its owners for the sake of the oil which might be obtained from it, and with a view of preserving the skeleton. The difficulties attending upon the investigation of the external form and internal structure of one of these colossal creatures in the circumstances under which this one presented itself have been graphically described by Eschricht*, and must be my excuse for the imperfection of the following notes.

When thrown ashore, the carcase was already in an advanced

* Untersuchungen über die nordischen Wallthiere, p. 3.

state of decomposition; the cuticle was almost entirely lost from the surface, so that evidence of the original colour could only be obtained from isolated patches remaining here and there attached to the true skin, which was of a uniform dirty white hue. The surface was moreover in most parts covered with circular or oval pits, about an inch across and a quarter of an inch deep, in many of which fine parallel striations showed indications of teeth, apparently of Dog-fish. Friction against the shingly beach had in some places added to the destruction of the surface caused by natural decay and the attacks of the voracious little sharks. Thus the dorsal fin and the extremities of the flukes of the tail were greatly injured, the former reduced almost to shreds.

When I first saw the animal, it was lying much in the position in which it came aground, a little way below high-water mark. The ventral surface was uppermost, and more of the left side than the right exposed. The thoracic and abdominal regions were much distended with gas, well displaying the capabilities for extension permitted in the skin by the characteristic longitudinal furrows, most of which were opened to their widest extent. These furrows at once pronounced the animal to be a Rorqual, and the small pectoral limb showed that it belonged to the subfamily *Balænopterinae*. A little further examination convinced me that it was an adult male of the common species of large Fin-Whale (*Physalus antiquorum*, Gray; *Pterobalæna communis*, Eschr.). Its general appearance agreed very closely, as far as one could judge in the unfavourable position in which it lay, with the figure given by Schlegel of a young individual (40 feet long) of this species, stranded, in 1841, at Katwijk aan Zee*. It was, I should say, rather less slender in proportion to its length; but this was a point difficult to judge of in its unnaturally inflated condition. The lower jaw projected in a most marked manner beyond the upper, fully 18 inches.

The principal measurements (in taking which I was assisted by my friend Mr. J. W. Clark, of Cambridge) were as follows:—Extreme length, from tip of lower jaw, in a straight line to the end of tail, 67 feet; from the point of the upper jaw to the anterior angle of insertion of the pectoral limb, 21 feet; between the latter point and the posterior canthus of the eye, 6 feet 2 inches. Length of the opening between the eyelids 4 inches. Length of pectoral limb, measured from anterior angle of insertion, 6 feet 9 inches; from head of humerus, after it had been cut off, 7 feet 6 inches. Extreme width of caudal fin about 13 feet, allowing for the abraded points. Length of the tail (or of the base of each fluke) 3 feet 4 inches. Depth of the cleft at the end of the tail, between the flukes, 3 inches. Height of the greatly compressed bicarinated caudal extremity of the body, 4 feet from the commencement of the lateral expansion of the tail, 4 feet 6 inches; hinder end of dorsal fin to the end of the tail, 15 feet; from end of tail to middle of anal aperture, 17 feet 9 inches; from the latter to the hinder end of genital cleft, 2 feet 7 inches. Length of the cleft 2 feet 8 inches; from anterior end

* Abhandlungen aus dem Gebiete der Zoologie, &c., 2tes Heft. 1843.

of the same to middle of umbilicus 4 feet 5 inches—the latter being thus 27 feet 5 inches distant from the end of the tail.

One of the most striking points in external conformation in which this Whale differs not only from all known toothed Whales, but from *Balæna*, *Megaptera*, and even most of the *Balænopterinae*, at least if the published figures of these animals are correct, is the great vertical depth of the much compressed caudal portion of the trunk, which changes little from the dorsal fin to the commencement of the lateral expansion, where the upper and lower sharp margins suddenly begin to converge, running as a strong keel for half the length of the flukes. The long, narrow, and pointed flukes have the hinder margin nearly straight. They presented in a very marked manner a peculiarity noticed by Dr. Murie in his account of a Fin-Whale captured at Gravesend*, viz. that they do not set out, at least the anterior part of them, in the same plane from the middle line of the tail, but the right one sweeps at first upwards, and is therefore convex above, the left one sweeping as much downwards, and being therefore concave. This affects chiefly the anterior and inner third of each fluke; the posterior edges and outer ends appeared to lie in an even plane.

