

Re-identification of a Skeleton of the Bryde's Whale (*Balaenoptera edeni*) from the Northern Coast of Borneo

The smaller rorquals of the Southeast Asian seas have been referred to under three different species headings: minke whale (*Balaenoptera acutorostrata*; ELLERMAN & MORRISON SCOTT, 1951), sei whale (*Balaenoptera borealis*; CHASEN, 1940), and Bryde's whale (*Balaenoptera edeni*; PILLERI, 1974) and therefore confusingly sometimes all three species are listed (CORBET & HILL, 1992). However, when reviewing the balaenopterid whale records from Thai waters we (ANDERSEN & KINZE, 1999) had to delete all records of 'minke whales' and 'sei whales' and reassign them to the Sittang whale, a small type of Bryde's whale (*Balaenoptera edeni*). We believe that the findings from Thailand are applicable to the whole region, i.e. that there is only one common species of the baleen whale, *Balaenoptera edeni*.

Because of the somewhat turbulent taxonomic history of *B. edeni*, proper species assignments within the region have suffered from erroneous assumptions. Described by ANDERSEN (1879) from the mouth of the Sittang River in Myanmar, *B. edeni* was for a long time doubted to be a genuine species. ANDREWS (1916, 1918) considered it conspecific with or closely allied with the sei whale (*Balaenoptera borealis*). Then FRASER (1937) and after him ELLERMAN & MORRISON SCOTT (1951) considered it to be a local form of the minke whale. The reason for this erroneous judgement may have been the incompleteness of the skeleton of the type specimen of *B. edeni* (which lacks the first ribs that would have been bifurcated and therefore diagnostic for *B. borealis* and *B. edeni* but not for *B. acutorostrata*), the unavailability of further specimens, and the relatively small 'minke whale' size of the specimen.

JUNGE (1950) eventually brought the nomenclature up to its present stage by lumping *B. edeni* with *B. brydei* described by OLSEN in 1912 (OLSEN, 1913). Hence, there are confusing reports on the occurrence of the minke whale in Malaysian waters. CHASEN (1940) and after him HERSHKOVITZ (1966) reported only the sei whale (*Balaenoptera borealis*) from Borneo, based apparently on a specimen kept in the Kuching Museum, but not the minke whale. Neither did GIBSON-HILL (1950) mention the minke whale from Bornean waters. PAYNE & FAIRLEY (1985) included the species in their field guide, but stated that it had yet to be confirmed from the island. CORBET & HILL (1992) included the Straits of Malacca in the distributional range of the minke whale without specific references.

Most recently, BEASLEY & JEFFERSON (1997) reiterated the occurrence of the minke whale, referring to a specimen in the Natural History Museum in London and a compilation provided by LEATHERWOOD (1986), apparently overlooking the work of RUDOLPH *ET AL.* (1997) who doubted that the north Borneo specimen was a minke whale.

ELLERMAN & MORRISON-SCOTT (1951), and HARRISON (1974), most likely based their accounts on the specimen of the "lesser rorqual" that was collected from the northern shore of Borneo. The skeleton of the specimen now placed in the Natural History Museum in London (NHM 1908.7.9.5) was indeed labelled as 'minke whale' (*Balaenoptera acutorostrata*).

The specimen was donated to the museum by the British North Borneo Company, which inferred that it originated from the shores of present day Sabah, and it was entered in the Museum's Mammal Register for 1908 under the name '*Balaenoptera rostratus*'. The original identification of the specimen most likely was made by the staff member in charge of the osteology collection, William P. Pycraft, under the guidance of the then Keeper of Zoology and founder of the British Stranded Whale Programme, Sir Sidney F. Harmer (Richard Sabin, pers. comm. 2000)

Since this sole evidence for the occurrence of the minke whale in Malaysian waters potentially rests on an erroneous taxonomic assumption, in January 2000 we re-examined the London specimen. Here we provide evidence that it is indeed a Bryde's whale and not a minke whale.

