

A SKULL OF THE MINKE WHALE DUG OUT FROM OSAKA

HIDEO OMURA

Whales Research Institute, Tokyo

ABSTRACT

Among collections of bones of whales dug out from Osaka and now being kept at the Osaka Museum of Natural History is included a half-broken skull of the minke whale, *Balaenoptera acutorostrata*. After comparing with known specimens of this species this whale was estimated to be a full grown animal of about 9 m in length.

INTRODUCTION

During several years in 1960's a number of bones of whales have been dug out from various places in Osaka city while large-scale construction works such as subways, expressways, and buildings were going on (Shindo, 1975). These bones are now being kept at the Osaka Museum of Natural History and I had a chance to observe these bones in December 1975 and found a half-broken skull of the minke whale is included among the collection.

In addition to these, bones of sperm whale were also dug out recently from underground of Higashiosaka city. The species of this whale was identified by Okazaki (1975) by the presence of the characteristic atlas and a tooth among the collection.

At the period of Jomon Transgression (about 7,000-3,000 B. P. [years before present]) a vast area from Uemachi Upland, where Osaka castle is situated, eastwards and including Higashiosaka city to Ikoma mountain had been invaded by sea water, forming a bay called Kawachi-wan. This area is now the Osaka Plain. The development of the Osaka Plain was studied by Kajiyama and Itihara (1972) with reference to the radio-carbon dates. They recognized nine successive stages of the development. In the second or the stage of the Paleo-Kawachi Plain (ca. 9,000 B. P., earliest Jomon age) the sea level was lower than in the present by 20 m or over. Osaka Bay was already in existence, but the Kawachi area was not covered by sea water. In the third or the stage of the Kawachi Bay I (ca. 7,000-6,000 B. P., the first half of early Jomon age) the sea level reached to that of the present and the Paleo-Kawachi Plain was widely covered by sea water. In the fourth or the stage of the Kawachi Bay II (ca. 5,000-4,000 B. P., latest early Jomon to middle Jomon ages) the sea level remained nearly unchanged, but in the next stage of the Kawachi Lagoon (ca. 3,000-2,000 B. P., latest Jomon to the first half of Yayoi ages) due to the development of the sand bar north of the Uemachi Upland, Kawachi Lagoon was formed and the inner part of the bay was filled with

fresh water. The growth of the sand bar continued and it developed successively into the stages of the Kawachi Lake I and II, Osaka Plain I, and finally to the stage of the Osaka Plain II or the present.

In the 3rd and 4th, and also in the 5th stages too, it is possible that whales came into the Kawachi Bay and some of them stranded ashore or dead afloat and finally sunk. This is the possible explanation why bones of whales dug out from the alluvial deposits in Osaka. It is also possible, therefore, that these bones are of the existing whale species.

OBSERVATION AND CONCLUSION

(Plates I and II)

This skull (O. M. N. H., F2639) was dug out from 14 m deep while constructing underground railroad at 2-Chome, Oimazato-hommachi, Higashinari-ku, on 11 August 1966. The skull was broken transversely towards middle part of the supraoccipital bone by mishandling during preparation for transportation after discovering. Its posterior portion is remaining in a very good condition, suggesting the skull was a splendid specimen before it was broken. Exo- and basioccipitals, and temporals are nearly perfect, enabling me to measure the breadth at squamosal or the greatest breadth of the skull, as well as other measurements concerning posterior region of the skull precisely. Posterior marginal portion of the vomer is remaining attached, but pterygoids are broken and tympanic bullae are lacking.

Vertex and facial region of the skull are completely broken, but orbital process of the frontal of both sides, part of vomer, 170 cm in length, and some fragments of maxillary and premaxillary are remaining separately. Frontals are broken at their proximal ends and their distal margins or orbits are complete and the orbital length was measured accordingly.

At a glance this skull can be identified to be a species of balaenopterid whales (Balaenopteridae) and from its comparatively smaller size to be the minke whale. Measurements of the skull are shown in Table 1, comparing with corresponding measurements of other specimens from the North Pacific and Antarctic, cited from Omura (1975). Measurements numbers in the table are the same as used in the previous paper (1975). The breadth of the skull at squamosal of this specimen (F2639) is far greater than in the two specimens from the North Pacific (AY69B, AY69A), and lying between figures for the two specimens from the Antarctic, suggesting the body length of this whale is also between these two specimens, i. e. 8.5-9.8 m and possibly around 9 m. These two whales from the Antarctic are physically matured (Omura, 1975) and since the body length at sexual maturity of minke whales is somewhat smaller in those from the North Pacific than in those from the Antarctic (Ohsumi *et al.*, 1970) this specimen from Osaka was possibly a full grown whale. This is also supported by rigid structure of the skull.

