Haplotype of the mitochondrial DNA control region of a neonatal finless porpoise stranded around the Yokohama Port

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The finless porpoise (Neophocaena phocaenoides), a small odontoceti, is listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In Japan, it inhabits a narrow band of shallow coastal waters less than 30 m in depth over sandy bottoms (Shirakihara et al. 1992). Because these waters are under influence of intensive human activities, which caused degradation and pollution of habitat of this species, a rapid decline in its population size has been reported in some waters (Reeves et al. 1997; Kasuya et al. 2002).

Until now, several studies on the population structure of the finless porpoise distributed in the coastal waters of Japan were conducted by questionnaire (Shirakihara et al. 1992), by aerial surveys (Amano et al. 2003), and by comparing the timing of parturition (Shirakihara et al. 1993), seasonal migration (Shirakihara et al. 1994), skull morphology (Yoshida et al. 1995) and the nucleotide sequence of the mitochondrial DNA control region (mtCR) (Yoshida et al. 2001). These studies have shown that there are at least 5 geographically distinct populations in the coastal waters of Japan (Yoshida et al. 2001). They were termed as Sendai Bay-Tokyo Bay population, Ise-Mikawa Bay population, Inland Sea-Hibiki Nada population, Omura Bay population, and Ariake Sound-Tachibana Bay population. However, a recent study suggested that the finless porpoise population covering a broad water (e.g. Sendai Bay-Tokyo Bay population) might contain more than one population, and that there might be more additional populations in several waters which have been not covered by above studies (Kasuya et al. 2002).

In this report, we determined the nucleotide sequence of the mtCR of a neonatal finless porpoise stranded around Yokohama Port, Tokyo Bay and compared it with those of haplotypes previously reported (Yoshida et al. 2001). The existence of the finless porpoise in Tokyo Bay has been confirmed by sighting (Nakajima 1963; Amano et al. 2003), but there is no report on the genetic information of the specimen from this water (Yoshida personal comm.).

Materials and methods

A neonatal finless porpoise (Neophocaena phocaenoides) was found near Yokohama Port (Fig. 1) on 30 May 2006 with no another individual. When the neonatal finless porpoise was found, it was repeatedly swimming in circles at the same place with the short respiratory intervals. Thus, it was judged to be unable to survive alone, and was transported to Hakkeijima Sea Paradise Aqua Museum (Yokohama, Kanagawa). After it died, body length and body weight were measured, and the neonatal traits were examined. Both muscle and skin tissues were excised and stored at −20°C. Total DNA extraction, PCR amplification and sequence determination of the mtCR fragment were performed from the tissues according to the methods of Yoshida et al. (2001). The nucleotide sequences of 10 haplotypes identified in the specimen from the coastal waters of Japan (Yoshida et al. 2001) were obtained from GenBank (Accession; AF193543-193552). The alignment analysis was performed using ClustalW multiple sequences alignment program (Thompson et al. 1994).

Results and discussion

The body length and the weight were 84 cm and 7.6 kg, respectively. These values are close to those previously reported in the finless porpoise estimated to age of 0 year old (Shirakihara et al. 1993). As shown in Fig. 2, the neonatal traits such as obvious fetal folds and

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remains of an umbilical cord were observed. These results indicate that the neonate had aged only few days. In addition, it was judged to have not taken the colostrums by measuring serum $\gamma$-globulin value (a veterinarian of the Hakkeijima Aqua Museum personal comm.).

We do not consider that neonates of the finless porpoise can move over 20 km from the mouth of Tokyo Bay to near Yokohama Port independently. Therefore, we concluded that the neonate was born in Tokyo Bay and separated from its mother as soon as it was born.

As shown in Fig. 3, a total of 440 bp of the nucleotide sequence of the mtCR of the neonate was determined. Comparing 345 bp of the nucleotide sequence with those of 10 haplotypes previously identified from the finless porpoises distributed in the coastal waters of Japan (Yoshida et al. 2001) revealed that the neonate possessed a haplotype b in Yoshida et al. (2001). Yoshida et al. (2001) reported that this haplotype was identified in the
individuals distributed in the coastal waters of Kashima Nada to Boso Peninsula and part of the individuals of the Ise-Mikawa Bay population. Although several finless porpoises have been observed in the coastal waters from the mouth of Tokyo Bay to Ise-Mikawa Bay (Shirakihara et al. 1992) and in Tokyo Bay (Nakajima 1963), there is no report on the population structure of this species distributed in these waters. Future detailed studies using a number of specimens and a variety of markers are needed, in order to confirm genetic relationships between the neonatal specimen and other individuals distributed through Kashima Nada to Ise-Mikawa Bay and to analyze the population structure of the finless porpoise inhabiting around Tokyo Bay.

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References


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