



Parasites of cetaceans stranded on the Pacific coast of Costa Rica

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ARTICLE INFO

Article history:

Received 7 May 2010

Received in revised form 31 March 2011

Accepted 12 May 2011

Keywords:

Dolphin
Whale
Helminth
Pathology
Stranding
Pacific Sea

ABSTRACT

Information regarding parasitic fauna of cetaceans from Costa Rica is provided for the first time. A total of 25 stranded dolphins and whales were examined between 2001 and 2009, including striped dolphin (*Stenella coeruleoalba*) ($n = 19$), pantropical spotted dolphin (*S. attenuata*) ($n = 2$), spinner dolphin (*S. longirostris*) ($n = 1$), bottlenose dolphin (*Tursiops truncatus*) ($n = 1$), dwarf sperm whale (*Kogia sima*) ($n = 1$) and Cuvier's beaked whale (*Ziphius cavirostris*) ($n = 1$). Pathological findings associated with the parasites are also presented. In the most representative dolphin species, *S. coeruleoalba*, the prevalence of parasites was 89.5%; moreover, all examined specimens of *S. attenuata*, *S. longirostris*, *T. truncatus* and *Z. cavirostris* presented parasites. No parasites were recovered from *K. sima*. Fourteen helminth taxa were identified, including six species of cestodes (*Strobilocephalus triangularis*, *Tetrabothrius forsteri*, *Trigonocotyle* sp., *Phyllobothrium delphini*, *Monorygma grimaldi*, *Tetraphyllidea* gen. sp. plerocercoid), four digeneans (*Nasitrema globicephalae*, *Brachycladium palliatum*, *B. pacificum* and *Oschmarinella albamarina*) and four nematodes (*Anisakis* spp., *Halocercus lagenorhynchi*, *Halocercus* sp. and *Crassicauda anthonyi*). A commensal crustacean, *Xenobalanus globicipitis*, was also identified. All identified parasites representing new geographic records for the Pacific coast of Central America and new host records are presented. Parasitological information is valuable for conservation of cetaceans in Pacific coast of Costa Rica.

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1. Introduction

The design and implementation of conservation plans for marine mammals is a matter of public concern. However, very little is known about the role of parasites in the dynamics of marine mammal populations (Raga et al., 1997). These animals commonly strand or are washed ashore along ocean beaches and the post mortem examination of them may provide information on causes of their death (Dailey and Walker, 1978; Raga et al., 1997; Gibson

et al., 1998; Jaber et al., 2006). The parasitic diseases as a factor in cetacean stranding behavior is still an area of current speculation, although for some authors the parasites are considered as a cause of debilitation or death (Dailey and Stroud, 1978; Stroud and Roffe, 1979; Gibson et al., 1998; Dailey, 2001; Jaber et al., 2006). Damage and mortality of individuals and populations caused by parasitic infections are dependent upon several factors, including the parasite species, its abundance, the health status of the host and competition with other pathogens (Raga et al., 2002).

Most Costa Rican marine mammals are cetaceans (5 families, 18 genera and 30 species), representing about 36% of the 83 species known worldwide, and 39% of all Latin American marine mammal species (Wehrmann and Cortés, 2009). About 27 marine mammal species have been observed or are expected to occur in the Pacific (96.5% are confirmed) and 29 (only 28% are confirmed) in the Caribbean waters of Costa Rica (Wehrmann and Cortés, 2009). Cetaceans are hosts of a great variety of parasites, which include nematodes, cestodes, trematodes, acanthocephalans and crustaceans (Aznar et al., 1994; Cerioni and Mariniello, 1996; Mignucci-Giannoni et al., 1998; Dailey, 2001; Ferti, 2002; Fernández et al., 2004; Colón-Llavina et al., 2009). Nevertheless, the parasite fauna of cetaceans from Costa Rica are unknown thereby the information gathered is valuable for conservation of these mammals.

In this work we provide the first records for parasite fauna of dolphins, dwarf sperm whale and Cuvier's beaked whale found stranded or dead along the Costa Rican Pacific coast. Additionally, pathological findings associated with them are also presented.