The furrowed region of the under surface commenced at about the middle of the lower jaw, and extended exactly as far back as the umbilicus, and on each side to the axillæ. The furrows were not symmetrical on the two sides of the body; they frequently divided at very acute angles, and united sometimes to the same, and sometimes to adjoining furrows; their general depth was $\frac{1}{2}$ inch, and the intervals between them from 2 to 3 inches. The penis was extruded, and about 6 feet in length, cylindrical at the base, and regularly tapering towards the extremity. Its orifice did not resemble that described and figured by Dr. Murie†, but was single and terminal, with a deeply lobed margin. Immediately behind the root of the penis were two longitudinal grooves, about 10 inches long, $1\frac{1}{2}$ inch deep, and 3 inches apart, slightly converging posteriorly. Each of these lodged a much compressed nipple, which reached in height to a level with the edge of the groove, and measured $1\frac{1}{4}$ inch from before backwards, and rather less than $\frac{1}{2}$ inch from side to side. They were of a pink colour, and had a soft, finely nodulated surface. These organs thus differed totally in situation from the rudimentary nipples of the male Porpoise, which are lodged in a single deep cavity behind the penis, having a minute aperture on the surface in the median line of what may be called the perinæum. The male mammary organs of the Cetacea were first described by Pallas in the *Beluga*, but appear to have remained unnoticed by any other author, until Eschricht verified their presence and fully described them in many different species‡.

The chin terminated in front by a slightly elevated vertical ridge; on each side of this were scattered somewhat irregularly, and extending over a space of 9 inches in length and $2\frac{1}{2}$ inches in breadth, twenty-five distinct deep circular pits, mostly surrounded by a dark-coloured

* Proc. Zool. Soc. 1865, p. 210.

† Ibid. p. 214.

‡ L. c. p. 83.

ring. These were evidently hair-follicles, from which the hairs had fallen out in consequence of the decomposition of the body; fortunately one hair still remained *in situ*; it was white, straight and stiff, about $\frac{1}{2}$ inch long. It was so loosely attached that by the time I had brought home the piece of skin (now a preparation in the Museum of the Royal College of Surgeons) it was no longer to be seen. Whether any similar follicles existed on the outside of the upper lip I cannot say, as it was nearly buried in the shingle*; the same reason prevented me getting a view of the blowholes. The part of the skin in which the external auditory meatus should have been situated on the side turned uppermost was, unfortunately, completely destroyed by one or more of the before-mentioned causes.

As to the colour, the remaining patches of cuticle on the upper surface of the body and the outer side of the pectoral fin were of a blue black; those on the whole under surface, from the chin to the tail, including the under surface of the fin, were white. A considerable portion of the large under lip was black. The cuticle remained attached to the bottom and sides of the furrows on the throat and abdomen, and, being in the greater part black, gave a very conspicuous appearance to the furrows when opened out, contrasting strongly with the white raised intervals. For a space of about 3 feet on each side of the middle line, on the throat, chest, and anterior half of the abdomen, the bottom and sides of the furrows were pink; on both sides of this and all across the posterior part of the furrows they were black. The demarcation between the two colours was very distinct; but where the pink epidermis approached the black, it was spotted or mottled with the latter colour.

A part to which the attention is sure to be soon directed in examining a Whalebone-Whale is the roof of the mouth; but the structure and mode of growth of the baleen have been so fully described by Hunter, Ravin, Rosenthal, and, finally, Eschricht and Reinhardt, that few further observations are necessary. The central portion of the palate, covered by a pale-coloured mucous membrane, formed a high angular ridge, like the roof of a house, posteriorly; but this gradually subsided anteriorly, until it became quite flat and very narrow (not more than 6 inches across). It expanded again in front to a width of 8 inches, and terminated by an almost abruptly truncated end. Around this the two sets of baleen met each other in the middle line, separating the palate by an interval of $1\frac{1}{2}$ inch from the front of the hard and tense upper lip†. The distance from the front edge of the conjoined sets of baleen to the tip of the snout was 5 inches. The space was mostly covered by a rayed indentation, looking very like an old cicatrix; but as it was situated exactly in the middle line and tolerably symmetrical, it was probably natural.

The chief baleen blades were 23 inches long on their outer, some-

* In Schlegel's figure above referred to, hairs are represented on the ends of both upper and under jaws.

