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(*Balaenoptera physalus*) stranded in Tierra  
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## ABSTRACT

Fin whales (*Balaenoptera physalus*) occur worldwide and can be found mainly in oceanic waters. Stranding may be caused by disease, starvation, abandonment, or other unknown reasons. This study reports the first confirmed record of *B. physalus* at the coast of Tierra del Fuego, Argentina (53°36'14.59"S/ 67°58'4.03"W) and provides information about the possible cause of death. Any superficial lesions were found and pathological analysis was not able to convincingly explain the stranding of the fin whale. However, histological section of lungs and respiratory tract showed a pneumonia principle that in combination with bad physical condition (e.g. insufficient fat deposits), may have contributed to its stranding and subsequent death.

## INTRODUCTION

Fin whales (*Balaenoptera physalus*) occur worldwide and can be found in all major oceans and open seas. Some populations are migratory, moving into colder waters during the spring and summer months to feed (e.g. high Antarctic waters), but the bulk of the population summer distribution is in between 40°-60°S in the South Atlantic Ocean (Notarbartolo di Sciara et al., 2003). This species is mainly oceanic but they can be seen near shore in areas where deep water approaches the coast (Jefferson et al., 2008). In Argentina Sea, sightings and strandings are very scarce due to their migratory routes that are far away the coast in offshore waters (Crespo et al., 2008).

Fin whales travel alone, in pairs or in small groups (Notarbartolo di Sciara et al., 2003). Single fin whales stranding may be caused by disease, starvation, abandonment (exclusion from the group), or other unknown reasons (Alstrup et al., 2013). There are reports of diseases in whales caused by different pathogens such as viruses, bacteria and parasitic infections (Lambertsen, 1986; Jauniaux et al., 1998; Notarbartolo di Sciara et al., 2003). These agents cause different conditions that affect this group of cetaceans, one of them is pneumonia. Pneumonia and bronchopneumonia are frequently observed in many marine mammals in association with a variety of infectious agents and exposure to toxins (Chapter 15, Viral Diseases; Chapter 16, Bacterial Diseases; Chapter 18, Parasitic Diseases; Chapter 22, Toxicology in Dierauf & Gulland, 2001), but are also occasionally observed in the absence of an obvious pathogen (Griner, 1983; Howard et al., 1983a). Pneumonia is probably the most common serious disease of marine mammals. Subtle signs and less than dramatic hematology and serum chemistry results are characteristic of this malady. Often anorexia or declining appetite is the only apparent sign (Dierauf & Gulland, 2001).

The goals of this study are: (1) report the first confirmed record of *B. physalus* at the coast of Tierra del Fuego (Argentina) and (2) provide information about the possible cause of death.

## **MATERIALS AND METHODS**

The stranded was reported on the night of 28 of July of 2016 at the northern coast of Rio Grande city, Tierra del Fuego (53°36'14.59"S/ 67°58'4.03"W). The animal was found by local citizens and was reported to the Municipal Government of Rio Grande. The necropsy was performed on 30 of July of 2016, following protocols of IMMA project. The specimen was identified according to its external morphological features and standard measurements were taken following Norris (1961).

The skeleton (# IMMA 06) is hold at the Centro de Interpretación de la Reserva Costa Atlántica of Rio Grande city and tissue samples are deposited at CADIC-CONICET.

Samples of lung, kidney, bladder, and muscle were taken for histopathology analyses. Histopathology was performed at CADIC and Universidad Nacional de La Plata (UNLP). Samples were fixed in 10% neutral-buffered formalin at room temperature and embedded in paraffin wax. Then, they were sectioned on a microtome to 5 mm thickness. Sections were stained in standard hematoxylin and eosin. The best section were mounted and examined under a microscope with a mounted camera.

## **RESULTS**

The fin whale was a young female of 15.8 m of total length. The age could not be determined but based on its length, was estimated to be approximately 2 y old corresponding to an immature animal (Aguilar & Lockyer, 1987).

Not superficial lesions were found. The subcutaneous and visceral fat deposits were in bad condition. The stomach was empty, only a small amount of brown fluid was present in the duodenum, jejunum, and ileum.

