

**MEMOIR ON THE ANATOMY
OF THE HUMPBACK
WHALE, MEGAPTERA
LONGIMANA, PP. 1-185**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649048106

Memoir on the Anatomy of the Humpback Whale, Megaptera Longimana, pp. 1-185 by John Struthers

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

JOHN STRUTHERS

**MEMOIR ON THE ANATOMY
OF THE HUMPBACK
WHALE, MEGAPTERA
LONGIMANA, PP. 1-185**

ON SOME POINTS IN THE ANATOMY OF A
MEGAPTERA LONGIMANA. By JOHN STRUTHERS,
M.D., *Professor of Anatomy in the University of Aber-*
deen. (PLATES I. and II.)

PART I.

HISTORY AND EXTERNAL CHARACTERS.

Parts Noticed and Order.

	Page		Page
1. History,	1	11. Hairs,	11
2. Dissection of the Carcase, .	3	12. Adaptations of the	
3. Table of Measurements, .	4	Jaws,	12
4. Size,	4	13. Cut-water,	12
5. Pectoral Fin,	5	14. The Whalebone,	13
6. Dorsal Fin,	6	15. Blowholes,	14
7. Tail-Fin,	7	16. Eye, and Ear-hole,	14
8. Surface of the Abdomen,		17. Colour,	14
Prepuce, Mammillary		Variations in the	
Pouch,	8	Colour,	15
9. The Plaitings of the Skin, .	10	18. Skin and Blubber,	16
10. Dermal Tubercles on the		19. Parasites,	16
Head,	11	20. Explanation of the Plates, .	17

1. HISTORY.—This Megaptera, a male, 40 feet in length, had shown itself in the Firth of Tay, off Dundee, for five or six weeks before the end of December 1883, when it was at last fatally wounded. After about a fortnight it disappeared for eight or ten days, then reappeared in the Tay, and during the three weeks before its death disported itself freely in sight of the inhabitants of Dundee, up and down the river, going up as far as the docks. The attraction to the Tay was believed to be the young herring with which the firth abounded at the time.

From the newspaper accounts of the appearance and movements of this whale in the firth, I had inferred that, although very rare on British coasts, it must be a *Megaptera longimana*. As described to me by witnesses who watched its movements, it rose out of the water seemingly for two-thirds of its length, almost perpendicularly, flapped its enormous paddles, and then fell to one side, causing great commotion in the smooth water.

This movement it was seen on one occasion to repeat three times. The movement was described as resembling the leap of a salmon, but slower. The intervals between the blowings were generally about two minutes, never more than five minutes. A stream like a spray fountain went up for, it seemed, 15 to 20 feet, at first straight up and then broke. The blow-hole part was not visible above water. When it rose ordinarily the back was seen first, then the dorsal fin; in disappearing, the dorsal fin was the last seen; neither the tail nor the paddles were shown.

When at last successfully harpooned it showed great strength and endurance for twenty-one hours, when the line parted, but it had been mortally wounded.¹ This was on New Year's morning, 1884. A week afterwards the carcass was observed by fishermen off Bervie, on the coast of Kincardineshire, floating so high as to be visible 6 miles off. It was towed into Stonehaven harbour on January 8, and beached there.

My first observations and measurements were made as it lay on its back at Stonehaven, and photographs were taken, from one of which fig. 1 is taken. On the day after it was beached, the carcass, the property of the fishermen who found it, was exposed by public sale and purchased for a large price by Mr John Woods, oil merchant, Dundee, with a view to exhibition.

¹ Some particulars of the endurance may be interesting. After the first harpoon, which was thrown and went in at the shoulder, it swam quietly, rising at intervals of two minutes to blow, but the vapour was reddish. After a second harpoon, which was fired, took effect, it made vigorous efforts, threw the tail in the air, lashed the water furiously and darted about in different directions. Volumes of blood were now thrown up, colouring the surrounding water. It had at first to drag two six-oared rowing boats and a steam launch, and, four or five hours afterwards, a steam tug was added. With this heavy drag it swam wildly about, on one occasion rising under one of the boats and lifting one end of it out of the water. Hand-lances were driven 3 feet deep into it, and blood spouted from the wounds. Two of the harpoon lines parted, but the steam tug and the two rowing boats were dragged out to sea by the remaining line, north to near Montrose, south to near the mouth of the Firth of Forth, then north again. At daylight a 4-foot-long iron was fired into it, also a couple of marling-spikes, and a number of iron bolts and nuts. About twenty-one hours after being harpooned it showed signs of exhaustion, turning from side to side and lying level on the water, but shortly revived and again held on; in half an hour the line parted, some way south of the Bell Rock, and the whale was free. The cruelty, which one cannot but recognise, of this long chase was largely owing to deficiency in modern appliances of attack.

