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Skin lesions in a resident population of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) from Japan

MIKI SHIRAKIHARA[1], MASAO AMANO[2] AND MARIE-FRANÇOISE VAN BRESSEM[3]

[1] *Faculty of Science, Toho University, Miyama, Funabashi, Chiba 274-8510, Japan*

[2] *Department of Animal Sciences, Teikyo University of Science and Technology, Uenohara, Yamanashi 409-0193, Japan*

[3] *Cetacean Conservation, Medicine Group (CMED-CEPEC), Museo de Delfines, Pucusana, Peru*

ABSTRACT

A year-round resident Indo-Pacific bottlenose dolphin *Tursiops aduncus* population inhabits the coastal waters off Amakusa-Shimoshima Island (130°07'E, 32°33'N), western Kyushu, Japan. A total of 172 dolphins, representing most of the members of this population, have been identified. In summer 2007, a likely mature male was observed with extensive, in relief, nodular skin lesions. The disease looks like lobomycosis caused by the yeast-like organism known as *Lacazia loboi* and reported in *T. truncatus* and Guiana dolphins (*Sotalia guianensis*) from the Americas, though other fungi may be involved. Small lumps that may represent the beginning of the disease were observed on this dolphin a year before. Three other dolphins had similar lumps.

INTRODUCTION

Indo-Pacific bottlenose dolphins *Tursiops aduncus* occur in shallow coastal waters including around oceanic islands in tropical to temperate Indo-Pacific waters (Jefferson *et al.*, 2008). At least, three resident isolated populations of this species occur in Japanese waters (Shinohara, 1998; Shirakihara *et al.*, 2002; Hayano *et al.*, 2004; Kogi *et al.*, 2004; Morisaka *et al.*, 2005). One of the populations resides year-round off the Amakusa-Shimoshima Island, western Kyushu (Shirakihara *et al.*, 2002). Its abundance has been estimated at 218 individuals. It includes two communities i.e. the northern and southern communities, between which occasional migrations of individuals occurred. Photo-identification surveys were initiated in 1994 for the northern community and in 2001 for the southern community. They were conducted during a short period in almost every summer since. The dolphins from the northern community commonly form a large group consisting of more than 100 individuals during the day.

Theodolite tracking studies revealed that this group spent most of the time (about 70% of a day) within a narrow area of about 40km^2 (Miki Shirakihara unpublished data, Fig. 1). In the summer 2007, extensive, in relief, nodular lesions were observed on the dorsal fin and back of a dolphin. Here we report on the emergence of the disease and its prevalence in the population in summer 2007.

MATERIALS AND METHODS

Photo-identification surveys were carried out in the coastal waters of Amakusa-Shimoshima Island in July 2007. The survey method mostly followed Shirakihara *et al*. (2002). The left side of the dorsal fin was photographed and compared with the photo-ID catalogue for this population. Newly-identified dolphins were added to the catalogue. Good quality, un-obscured images almost parallel with the plane of the film were used to search for skin lumps. The presence of the lesions on each dolphin was determined by examining one to 13 images of the same dolphin. The prevalence of the skin lumps was calculated as the ratio of the number of affected animals to the number of individuals for which suitable pictures were available. Archived photos were used to confirm the development of the disease.

RESULTS

Among 172 individuals identified in July 2007, 147 were examined for the presence of skin lumps. A likely mature male (dolphin #125 from the northern community) exhibited extensive, in relief, nodular cutaneous lesions (Fig. 2a,b). The disease looked like lobomycosis caused by the yeast-like organism known as *Lacazia loboi* and reported in *T. truncatus* and Guiana dolphins (*Sotalia guianensis*) from the Americas (Reif *et al.*, 2006; Van Bressem *et al.*, 2007; Van Bressem *et al.*, 2008). However other fungal agents such as *Fusarium* spp. or *Trychophyton* spp. may be involved (Hoshina and Sugiura, 1956; Frasca *et al.*, 1996). Small lumps that may have represented the beginning of the disease were observed on the lateral side of this dolphin in summer 2006 (Fig. 2c). Similar lumps were also detected on the dorsal fin and back of three other dolphins: a likely mature male (#122 from the southern community) and a mature female (#6023 from the northern community), and another mature female (#69 from northern community). The prevalence of the extensive mycotic disease was 0.7 % (1/147) in summer 2007. If the lumps observed in the three other dolphins do indeed represent the beginning of the disease, then, prevalence would reach 2.7 %. True prevalence could be higher as we only saw the upper body part.