TABLE 1. MEASUREMENTS OF THE SKULL (F2639) COMPARED WITH THE KNOWN SPECIMENS OF THE MINKE WHALE (in mm)

| Measurements | F2639 | AY69B* | AY69A* | 71J2793* | 71J2883* |
|--|-------|------------------|------------------|-----------------|-----------------|
| | Osaka | N. Pacific | N. Pacific | Antarctic | Antarctic |
| 16. Breadth of skull at squamosal | 1,180 | 708 | 613 | 1,075 | 1,256 |
| 19. Length of orbit, frontal, right | 207 | 156 | 146 | 188 | 207 |
| 20. Length of orbit, frontal, left | 206 | 157 | 146 | 190 | 207 |
| 21. Breadth of occipital bone | 822 | 563 | 473 | 760 | 886 |
| 22. Breadth across occipital condyle | 229 | 157 | 154 | 203 | 228 |
| 23. Height of occipital condyle, right | 124 | 98 | 120 | 131 | 145 |
| 24. Height of occipital condyle, left | 124 | 96 | 100 | 124 | 142 |
| 25. Breadth of foramen magnum | 79 | 83 | 80 | 70 | 79 |
| 26. Height of foramen magnum | 60 | 90 | 85 | 97 | 127 |
| Sex, body length, and age | ? | M. 6.6 m juv. | M. 5.4 m juv. | M. 8.5 m ad. | F. 9.8 m ad. |

* Cited from Omura (1975).

In other measurements figures for this specimen are within the ranges of the values of the two specimens from the Antarctic or very close to them, except the measurement no. 26 (height of foramen magnum), which is thought to be of less importance. From this table it can safely be concluded that this specimen is a skull of the minke whale, *Balaenoptera acutorostrata*. There remains, however, still a taxonomic problem among minke whale populations of the world, i. e. a possibility that the Antarctic minke whale, *B. bonaerensis*, is in fact a different species or subspecies of the minkes in the northern hemisphere, *B. acutorostrata*. But the distinctions so far noted in the skull are in the vertex and facial regions and not concern the posterior portion of the skull (Omura, 1975). Accordingly this problem does not affect the above conclusion.

ACKNOWLEDGMENTS

My sincere thanks are due to Mr. Hiroyuki Taruno and other members of the Osaka Museum of Natural History. They extended me all possible arrangement and help for the works done at the museum. Mr. H. Taruno also read and commented on draft of the manuscript.

REFERENCES

- KAJIYAMA, H. and M. ITIHARA, 1972. The developmental history of the Osaka Plain with references to the radio-carbon dates. *The Memoirs of the Geological Society of Japan*, 7: 101-112. (In Japanese with English abstract).
- OHSUMI, S., Y. MASAKI and A. KAWAMURA, 1970. Stock of the Antarctic minke whale. *Sci. Rep. Whales Res. Inst.*, 22: 75-125.

Sci. Rep. Whales Res. Inst.,
No. 28, 1976.

- OKAZAKI, Y. 1974. Higashiosaka-shi de Makko-kujira no Hakken (Bones of sperm whale discovered in Higashiosaka city). *Nature Study* (ed. Osaka Museum of Natural History), 21 (12): 143-144. (in Japanese).
- OMURA, H. 1975. Osteological study of the minke whale from the Antarctic. *Sci. Rep. Whales Res. Inst.*, 27: 1-36.
- SHINDO, N. 1975. *History of whales in the Inland Sea*. Hyogo. 89pp.

EXPLANATION OF PLATES

PLATE I

Half-broken skull of the minke whale dug out from Osaka and now being kept at the Osaka Museum of Natural History. F2639.

Fig. 1. Posterior view.

Fig. 2. Anterior view.

PLATE II

The same specimen shown in Plate I.

Fig. 1. Superior view.

Fig. 2. Inferior view.



