AMERICAN MUSEUM NOVITATES

No. 9

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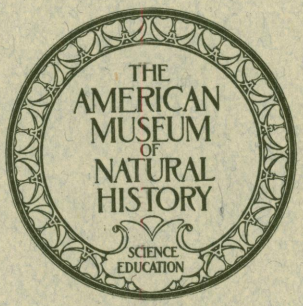
By Roy Chapman Andrews



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By Roy Chapman Andrews

In July 1919, a female Humpback Whale (*Megaptera nodosa*) with two remarkable protrusions on the ventral side of the body, posteriorly, was captured by a ship operating from the whaling station at Kyuquot, on the west coast of Vancouver Island, British Columbia.

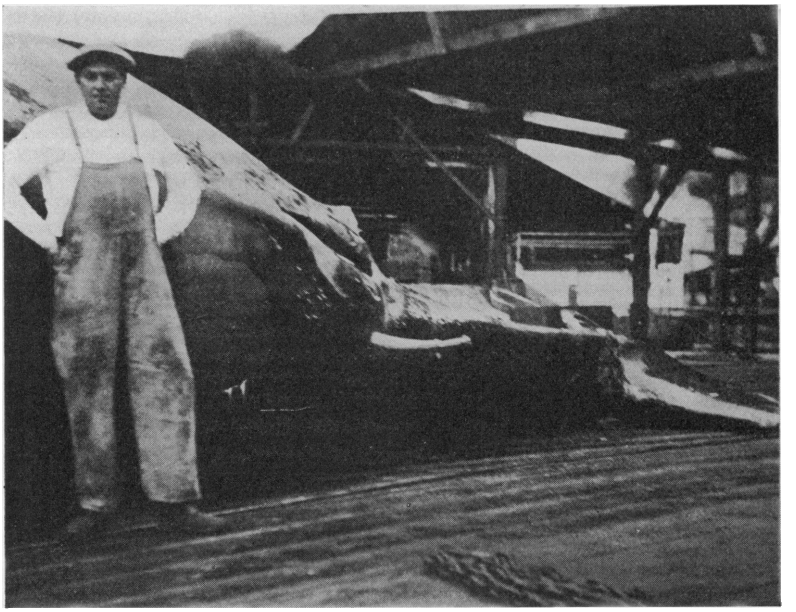

Fig. 1. Caudal part of the whale, showing the hind limb *in situ*.

One of the protrusions was cut off by the crew of the vessel but the other was photographed *in situ* by the superintendent of the Station. Mr. Sidney Ruck and Mr. Lawson, officials of the Consolidated Whaling Company, appreciated the importance of the discovery and presented the skeletal remains of the attachment to the Provincial Museum, Victoria, B. C.

At my request, Mr. Francis Kermode, Director of the Provincial Museum, very courteously submitted the bones to me with permission to publish upon the result of my examination.

Under date of March 4, 1920, Mr. Ruck writes to Mr. Kermode as follows:

> I enclose herewith three photographs showing the unusual development of the pelvic Rudiments in a whale captured at the Kyuquot Station last July, of which you have the bones. It is to be regretted that better pictures in evidence of this unprecedented development were not obtained.
>
> I have been connected with the Whaling Industry for 22 years and during my time have come in contact with prominent Naturalists such as Professor True of the Smithsonian Institute, Professor Lucas of the Natural History Museum, Brooklyn,[1] and Professor Andrews of the Natural History Museum, New York, and neither in their experience or mine have the protrusion of the pelvic bones beyond the body ever been seen or heard of.
>
> This particular whale was a female humpback of the average length with elementary legs protruding from the body about 4 feet 2 inches, covered with blubber about one-half an inch thick.
>
> As shown in the best photograph these legs protruded on either side of the genital opening; the left leg was cut off by the crew of the vessel and lost, and the point at which it was cut off is clearly shown in the photograph. The end of the leg seen in the picture terminated in a kind of round knob like a man's clenched fist.
>
> The two bones of the leg which you have are connected by cartilage which I was informed had shrunk about 10 inches, and possibly more by this time. At any rate the total length of the leg before it was cleaned of the blubber and flesh was, as before stated, about 4 feet, 2 inches, from the body.

After studying the material and discussing it with various scientists, I have come to the conclusion that the protrusions actually do represent vestigial hind limbs and show a remarkable reversion to the primitive quadripedal condition.

I am well aware that zoologists are inclined to accept reported instances of reversion with extreme reluctance and that, at first sight, the tendency will be to consider this a teratological case of no reversionary significance, but the evidence is so strong that I can not interpret it in that way.

Mr. Ruck reports that the total length of the leg "before it was cleaned of the blubber and flesh" was about four feet and two inches. The skeletal remains in my possession consist of two bones and two heavy cartilages. When placed in position as in Fig. 2, the total length is 31 inches.