The carcase was removed the same night to Dundee, tugged by a rope attached to the tail.¹

2. DISSECTION OF THE CARCASE.—After it had lain a fortnight for exhibition, I was allowed to make a dissection of the carcase, in which I was assisted by Mr Robert Gibb and Mr George Sim, of Aberdeen, and by several Dundee whale-fishers.² The carcase having been turned on the back, my first care was to remove a large portion of the abdominal wall, in its whole thickness, from the umbilicus to behind the anus, and of sufficient breadth to include the pelvic bones and rudimentary hind limbs. This half-putrid mass was pickled and sent on to Aberdeen to be dissected at leisure. On looking for the viscera they were found to be so decomposed as to be mostly unrecognisable, reduced along with the muscles to a pulp into which the whale-fishers went knee-deep. We tried to preserve the heart, but our hands went through it. Our attention was therefore directed to securing the bones, some of which came out already detached from the soft parts. The vertebræ, except those of the narrow part next the tail-fin, the sternum, ribs, and hyoid, were removed, and sent on to my macerating troughs at Aberdeen.³

On August 7, fully seven months after the death of the whale, I went to Dundee to complete the removal of the bones,

¹ When lifted out of the water in Dundee harbour with the steam crane, by a chain round the tail, high in the air, the tongue and some other soft parts, and the cervical vertebræ, fell out by the mouth into the water. The vertebræ were recovered. It was then placed on the belly on railway lorries, and dragged by eighteen powerful horses along the docks, and, after various mishaps, reached Mr Woods' yard, where it was placed for exhibition.

² I may here remark, in apology for delays and shortcomings in my observations of the external characters and internal structure of this Megaptera, that everything had to be subordinated to its exhibition at Dundee and then at other towns. The dissection was not only late (January 25 and 26), but was attended by difficulties and by unusual accompaniments. When we arrived to perform it, we found that the astute proprietor had announced a special admission, adding the attraction of a band of music, and I may add we had a snow-storm which drove us off from time to time.

³ The remains were then prepared for exhibition by the proprietor, Mr Woods. The putrid soft parts having been scooped out, and the remaining soft parts prepared with antiseptics, a wooden backbone was introduced, wooden bars supplied the place of ribs, and the body was stuffed and stitched below into proper form. The embalmed whale, thus wonderfully restored in form and much lightened, was exhibited during the next few months in various towns, first in Aberdeen, then in Glasgow, Liverpool, and Manchester, again in Glasgow, in Edinburgh, and finally again in Dundee.

in which I was assisted by Mr Robert Gibb, Aberdeen, and Dr Greig, junior, Dundee. The blubber in being cut in pieces was seen to average about 3 inches in thickness and was in a fair state of preservation. The skull and remaining bones were sent on to Aberdeen, the paddles entire, so that I could dissect them carefully. The skeleton was presented by Mr Woods to the Dundee Museum, where it will be finally placed.

3. MEASUREMENTS—

	ft.	in.
Length, from point of lower jaw to cleft of tail, straight,	40	0
Pectoral fin, length along lower border,	12	0
" greatest breadth,	2	8½
Dorsal fin, height of fin proper,	0	7
" height of entire elevation,	0	11
" distance from cleft of tail,	12	4
Tail fin, width between the tips,	10	6
" extreme width, straight,	11	4
" greatest antero-posterior breadth,	3	0
Mammillary pouch, in front of anus,	2	0
Projection of lower jaw beyond upper,	1	1
Point of lower jaw to angle of mouth, straight,	9	4
Same to below angle of mouth, along the curve,	10	4
Point of lower jaw to pectoral fin,	14	1
Eye to eye, centre of, over the top,	7	10
Distance of latter line behind blow-holes,	1	2
Ear-hole behind posterior canthus of eyelids,	1	5
Whalebone, largest plates, length,	1	8
" largest plates, greatest breadth,	0	5

