55. Cervical Vertebræ of a Gigantic Blue Whale from Panama. By Sir Sidney F. Harmer, K.B.E., Sc.D., V.P.R.S., F.Z.S.

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(Text-figure 1.)

The bones under consideration (which were exhibited) were the second and third cervical vertebræ of a Blue Whale (*Balænoptera musculus* L.), and had been presented to the British Museum (Natural History) by Mr. F. A. Mitchell-Hedges, who had given the following account of their history:—The whale entered the harbour at Cristobal, the northern entrance to the Panama Canal, in January 1922. It passed up the canal towards the first locks at Gatun, and having become a menace to shipping, it was killed with machine-guns. It was towed by tugs to the Cristobal docks, where unsuccessful efforts to raise it from the water were made with powerful 75-ton cranes. It is said to have been carefully measured, at this stage, as having a length of 98 feet, and its weight was estimated at 100 tons. It was later towed out to sea, but it drifted ashore again, and after having been towed out once more, it was bombed from the air by United States army planes. Parts of the carcass subsequently came ashore at Santa Isabel, between Nombre de Dios and Cape San Blas, where the vertebræ were found by Mr. Mitchell-Hedges.

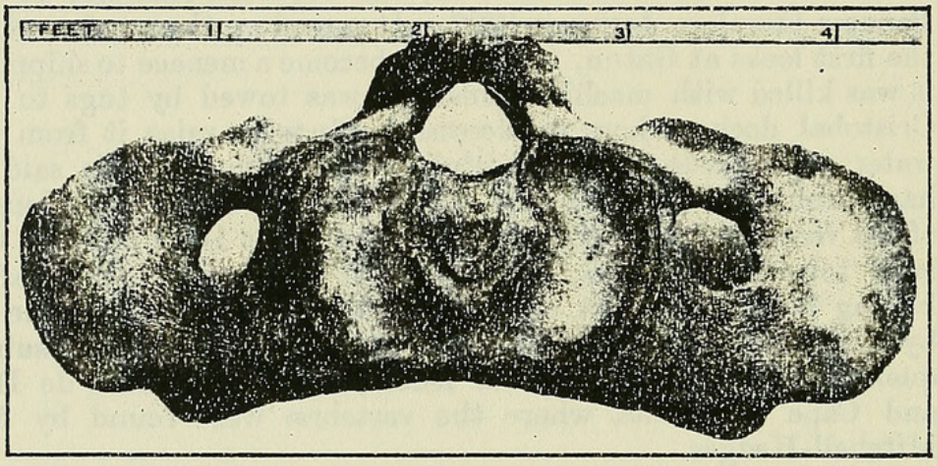
The specimen is of special interest from several points of view. The Blue Whale is commonly considered an ice-loving species, and it has been found in large numbers on the fringe of the Arctic and Antarctic ice. Although it is known to travel considerable distances from the poles, as shown by its frequent capture by whaling companies off the Finmark, Newfoundland, and South African coasts, records of its occurrence in or near the Tropics are rare. In his memoir, "The Whalebone Whales of New England" *, Mr. Glover M. Allen states that the Blue Whale is essentially a "cold-water" species, and that New Jersey "perhaps represents nearly the normal southward limit" on the Atlantic coast, though it may eventually be found to follow the inshore waters as far south as the Carolina coast. The specimen under consideration occurred in lat. 9° 30′ N., and the record is of importance as bearing on the possibility of a migration across the equator of Blue Whales from the Northern Hemisphere to the Southern, or *vice versâ*.

* Allen, G. M., Mem. Boston Soc. Nat. Hist. vol. viii. No. 2, p. 255 (1916).

In structure the vertebræ show an unusual peculiarity. Although *Balænoptera* is ordinarily distinguished from *Balæna* by the fact that all the cervical vertebræ are completely free, these two vertebræ are firmly ankylosed to one another by a union between their centra, principally on the right side, at the periphery, where there is some indication of a diseased condition of the bone.

The specimen is further of interest, from the information it gives as to the size which may be reached by the Blue Whale in Northern waters. Recent unpublished records of the Southern Whaling Companies establish the fact that the length of 100 feet may be exceeded in that part of the world, and the opinion has been expressed that the Southern race differs from the Northern by attaining a greater size. Thus Allen (*op. cit.* p. 249), relying on measurements of Northern Blue Whales made by

Text-figure 1.



Blue Whale (*Balænoptera musculus*). Anterior view of the ankylosed axis and third cervical vertebra; the neural arch of the latter just visible through the neural canal of the axis. Panama, F. A. Mitchell-Hedges Coll.

A scale nearly of 5 feet in length is seen resting on the somewhat injured neural spine of the axis.

True and at the Norwegian whaling stations, comes to the conclusion that 77 feet 2 inches "is probably nearly a true maximum," although he mentions a Norwegian record of 87 feet 6·5 inches. The question had previously been discussed at length by True *, who concluded (p. 156) that the maximum length of Newfoundland Blue Whales is less than that of Norwegian specimens, pointing to a difference in size of Blue Whales on opposite sides of the Atlantic. This opinion, which has been quoted in support of the view that the Eastern and Western schools are distinct in that ocean, is obviously affected by the present record.

* True, F. W., "Whalebone Whales of the Western North Atlantic," Smithson. Contr. Knowledge, vol. xxxiii. (1904).