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[1]Then of the U. S. National Museum, now of The American Museum of Natural History.

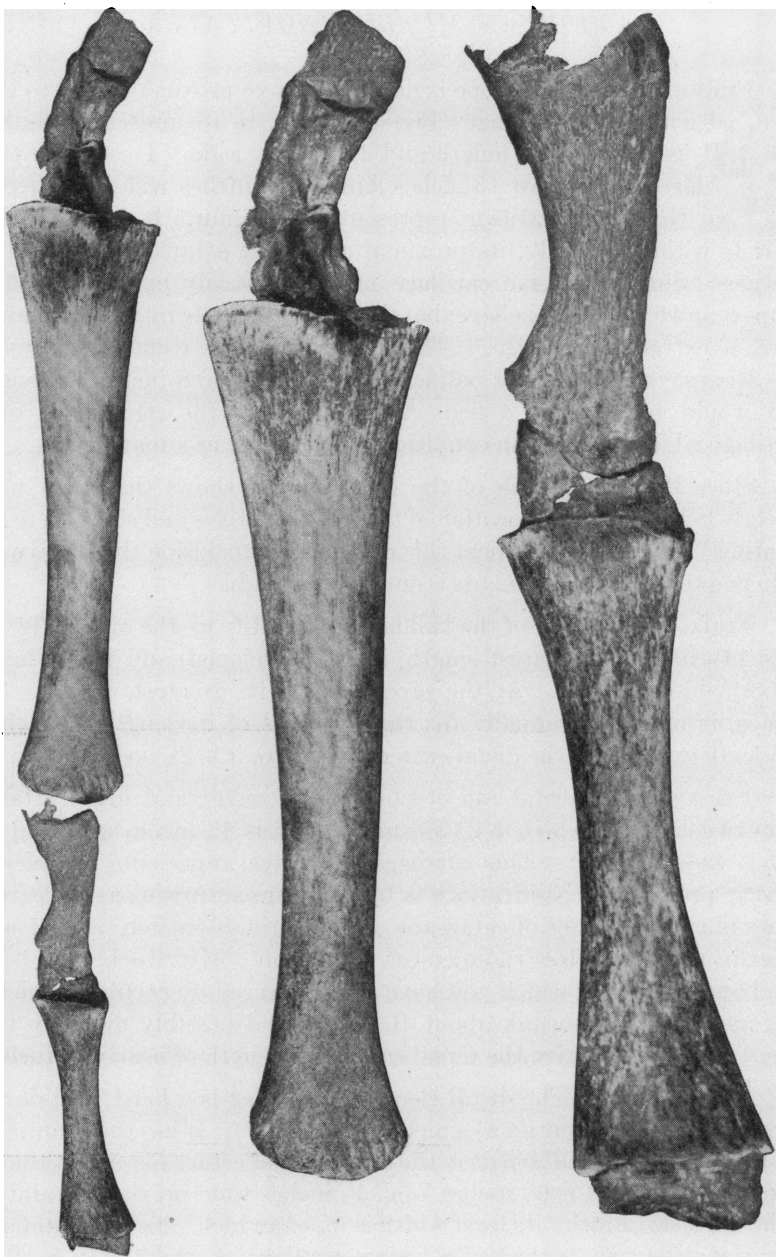

Fig. 2. Skeleton of the hind limb.
Fig. 3. Cartilaginous femur and osseous tibia.
Fig. 4. Cartilaginous tarsus and osseous metatarsal.

FEMUR.—The larger bone is deeply concave proximally and to it is attached a massive cartilage (Fig. 3) which, in its present shrunken condition, is 5¼ inches in length and 1⅝ inches wide. I estimate that this cartilage was at least 15 inches long and 3 inches wide when fresh. I believe that this cartilage represents the femur. It probably lay entirely within the body, its proximal end being attached to the pelvic vestiges. Such a massive cartilage must necessarily have had a firm support and leads me to believe that the pelvic elements in this individual were of extraordinary size. The pelvic bones, as usually present in the *Megaptera*, are slender ossifications about 6 or 8 inches in length and would not furnish a firm enough base for the attachment of a cartilage which, in its fresh condition, was as large as a man's wrist.

Since the photograph of the limbs *in situ* shows that they were directly below the usual location of the pelvic vestiges and since there are no other "floating" bones near this region, the conclusion that they were attached to the pelvic elements is entirely justifiable.

TIBIA.—The larger of the two bones I identify as the tibia (Fig. 3). It is 14¼ inches in greatest length, is well developed, and has a hard, smooth outer surface. At the proximal end its greatest width is 3¾, inches, it narrows gradually for three-fourths of its length, and then suddenly expands at the distal extremity, where it is 2½ inches wide.