4. SIZE.—The 40 feet straight measurement, to the mesial cleft of the tail, was increased only 1 foot by following the curves on the side, only half a foot when taken over the belly. To the most posterior part of the tail-fin gave 9 inches more than to the median cleft.¹

¹ The common statement that Megaptera when mature may reach a length of nearly 60 feet, appears to rest on the authority of Captain Holböll. Fabricius had put it at 50 to 54 feet, but even that would appear to be an unusual size. Mr A. H. Cocks (*The Zoologist*, 1884, 1885, 1886, and 1887) gives much interesting information in regard to finners, obtained during his visits to the

5. PECTORAL FIN.—The great length of the pectoral fin, or paddle, is the most striking character of Megaptera among all the whalebone whales. The following table shows the length of the paddle in proportion to the length of the entire carcase in those I have had the opportunity of measuring:—

	Length of Whale.		Length of Pectoral Fin.	
	ft.	in.	ft.	in.
Balenoptera musculus, Wick, 1869,	65	6	8	8
Balenoptera musculus, Peterhead, 1871,	64	0	7	8
Balenoptera musculus, Stornoway, 1871,	60	6	7	1½ ¹
Balenoptera musculus, Nairn, 1884,	50	0	5	11
Balenoptera borealis, Orkney, 1884,	35	0	4	7
Balenoptera rostrata, Aberdeen, 1870,	14	6	2	2
Balenoptera rostrata, Bervie, 1877,	16	0	2	3
Balena mysticetus, Davis Straits, 1873,	48	0	8	6
Balena mysticetus, Davis Straits, 1874,	35	0	5	6
Megaptera longimana, Dundee, 1884,	40	0	12	0

These measurements are from the head of the humerus to the tip of the paddle. That is little less than the measurement along the inferior (radial) border when the fin is still attached to the body. The measurement along the ulnar border is con-

Fin-Whale Fisheries, where large numbers of the various finners are killed. The common statements in regard to the lengths attained among the other finners are borne out, but not so in regard to Megaptera. Plenty of instances are mentioned of the Blue Whale (*B. Sibaltdii*) reaching from 70 to 80 feet, or more, giving averages of 75 and 79 English feet; of the Razorback (*B. musculus*) from 60 to 70 feet, with averages of over 64 feet; and of the Black Whale (Rudolphi's rorqual, *B. borealis*) from 40 to 45 feet, some nearly 50 feet. Of the Humpback (*Megaptera longimana*) the largest averages of length were Captain Horn's, being, on a take of 6 males, 41½ English feet (the longest 53 feet), and of 2 females, 46½ feet (the longest 48 feet). Mr Cocks remarks—"The average for all the males whose length is given above is under 35½ English feet, while that of the females is just over 40½ English feet. The number of Humpbacks taken that year (1886) is given at 94; of the Blue Whale, 152; of the Razorback, 646; of Rudolphi's rorqual, 62; total 954, by 39 whalers." Mr Cocks says of the fishery of 1885—"Captain Berg told me that he had this season captured the biggest Humpback he had hitherto seen. It was a female, and measured 50 Norwegian feet (52 feet English) in a straight line (measured as Dr Guldberg had directed)." While the state of some parts of the skeleton will sufficiently show that my Megaptera was not full-grown, it would appear, from the lengths given by Mr Cocks, that a 40-foot male Megaptera is not so far from being adult as the nearly 60 feet statement might have led us to infer.

¹ In this *B. musculus* the length of the paddle would have been a little more but for a mal-development near the point.

siderably less. In the 50-foot-long *B. musculus* the length was 4 feet 2 inches along the ulnar border, 6 feet along the radial border, and after removal the measurement from the head of the humerus was the 5 feet 11 inches given in the table. In this Megaptera the measurements were:—inferior border, 12 feet; superior border, 10 feet 3 inches; along the middle, straight, 11 feet 8 inches; from the head of the humerus, after removal of the fin, 12 feet. The measurement at the shorter border would give the pectoral fin of Megaptera a proportion of more than a fourth of the total length of the carcase; that along the inferior border as rather nearer a third than a fourth. In the other great finners the proportion may be put at about an eighth, taken on the lower border.