The histopathological analysis of kidney, bladder, and muscle presented conservative features. However, histological sections of lungs and respiratory tract showed characteristics compatibles with pneumonia such as pulmonary congestion, alveolar emphysema and frothy fluid in trachea and bronchi. Specifically, the histological sections of the lung showed an initial stage of acute pneumonia (lung inflammation): (1) blood infiltrate and epithelial desquamation (Figure 1); (2) alveolar epithelium filled with compound exudate containing pneumocytes and macrophages, which was observed also exudate in the light which is a response to the catarrhal (Figure 2); (3) lung emphysema (Figure 3) with partial destruction of interalveolar septa, leading to the permanent enlargement of the air spaces. Changes in the pulmonary parenchyma are accompanied by a thickening of the wall of the pulmonary vessels and the presence of an abundance of cells (macrophages) within the air spaces.

## **DISCUSSION**

Pneumonia is an important cause of morbidity and mortality in marine mammals and may have a variety of causes such as bacterial, viral, parasitic and mycotic (Gonzales-Viera et al., 2011). Besides in the respiratory system of marine mammals pathogenic bacteria can often be cultured more frequently than in other tissues and organs (Dunn et al., 2001). Bacterial pneumonia is a very common disease that can lead to the stranding and death of pinnipeds and cetaceans (Howard et al., 1983b), and bacterial respiratory infections often result from a heavy parasitism. Symptoms of lungworm infestation vary

with host and parasite species, as well as with intensity of infection. They include cough, dyspnea, lethargy, and potentially death (Dailey, 2001). Lungworms of the family Pseudalidae, genera *Halocercus*, *Pseudalius* and *Stenurus* are the most common parasites found in cetaceans (Measures, 2001). In this case, no parasites were found in the bronchi, so pneumonia caused by the presence of parasites in the alveoli could be ruled out. Nor was it possible to perform bacteriological analyzes to determine bacterial pneumonia and therefore, the origin of the pneumonia is unknown. Pneumonia and alveolitis are the most common findings in both cetaceans and pinnipeds. Pneumonia with congestion, edema, exudation into alveoli, proliferation of type II pneumocytes and syncytia are seen histologically (Dierauf & Gulland, 2001). We found that lungs were edematous with areas of emphysema and consolidation but proper diagnosis is essential to confirm etiology in any case.

The empty stomach and a small amount of fluid in the intestines, and the low amount of subcutaneous and visceral fat deposits indicate that the fin whale had not eaten for several days. The low amount of reserves of subcutaneous and visceral fat could indicate a low caloric consumption for several days. Emaciation could also be considered as a possible contributory factor leading to stranding (Alstrup et al., 2013).

The disease condition was often serious, but not always identifiable with the cause of death. Frequently, the animals are affected by several types of diseases making diagnosis complex and difficult. Furthermore, lesions caused by stranding often masked signs of pre-existing disease creating further diagnostic problems. For example, when a cetacean gets stranded most of the body weight lies on the thorax and immobility, preventing venous circulation, causes congestion of the liver and other organs.

Although the necropsy was carried out within a few hours of death, we could not to make an accurate diagnosis of the causes of death. We conclude that none of the pathological findings can convincingly explain the stranding of the fin whale. However, the pneumonia principle and the insufficient fat deposits that suppose a bad physical condition, may have contributed to its stranding and subsequent death.