DISCUSSION

This study is the first to report on a probable mycotic disease in a coastal-resident population of Indo-Pacific bottlenose dolphins in Japan. The extensive nodular skin lesions observed on the dorsal fin

and back of the dolphin #125 were never seen since the photo-identification survey was started in 1994 around Amakusa-Shimoshima Island. Another scientist who has studied this population for about 10 years also has never observed such obvious lesions (Akira Takemura pers. comm.). The fact that the # 125 dolphin had only small lumps the year before suggests a recent emergence of the disease. The presence of skin lumps in three other dolphins in 2007 implies that the disease is spreading. The formation of large and tight groups, and possible narrow ranging patterns of this population could favor the propagation of the disease. Previous studies have suggested a possible association between chemical and organic water pollution with the emergence and increase prevalence of lobomycosis and lobomycosis-like disease in Americas (Reif *et al.*, 2006; Van Bressem *et al.*, 2007; Van Bressem *et al.*, 2008). Amakusa-Shimoshima Island is located at the mouth of Ariake and Yatsushiro Sounds. The sounds are characterized by large tidal range (about 4-6m at a maximum) and freshwater discharge into the inner area. In addition to fisheries, aquaculture of seaweed (*Porphyra* spp.) and fishes such as yellowtail (*Seriola quinqueradiata*) are developing in these areas. Thus, the habitat is under the anthropogenic impacts suspected of association with the disease. It has also been suggested that *Lacazia loboi* may be spread by ballast waters (Van Bressem *et al.*, 2007; Van Bressem *et al.*, 2008). Although around Amakusa-Shimoshima Island, most of the boat traffic is represented by small fishing boats, there is some commercial boat traffic heading for the larger ports in Ariake and Yatsushiro Sound (Fig. 1). Thus, the area may not be free from ballast waters. Further photo-identification studies are needed to explore epidemiology and ecology of the disease in dolphins from the Amakusa population.

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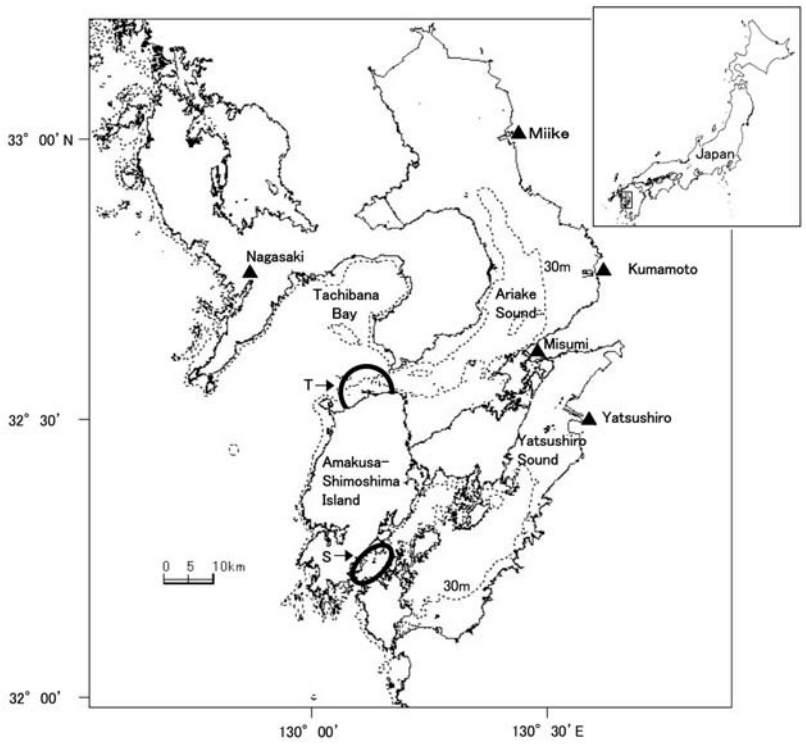

Fig. 1. Map of Ariake Sound, Tachibana Bay and Yatsushiro Sound, in western Kyushu, Japan. T = range of the theodolite tracking; S= area where the photo-identification survey was conducted for the southern community; black triangle= large port.