The material available for comparison in the British Museum is unfortunately scanty, and the best is a skeleton of a Blue Whale which was stranded at Rosslare, Wexford Bay, on Mar. 25, 1891. According to the information given by W. Crouch* and G. E. H. Barrett-Hamilton †, this specimen was probably a female 82 feet long. The examination of its vertebral column shows that the epiphyses of the centra are free, or nearly free, along the whole length of the column. The process may perhaps have commenced in the caudal region. It should be noted, however, that True ‡ quotes an observation by Guldberg, who measured a male Blue Whale as 78 feet 9 inches long, and subsequently ascertained that all the epiphyses were ankylosed to the bodies of the vertebræ. Flower § has pointed out that ankylosis of the vertebral epiphyses in Cetacea commences in the cervical and caudal regions, extending from both ends towards the middle of the length of the column, where the process is finally completed. He distinguishes animals in which this process has commenced but is incomplete as being in the "adolescent" stage, which has thus hardly been reached by the Wexford whale. The Panama vertebræ, on the contrary, have their epiphyses completely united; and it may be inferred from their condition that the animal was fully adult, although it is obvious that they give no complete answer to the question whether all the vertebral epiphyses were thus united.

The axis of the Panama specimen measures 4 feet $7\frac{1}{4}$ inches from tip to tip of the transverse processes, and it thus greatly exceeds in size those of (1) the Wexford whale, with a corresponding measurement of 3 feet $8\frac{1}{2}$ inches, and (2) the female specimen recorded by Sir William Turner ||, of an estimated length of "70 to 80 feet or upwards," stranded at Longniddry, Firth of Forth, November 1869, whose axis measured 3 feet 8 inches across. The Panama axis is strikingly more massive than that of the Wexford whale, as is shown by a comparison of the weights. The ankylosed axis and third cervical vertebra of the Panama whale weigh 112 lbs., while the corresponding bones of the Wexford whale are only 53 lbs. This gives a fair comparison of the actual volume of the bones, even taking into account the possibility of a slight error due to differences in the amount of animal matter left after cleaning. It is further in accordance with expectation, in an animal increasing from 80 to 100 feet in length, a proportion of 4 to 5. The increase in volume should be in proportion to the cubes of these numbers, and the cube of 5 is almost exactly twice the cube of 4.

It is of interest to attempt to verify the recorded length of the Panama whale. True ¶ has recorded the measurements of a

* 'The Zoologist,' 1891, p. 215.
† *Ibid.* p. 306.
‡ *Op. cit.* p. 151.
§ Proc. Zool. Soc. 1864, p. 385.
|| 'Marine Mammals Anatom. Mus. Univ. Edinburgh,' London, 1912, pp. 40–50.
¶ *Op. cit.* pp. 180, 184.

Blue Whale stranded at Ocean City, New Jersey, in October 1891. Although not completely satisfactory, in view of the small size of the animal, this may be taken as a basis for comparison. The measurements it is necessary to notice are as follows:—

	Whale, length.	Skull, length.	Mandible, along curve.	Mandible, straight.	Axis width.
New Jersey ...	66′ 2″	14′ 7½″ (estimated)	17′ 1″	15′ 2″	3′ 0″
Wexford	82′ 0″	?	20′ 1″	18′ 8″	3′ 8½″
Longniddry ...	?	—	21′ 2″	19′ 5″	3′ 8″
Panama	—	—	—	—	4′ 7¼″

The Wexford skull is partially disarticulated, and it is not possible to state its exact length. According to True's measurements of the New Jersey specimen, the total length of the animal is approximately given by multiplying the length of the skull by 4·5, of the mandible (along curve) by 3·9, of the mandible (straight) by 4·4, and of the axis-breadth by 22. The proportions in other whales are known to differ as a result of age or individual variation, but it is not without interest to ascertain how far the factors indicated above will apply in the present connection. Taking these proportions, the estimates of the length of the Longniddry whale, derived from the axis, the mandible (straight) and the mandible (along curve) are respectively 80′ 8″, 85′ 5″, and 82′ 6″, with an average of 82′ 10″, which agrees well enough with Turner's vague estimate of "70 to 80 feet or upwards." The same three measurements of the Wexford whale are respectively 81′ 7″, 82′ 1″, and 78′ 4″, with an average of 80′ 8″, as compared with the recorded length of 82 feet. The only available measurement of the Panama whale is that of the axis; but, applying the same proportion, the estimated total length of the animal is 101′ 3½″. I think this may be regarded as a substantial confirmation of the recorded length of 98 feet. The skull of this animal may have been about 23 feet long.

Scoresby*, a particularly reliable authority, mentions the following records of large Blue Whales, which he describes as *Balænoptera Gibbar*:—A specimen found dead in Davis Strait, 105 feet; an individual stranded on the banks of the Humber in September 1750, 101 feet. Another old record of a large Blue Whale is that of the well-known "Ostende Whale," which was found floating in the North Sea and towed into the harbour of Ostende on Nov. 4, 1827, its length having been variously estimated as 80 to 102 feet. It has been customary to discredit such measurements, but the evidence of the Panama specimen tends to confirm their accuracy. The point is one of great importance, in view of the inclination of naturalists to distinguish a

* 'An Account of the Arctic Regions,' vol. i. pp. 481, 482 (1820).

Southern race of Blue Whales by their superior size. The evidence now submitted shows that Blue Whales of a size much larger than that generally accepted may occur to the north of the equator, and thus throws doubt on the assumption that the Northern Blue Whale is smaller than those that frequent the Southern Ocean. It may be suggested that owing to the great intensity of whaling which has occurred in Northern waters, few Blue Whales of the largest size have been permitted to survive, but that in the South, where whaling has been practised only since 1904/5, a greater number of these individuals have remained. It may be anticipated that the enormous destruction which is at present taking place in the South will result in a diminution of the number of these very large specimens.