† The two sets of baleen appear to meet in the middle line in front in all the Rorquals; but in the Greenland Right Whale (*Balaena mysticetus*) they are, according to Eschricht and Reinhardt, separated by a considerable interval.

what concave edge, including their hair-like termination, and 12 inches broad at the base; the whole set was 14 inches broad, the inner 2 inches being made up of four or five subsidiary blades, with straight, parallel sides. These are not mere detachments split off as it were from the inner side of the chief blade; for they are not even placed in a line with it or each other, but often in a line with the intervals between the main blades. The main blades, where they were largest, were set rather less than $\frac{1}{2}$ inch apart; for in a space of 6 inches I counted fourteen blades. Anteriorly they decreased in size, and, in the part encircling the palate in front, consisted of little, isolated, irregularly scattered, very narrow blades, having an oval section, with the long axis in the direction of that of the head; their length at this part I could not ascertain, as they had all been cut off short. Posteriorly they also diminished, and the whole broad area from which the whalebone grew became covered with closely packed small blades, each ending in a flattened tuft of hair and gradually becoming narrower, until at the hindermost part they were resolved into a mat of fine hairs. The horny baleen was readily pulled off from its vascular matrix, a portion of which, removed from behind the middle of the right side of the palate, was obtained for the College Museum. The dense vascular layer (containing much oil) immediately investing the bone is about 1 inch thick; from this spring a series of transverse laminæ, exactly corresponding to the whalebone blades, both the large as well as the subsidiary plates. These laminæ, in the case of the largest plates, were $1\frac{1}{2}$ inch in depth. They end in a fine fringe of hair-like bodies, about 4 inches long and gradually tapering to a point, which penetrate into the interior of the horny blade, and which serve for secreting the pulp of the whalebone hairs. The toughness and power of resistance to decomposition of these vascular secreting organs was very surprising.

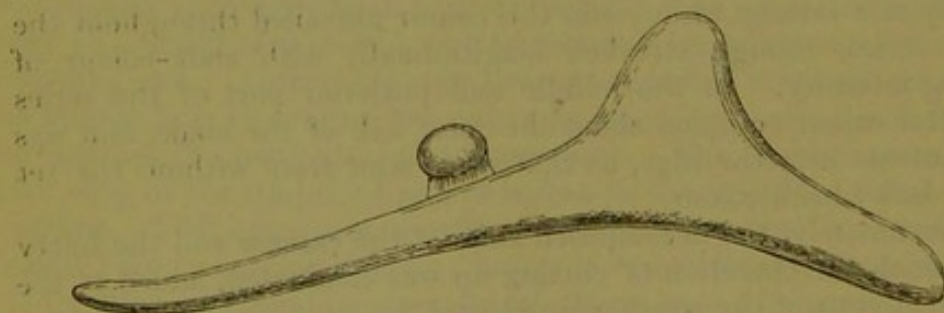
The colour of the baleen was certainly different from what it is usually said to be in the common Fin-Whale. The hairy terminal parts, as seen when looking into the mouth, were, from end to end of the series, of a uniform dirty yellowish white, resembling, in fact, the baleen of *Balænoptera rostrata*. The anterior smaller blades were entirely of a creamy white; and this colour prevailed throughout the whole series, though streaked longitudinally with slate-colour of varying intensity. In the middle and posterior part of the series the latter colour occupied about the outer half of the blade, and was most intense near the edge, so that when seen from without the set had a dark bluish colour.

Unfortunately, the decomposed state of the carcase and the hurry with which the operation of cutting up was conducted, added to the inclement state of the weather, prevented me from making any satisfactory observations upon the visceral anatomy. My principal attention was therefore directed to preserving the skeleton in a perfect condition, and observing, as far as opportunity permitted, the natural connexions of the bones. To save the rudimentary pelvic bones from the destruction to which they are almost invariably consigned, was of course my first care; but here I was nearly too late: these bones,

with the surrounding parts, had, before I arrived on the spot on Monday morning, been already severed from their connexion with the spinal column, and had to be sought for among a mass of most uninviting-looking carrion thrown upon the beach. Dr. Murie kindly assisted at this part of the examination; and we were not long in discovering their situation and in determining one of the most important points in the anatomy of this animal that has hitherto remained unsolved.