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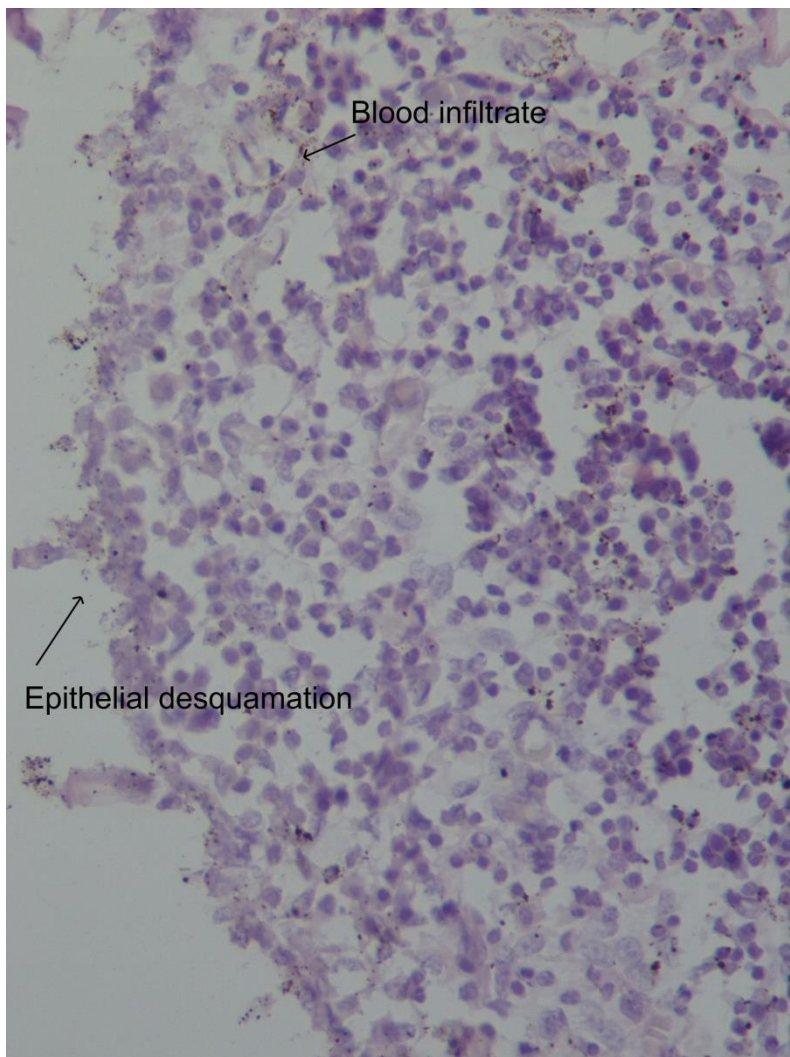
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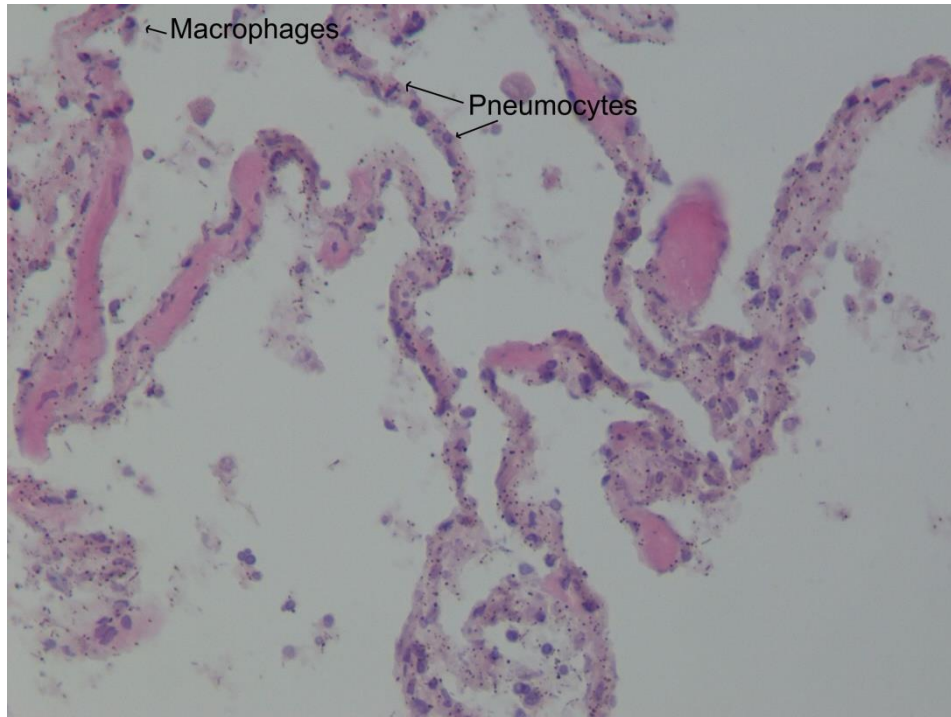
175 **Figure 1.** Histological section of the lung showing blood infiltration and epithelial  
176 desquamation of the lamina.



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179 **Figure 2.** Alveolar epithelium with pneumocytes and macrophages.



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192 **Figure 3.** Rupture of the alveolar walls (emphysema).