Based on the features published by OMURA *ET AL* (1981) and ANDERSEN (1994), and on a combined character state analysis, we hereby re-identify it as a Sittang whale which is a small eco-type of the Bryde's whale (*Balaenoptera edeni*), being conspecific with the type specimen of *Balaenoptera edeni* Andersen, 1879.

The London specimen (Fig. 1) was subadult (vertebral epiphyses not fused with the vertebral bodies) and exhibited bifurcated first ribs (Fig. 2) and an vertebral count of 52+ which immediately excludes the minke whale, *B. acutorostrata* (no bifurcated first ribs, max. 48 vertebrae). Bifurcated ribs are only found in *B. borealis* and *B. edeni*. The specimen further exhibits the following diagnostic features of Bryde's whales:

- 1) In dorsal view the shape of the outer margin of the rostrum of the Borneo is convex, not straight as in sei whales.
- 2) The front margin of the nasals is straight in the Borneo specimen not convex as in sei whales (Fig. 3).
- 3) The front margin of the nasals of the Borneo specimen is situated clearly posterior to the anterior border of the post-maxillary cavity being diagnostic for *B. edeni* (Fig. 3).
- 4) The basicranial part of the skull is much longer than broad, being diagnostic for *B. edeni* (Fig. 4).
- 5) The groove between the angular and articular parts of the mandible is shallow, being diagnostic for *B. edeni* (Fig. 5).
- 6) The posterior extension of the angular portion of the mandible of the Borneo specimen is at the level of the articular portion (being diagnostic for *B. edeni*).

It should be noted that single features may fail to identify the species, but a combined character analysis will provide a safe species identification.

The minke whale has yet to be confirmed from Indonesian and Thai waters (ANDERSEN & KINZE, 1999; RUDOLPH *ET AL.*, 1997). A roqual record from the Philippines (HERRE, 1925) was assigned to minke whale by STEWARDS & LEATHERWOOD (1985) based solely on its small size, but it cannot be ruled out that it was a Bryde's whale instead. WANG (1984) reported both minke and Bryde's whales from adjacent Chinese waters. SMITH *ET AL.* (1995) also reported both minke and Bryde's whales for Vietnamese waters but the basis for their identification has been criticized (ANDERSEN & KINZE, 2000). The only safe record of a minke whale henceforth, however, originates from Vietnam (HO & NGHI, 1999).

Minke whale, Bryde's whale and sei whale all occur in Southeast Asian waters, but given the confusing taxonomic history, species determinations of stranded specimens must



Figure 1. The Borneo specimen in the London collection. To the right a true minke whale for comparison.

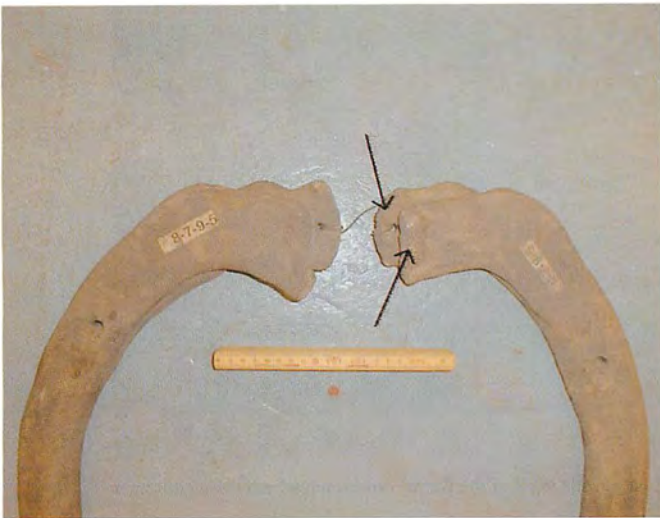


Figure 2. Bifurcated or double headed first ribs of the Borneo specimen (arrows).