The paddle in Megaptera is also of greater breadth than in other finners, though not than in *Mysticetus*.¹ In the 64-foot-long *B. musculus*, the greatest breadth was 19 inches, in the 50-foot-long one, 16 inches. In this Megaptera it is 32½ inches. The breadth is, however, not greater in proportion to the length in Megaptera than in the full-grown *B. musculus*, but rather less.

Another external character of the paddle of Megaptera is the very undulating anterior border, showing two greater and seven lesser nodes (see fig. 1), the causes of which are made clear by the dissection. A few lesser undulations are seen on the ulnar border towards the tip.

6. DORSAL FIN.—The form is shown in fig. 2. There is what may be called the fin proper and the basement, a low elevation from which the fin proper rises abruptly behind and gradually in front. The basement is marked off only by a gradual elevation from the general contour of the back. It extends from about 2 feet behind the tip of the fin proper to about 4 feet in front of it. Height of fin proper 7 inches, of the entire elevation 11 inches. Thickness at the middle of the fin proper, 1¾ inches; at base of fin proper, 3 inches; of basement at its lower part, 12 inches; at 2 feet in front of fin proper, and at mid-height of basement there, 4 inches. In Rudolphi's

¹ Mr Robert Gray informs me that his father, Captain David Gray, this summer caught the largest Right Whale (*Balaena mysticetus*) he has ever taken, a female 57 feet long; length of the pectoral fin, measured along the middle of the out-stretched fin, on the inner surface, 8 feet 2½ inches, greatest breadth 5 feet 1 inch.

diagram¹ the dorsal fin is not very like this one, stands up more, and the point and both margins are different. In the small figure given by Eschricht (p. 152, fig. 48), the notch is much less marked than in this one. As seen in my figure, the anterior slope is a little concave on the basement, and becomes convex on the fin proper. No exact spot could be fixed on here for the commencement of the fin proper as distinguished from the basement, but the level of the notch behind determines that to the eye. The point is some way behind the top, with a fall of about 1 inch. The posterior border below the point is convex down to the bottom of the notch. This, with the gentle concavity of the posterior slope of the basement, renders the notch pretty sharp, more so than in the higher and more recurved fin of *B. musculus*.²

As to situation, the distance from the cleft of the tail to the notch of the dorsal fin was 12 feet 4 inches of the 40 feet. In my 64-foot-long *B. musculus* the distance was 15 feet 8 inches (height of fin 15 inches, length at base 24 to 26 inches). This would place the dorsal fin further forwards in Megaptera than in *B. musculus*.

7. TAIL-FIN.—The form of the tail-fin is shown in fig. 3. Its greatest antero-posterior breadth was 3 feet, only 3½ inches more than the breadth of the pectoral fin; its total width less than the length of the pectoral fin by 8 inches. The statement of the depth of the median cleft, commonly said to be deep, will depend on where the measurement is taken. From between the neighbouring convexities, about 7 inches out, the depth is 3½ inches; from between the first prominent serrations, about

¹ *Abhand. König. Acad. der Wissenschaften*, Berlin, 1829, Taf. v. fig. 1.

² I have noted these points particularly on account of the question of the origin of the name "Humpback" for this species. "Les mégaptères ont une bosse sur le dos à la place d'une nageoire"—"une véritable bosse dépendante de la peau," says the eminent cetologist P. J. van Beneden. There was nothing in the appearance of the back of this Megaptera to suggest to us the appropriateness of the name Humpback. That, however, will depend partly on the idea one associates with the word humpbacked. The name may have arisen rather from the rounded back Megaptera shows above water, as long ago suggested and figured by Eschricht (*Untersuchungen über die Nordischen Wallthiere*, p. 152, fig. 48):—"Der Name *Humpback* scheint übrigens nicht nur von der Rückenflosse, sondern eben so wohl von dieser Krümmung des Rückens beim Untertauchen." The term, though rather misleading as to the true form, is a convenient one to the whale-fishers.