TARSUS.—The distal end of the tibia is convex and gives attachment to a cartilage which in its shrunken state is 4¾ inches long and 1¾ inches wide (Fig. 4). This cartilage, I believe, represents the tarsus. That it presents no ossifications is by no means surprising as the carpal bones in the fore limbs of cetaceans are sometimes entirely absent and often in a more or less rudimentary condition. Mr. Ruck says "the two bones of the leg which you have are connected by cartilage which I was informed had shrunk about 10 inches and possibly more by this time." This would give the tarsal cartilage a length of nearly 15 inches.

METATARSAL.—The distal element in the leg is a hard, well-developed bone which I identify as a metatarsal (Fig. 4). It has the characteristic shape of the metacarpals in the fore limbs of cetaceans except that it is more slender. It is 6⅛ inches long, 1⅞ inches wide proximally, and 1⅞ inches in distal width; its least width is 15/16 of an inch. To the distal end of the metatarsal is attached a heavy cartilage of which only ¾ of an inch remains intact. This cartilage probably formed the extremity of the limb skeleton.

EXTERNAL APPEARANCE OF THE LIMB.—In reference to the limb as it appeared in the fresh condition, Mr. Ruck says that the end terminated in a "kind of round knob like a man's clenched fist," that the total length was about four feet and two inches, and that it was covered with blubber about one-half inch thick. I infer from Mr. Ruck's description that the connective tissue and blubber were essentially the same as in the flipper, or fore limb, of cetaceans. The photograph of the limb *in situ* (Fig. 1) show that there are two prominent, truncated tuberosities on the distal half. The proximal "bunch" evidently indicates the distal end of the tibia and the other is at the extremity of the metatarsal. These tuberosities may very properly be homologized with those on the outer, or anterior, edge of the flipper in the *Megaptera* which indicate the extremities of the radius and the second digit. This is, I believe, a point which has considerable significance.

Since the stalk-like cartilaginous femur probably lay entirely within the body and the remainder of the limb entirely outside, there was undoubtedly a certain flexibility at the point of junction with the body.

In a paper entitled 'Untersuchungen an walen,'[1] Professor W. Kükenthal has described external rudimentary hind limbs in three early embryos of *Megaptera*. These appear as two more or less caudally directed papillæ on either side of the genital organ in the same relative position as the hind limbs which I have described in this paper. In Kükenthal's Stage I (an embryo 32 mm. in length) the rudiments are best developed and are 12 mm. long. In Stage II (an embryo 28 mm. long) the rudiments are somewhat less distinct, reaching a length of 8 mm. In Stage III (an embryo 30 mm. long) the hind-limb rudiments have still more decreased in size and appear as minute papillæ.

Kükenthal has also discovered hind-limb rudiments in embryos of *Phocæna communis* and *P. dalli*, and Guldberg has recorded them in embryos of *Lagenorhynchus acutus* and *Phocæna communis*.

Kükenthal states that the hind-limb rudiments are found in later embryonic stages of the Mystacoceti than in the Odontoceti and concludes that in the evolution of cetaceans the hind limbs lost their functional character in the Odontoceti earlier than in the Mystacoceti.

Since Kükenthal's and Guldberg's researches have shown that external hind-limb rudiments are still present in some cases in embryonic life, it is by no means impossible that, these vestigial organs should continue their growth and persist until the adult stage. I believe that

[1]Jenaische Zeitschrift für Naturwissenchaft, LI, 1914, pp. 49–52.

that is exactly what has occurred in the specimen which I have described above, and that we are confronted with a clear case of partial reversion to a primitive quadripedal condition.

The limbs, according to the statements of the whalers, were symmetrical; they are in the exact position in which the hind-limb rudiments have been found in embryonic *Megaptera;* there are strong indications that the cartilaginous femur was attached to the pelvic elements; they are homologous in many respects to the flippers, or fore limbs, and, were this a teratological case, it is doubtful if these homologies would exist.

Unwilling as are many evolutionists to accept reported cases of reversion, I can see no other explanation for the facts presented here. That this condition is extremely rare must certainly be true for, so far as I am aware, this is the only recorded case among cetaceans. The presence of rudimentary hind limbs would almost certainly attract the attention of whalers under any condition and eventually be reported to a scientific institution, as was done in the case under consideration. Although hundreds of thousands of whales have been killed, especially in the last fifty years since the beginning of shore-whaling, no other instance has been reported. We are greatly indebted to Mr. Ruck and Mr. Lawson for their quick appreciation of the importance of their discovery and I wish again to express my thanks to Mr. Kermode for giving me the privilege of describing it.

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FRANK E. LUTZ, Editor

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