2. Materials and methods

Internal parasites were collected from 25 stranded and dead dolphins and whales on the Pacific coast from Costa Rica, during the period 2001–2009. In this period the following cetaceans were studied: 19 striped dolphin (*Stenella coeruleoalba*), 2 pantropical spotted dolphin (*S. attenuata*, previously known as *S. graffmani*), 1 spinner dolphin (*S. longirostris*), 1 bottlenose dolphin (*Tursiops truncatus*), 1 dwarf sperm whale (*Kogia sima*), and 1 Cuvier's beaked whale (*Ziphius cavirostris*). Biological data and geographic localities of these animals are presented in Table 1.

Either dead or moribund cetaceans were collected from the beach by the participants and volunteers of the Fundación Keto and transported to the Departamento de Patología, Escuela de Medicina Veterinaria, Universidad Nacional de Costa Rica where the necropsies were carried on. During necropsy, major organ systems were analyzed, including skin, blubber, muscles, abdominal cavity, alimentary system (esophagus, stomach, small and large intestine, liver and pancreatic blood vessels, hepatic and pancreatic ducts), urinary system (kidneys, ureters and urinary bladder), reproductive system, thoracic cavity, respiratory system (air sinuses, trachea, bronchi and lungs), and central nervous system. Animals were necropsied fresh or refrigerated but never frozen. Samples of affected tissues were fixed in 10% buffered neutral formalin and processed for conventional histopathology examination.

Table 1

Biological data and geographic localities of stranded cetaceans on the Pacific coast of Costa Rica, 2001–2009.

Species/case number	Sex/age	Beach/province
<i>Stenella coeruleoalba</i> :		
ND14701	F/J	Hermosa, Guanacaste
N9303	M/J	Undetermined
N16503	F/U	Playa Grande, Guanacaste
ND12504	F/U	Tambor, Puntarenas
NP14004	F/U	Osa, Puntarenas
ND2105	M/A	Matapalo, Puntarenas
ND2505	M/J	Matapalo, Puntarenas
ND3005	F/A	Tambor, Puntarenas
ND3805	F/J	Tambor, Puntarenas
ND1406	F/A	Tambor, Puntarenas
ND2506	F/J	Bahía Ballena, Puntarenas
ND3106	M/J	Esterillos Oeste, Puntarenas
ND7506	F/A	Guacalillo, Puntarenas
ND2307	M/J	Matapalo, Puntarenas
ND2407	F/A	San Isidro, Puntarenas
ND8107	F/A	Quepos, Puntarenas
ND5808	M/J	Puntarenas, Puntarenas
ND5509	M/J	Barú, Puntarenas
ND7309	F/A	Malpaís, Puntarenas
<i>S. attenuata</i> :		
ND204	M/J	Matapalo, Puntarenas
ND0109	M/S	Bajamar, Puntarenas
<i>S. longirostris</i> :		
ND7207	F/J	Tamarindo, Guanacaste
<i>Tursiops truncatus</i> :		
ND3909	F/A	Bahía Salinas, Guanacaste
<i>Kogia sima</i> :		
ND6106	F/C	Matapalo, Puntarenas
<i>Ziphius cavirostris</i> :		
ND4009	F/A	Matapalo, Puntarenas

A – adult; C – calf; F – female; J – juvenile; M – male; S – senile; U – undetermined.

Where the collection of all parasites specimens was not feasible, representative samples were taken. The parasites recovered during post mortem examination were transported to the laboratory, washed in physiological saline, and fixed and preserved in 70% ethanol or (93 parts 70% ethanol: 5 parts 10% formaldehyde: 2 parts acetic acid) AFA. Because the examination of all of the specimens under light microscope was not feasible, so the samples were scanned and sorted under stereomicroscope and representatives of the different forms were prepared for examination under light microscope. The staining and mounting of the helminths were carried out as described by Gibson et al. (1998). Platyhelminth specimens were stained with Mayer's paracarmine, dehydrated in an alcohol series, cleared in beechwood creosote and mounted in Canada balsam, whereas nematodes were examined as wet-mounts in clearing agents, such as glycerin (for small worms), lactophenol or beechwood creosote (for large worms). These compounds were removed from the specimens by the use of acid-alcohol prior to their being returned to the storage ethanol or AFA. On the other hand, the plerocercoids were processed as described by Agusti et al. (2005a). Most plerocercoids were collected alive and were stained with eosin, dehydrated in 70% (v/v) ethanol, and cleared with lactophenol.

Barnacles were observed under a stereomicroscope. The identification was based on Rajaguru and Shantha (1992).

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