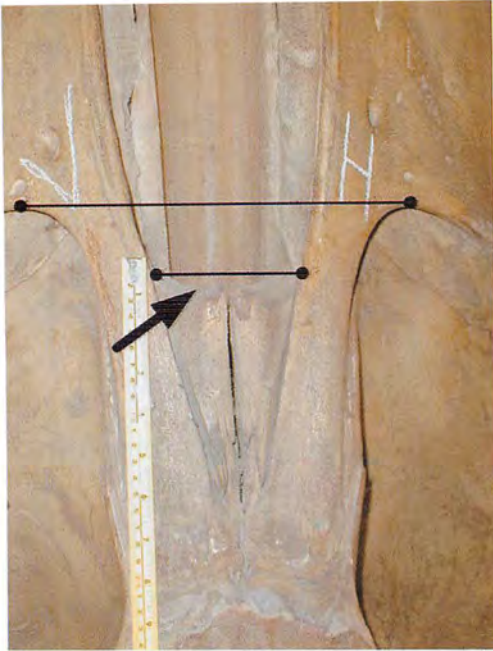


Figure 3. The nasal portion of the Borneo specimen exhibiting a slightly concave (arrow) front margin of the nasals and a front margin of the nasals (lower line) clearly posterior to the anterior border of the post-maxillary cavity (upper line).



Figure 5. The shallow groove between the angular and articular parts (arrow) of the mandible. The posterior extension of the angular portion of the mandible is at the same level as the articular portion.



Figure 4. The basicranial part of the skull of the Borneo specimen which is much longer than broad.

Table 1. External and osteological features to distinguish between the three smaller rorqual species of the southeast Asian seas.

	<i>B. acutorostrata</i>	<i>B. edeni</i>	<i>B. borealis</i>
External features			
TL (birth)	2.8 m	3.0 m	4.0 m
TL (adult)	7–10 m	8–14 m	15–20 m
pleats reach navel	never	yes	never
number of rostrum ridges	1	3	1
flipper spot	yes	no	no
baleen colour	white/grayish	gray/yellowish	black
baleen fringes	coarse	coarse	very fine
Osteological features			
Rostrum	pointed	rounded	rounded
basicranial exposure	long/narrow	long/narrow	short/broad
bifurcated rib	Never	Yes	Yes
number of vertebrae	46–48	54–55	56–57

be based on either osteological material and external features, or DNA-probes or ideally a combination of both.

We suggest a re-examination of all small balaenopterid specimens within the whole Sunda region. The three small species known from the area can be identified using Table 1.

REFERENCES

- ANDERSEN, M. 1994. The occurrence and distribution of the Sittang whale (*Balaenoptera edeni* Anderson 1879) in Thai waters with remarks on osteology. M. Sc. thesis, University of Copenhagen.
- ANDERSEN, M., AND C. C. KINZE. 1999. Annotated checklist and identification key to the whales, dolphins, and porpoises (Order Cetacea) of Thailand and adjacent waters. *Nat Hist Bull. Siam Soc.* 47: 27–62.
- ANDERSEN, M., AND C. C. KINZE. 2000. Review and new records of the marine mammals and sea turtles of Indochinese waters. *Nat Hist Bull. Siam Soc.* 48: 177–84.
- ANDERSON, J. 1879. Anatomical and zoological researches: comprising an account of the two expeditions to western Yunnan. Quaritch, London. 2 vols.
- ANDREWS, R. C. 1916. Monographs of the Pacific Cetacea. II. The sei whale (*Balaenoptera borealis* Lesson). *Mem. American Mus. Nat. Hist. N. S.* 1.
- ANDREWS, R. C. 1918. A Note on the Skeleton of *Balaenoptera edeni* Anderson in the Indian Museum, Calcutta. *Rec. Indian Mus.* 15.
- BEASLEY, A., AND T. J. JEFFERSON 1996. Marine Mammals of Borneo: a preliminary list. *Sarawak Museum Journal* 51: 193–210
- CHASEN, N. F. 1940. A handlist of Malaysian mammals. *Bulletin of the Raffles Museum* 15: 1–209.
- CORBET, G. B., AND J. E. HILL 1992. *The Mammals of the Indomalayan Region*. Oxford University Press, Oxford, 488 pp.
- ELLERMAN, J. R., AND T. C. S. MORRISON-SCOTT 1951. *Checklist of Palaearctic and Indian Mammals 1758 to 1946*. British Museum (Natural History), London, 810 pp.