Many years ago Reinhardt discovered that, besides the ordinary elongated bone found on each side of the pelvis in all Cetacea, and to which the corpus cavernosum of the penis is attached, there is also, in the Greenland Whale (*Balæna mysticetus*), a second, smaller, more rounded bone, attached by ligamentous fibres to the outer side of the former. More recently it has been proved (Eschr. & Reinhardt 'On the Greenland Whale') that, at least in some, if not all specimens of the same animal, a third, still smaller bone is present, attached to the distal end of the second. In the *Megaptera* there is a second bone on each side, though smaller and less definitely shaped than in *Balæna*; but hitherto no trace of this bone has ever been found in any of the true Fin-Whales, although in one species at least (*Balænoptera rostrata*) it was carefully searched for by Eschricht. This distinguished cetologist was at first inclined to regard these accessory bones, especially as then only the one pair were known, as having their nearest analogy in the marsupial bones of the Marsupialia; but in his more recent work, written in conjunction with Reinhardt, they are regarded (and, I think, with much reason) as the homologues of the posterior extremities of the ordinary Mammalia—the first accessory bone representing the femur, and the second (found only in the *Balæna mysticetus*) the tibia.

On searching in the neighbourhood of the larger bone, I found, not indeed another bone, but a distinct nodule of cartilage, of a slightly compressed irregularly oval form, $1\frac{1}{4}$ inch long and $\frac{3}{4}$ inch across, enveloped in a fibrous capsule, and attached by fibrous tissue, at the distance of about $\frac{1}{2}$ inch, to the outer side of the main bone,



rather in front of the middle. Both of the larger bones had this cartilaginous appendage, which I can scarcely doubt is the rudimentary representative of the hind leg of this colossal mammal.

The two bones forming the pelvis resembled each other very closely both in size and form, and were precisely similar in general

characters to the corresponding bones in the skeleton of the common Fin-Whale, now in the Alexandra Park; only they were $2\frac{1}{2}$ inches shorter: their length was 16 inches. Rather behind their middle is a short strong angular projection; the posterior or shorter ramus is subcylindrical and truncated; the anterior or longer ramus is thin and flattened.

The other bones, as far as I could see them, confirmed the diagnosis of the species made from the external characters. There were 15 pairs of ribs, the last rib well-developed and attached to the transverse process of the corresponding vertebra; the first had no capitular process, but resembled that at the Rosherville Gardens, figured by Dr. Murie in these 'Proceedings' (1865, p. 224).

The lumbar vertebræ were fourteen in number. The tail is not yet sufficiently cleaned to count its bones. The sternum was more regularly cross-like than in any other *Physalus* I have seen, but still maintained its usual character of being broader than long, the dimensions being 23 and 22 inches respectively. The ends of the first ribs were articulated to its hinder ramus—their anterior borders being in close contact, and connected by strong fibrous tissue with the posterior margins of the projecting lateral arms of the sternum.

Although the animal appeared to be adult, a large portion of the posterior end of the upper border of the scapula, as much as a foot in depth, consisted only of cartilage.

One other observation may be worth recording, which is, that in taking off the skin from the bones of the forearm, on the inner surface, in the interval between the radius and ulna, were seen some well-developed muscles (the red fibres of which reached nearly to the lower end of these bones) ending in strong tendons, passing to, and radiating out on, the palmar surface of the hand. Circumstances prevented me from following out the details of their arrangement and distribution; but as in the Porpoise and those few other Cetaceans of which the limbs have been dissected no muscles are found below the elbow, and as they can, apparently, have little or no function, their presence is of considerable interest, and this notice may direct attention to their fuller investigation on some future occasion.

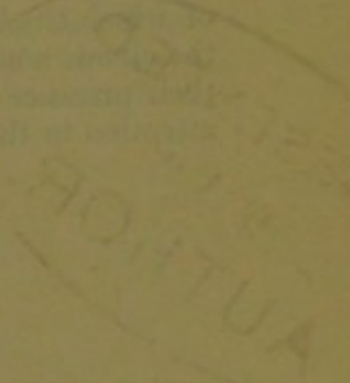
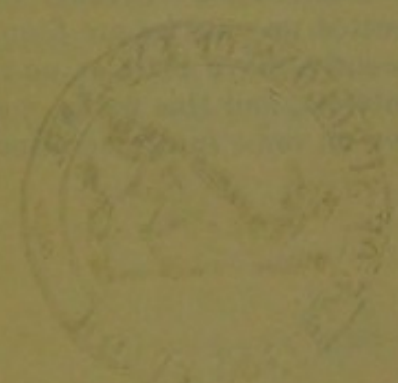
2-1-1873

My dear Sir,
I have the honor to acknowledge the receipt of your letter of the 28th inst.

Yours faithfully,
J. B. [Signature]

I am sorry to hear that you are not well, and hope that you will soon be able to resume your usual avocations. I have no objection to your taking a short holiday, and am sure that your friends will be glad to hear of it. I am, Sir, very respectfully,
Yours obedient servant,
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