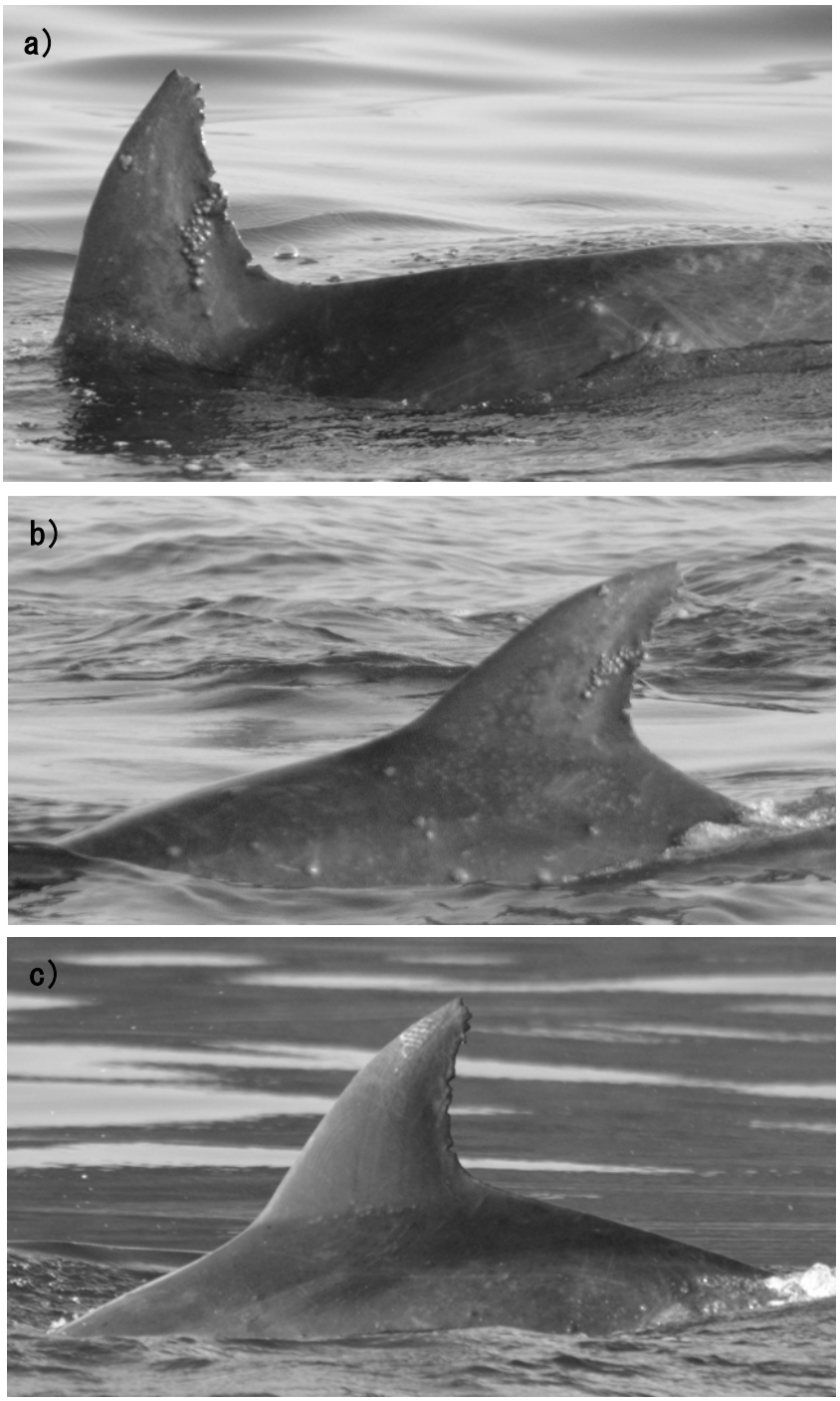

Fig.2. Mycotic disease in a *Tursiops aduncus* (#125) from the coastal waters of Amakusa-Shimoshima Island, western Kyushu, Japan. Photographs taken on 27 July 2007 (a, b) and on 29 July 2006 (c).