- FRASER, F. C. 1937 Whales and Dolphins pp. 201–349 in Norman & Fraser (eds) 1937. *Giant Fishes, whales and dolphins* Putman Publisher's, London.
- GIBSON-HILL, C. A. 1950. A note on the rorquals. *J. Bombay Nat. Hist. Soc.* 49: 14–19.
- HERRE, A. W. 1925. A Philippine rorqual. *Science* 61: 541.
- HARRISON, J. L. 1974. *The mammals of Malaya*. Malayan Nature Society (Singapore Branch), Singapore, 340 pp.
- HERSHKOVITZ, P. 1966. Catalogue of living whales. *Bull. U. S. National Mus.* 246: 1–259.
- HO, D., AND B. Q. NGHI. 1999. Review on the status of marine mammals in Vietnamese waters. Paper presented at the workshop and seminar on marine mammals and sea turtles, Nha Trang 8–13 February 1999, 13 pp.
- JUNGE, G. C. A. 1950. On a specimen of the rare fin whale, *Balaenoptera edeni*, Anderson, stranded on Pula Sugi near Singapore. *Zool. Verhandelingen* 9: 1–26.
- LEATHERWOOD, S. 1986. Whales, dolphins and porpoises of the Indian Ocean Cetacean sanctuary: A catalogue of available information. *Hubbs Marine Research Center Technical Report # 87–197*. San Diego. 207 pp.
- OLSEN, O. 1913. On the external characteristics and biology of the Bryde's whale (*Balaenoptera brydei*) a new rorqual from the coast of South Africa. *Proc. Zool. Soc. London* [1913]: 1073–1090.
- OMURA, H., T. KASUYA, H. KATO, AND S. WADA. 1981. Osteological study of the Bryde's whale from the central South Pacific and eastern Indian Ocean. *Sci Rep. Whales Res. Inst.* 33: 1–26.
- PAYNE, J., C. M. FRANCIS AND K. PHILLIPPS 1985. *A Field Guide to the Mammals of Borneo*. Sabah Society/World Wildlife Fund Malaysia, 322 pp.
- PLLERI, G. 1973. *Cetologische Expedition zum Indus und Persischen Golf und Forschungsreise nach Goa und Thailand im Jahre 1973*. Hirnanatomisches Institut, Waldau-Bern, 52 pp.
- RUDOLPH, P., C. SMEENK, AND S. LEATHERWOOD. 1997. Preliminary checklist of Cetacea in the Indonesian Archipelago and adjacent waters. *Zool. Verh. Leiden* 312: 1–48.
- SMITH, B., T. A. JEFFERSON, D. T. HO, S. LEATHERWOOD, C. V. THUOC, M. ANDERSEN, AND E. CHIAM. 1995. Marine mammals of Vietnam: a preliminary checklist. *Collection of Marine Resaerch Works* 1995, vi: 147–176.
- STEWART, B. S., AND S. LEATHERWOOD. 1985. Minke whale. Pages 91–136 in S. Ridgeway and R. Harrison (eds.), *Handbook of Marine Mammals Vol 3*. Academic Press, London, England.
- WANG, P. (1984). Distribution of cetaceans in Chinese waters. *Acta Zoologica Sinica* 6: 52–56. (in Chinese).

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