

Report of skin disease in Southern Right Whale (*Eubalaena australis*) from Península Valdés, Argentina. A possible conservation concern.

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Introduction:

First records of skin lesions of Southern Right Whales were taken between 2005 and 2008 as part of a study of parasitic feeding behaviour of sea gulls on right whales. Many lesions are wounds caused by the attacks of kelp gulls (*Larus dominicanus*), that feed on the skin and blubber from whales' backs (Bertellotti et al. 2008, Fazio et al. 2012). A variety of other lesions of unknown etiology were observed, affecting both adults and calves born in this area (Bertellotti et al., 2008). Since gulls commonly feed on garbage and sewage in proximities of cities could carry a lot of pathogens that could cause some skin diseases in whales. Other hypothesis claim that injuries are associated with changes in the marine ecosystem where whales live. Changes in the marine environment caused either by climate alterations or anthropogenic factors contribute to the appearance of diseases that may affect several marine mammal species (Van Bressemer et al., 2009 b). The assessment of the cetacean species health condition at sea is difficult since it requires huge logistic efforts to be made. There are an increasing number of studies that use photo-identification images to evaluate dolphin and whale's skin diseases (Wilson et al., 1999; Van Bressemer et al., 2003; Pettis et al., 2004; Hamilton and Marx, 2005). The increasing occurrence of skin lesions in Southern Right Whales may reflect their health status and may act as an indicator of

deterioration and alteration of the marine ecosystem in which whales live. There is mounting circumstantial evidence that chemical and biological pollution has increased the emergence and severity of several diseases in cetaceans (Aguilar & Borrell 1994, Ross 2002, Hall et al. 2006; Van Bresseem et al. 2007b). Climate changes can increase water temperatures, modify the distribution of vectors and reservoir species, change pathogen and host interaction dynamics and alter pathogen transmission cycles (Greer et al. 2008).

This report presents the preliminary results obtained from the study of skin lesions in right whales at Península Valdés, which is carried out as part of the doctoral thesis of the Vet. Carla Fiorito under the guidance of Prof. Dr Daniel M. Lombardo and Dr. Marcelo Bertellotti. This thesis is entirely developed in Argentina, in the Faculty of Veterinary Sciences of University of Buenos Aires (UBA). The objective of this work is to determine the causes of skin lesions observed in whales.

Material and methods

During 2012 and 2013 whale season, samples of skin lesions were taken from living and dead whales. We have used a variety of techniques, including biopsies of live whales, dissection of dead whales and swabs lesions in both living and dead whales. All individuals sampled were photographed. This will be used to obtain a complete assessment of the overall condition of the animal, number and distribution of lesions and its macroscopic characterization. All samples were taken under sterile conditions. The biopsy specimens and dissection were divided into 2 parts, one of which was placed in 10% buffered formalin for histopathological analysis. The other half was stored at -70 ° C for later analysis. The samples were analyzed in laboratories of Histology of the Faculty of Veterinary Sciences of the UBA.

Result and discussion:

As a result of analysis of injuries obtained during 2012 and 2013, we could detect the presence of viral and bacterial agents in whale skin lesions.

Viral agents: we confirmed the presence of poxvirus in skin lesions from Southern Right Whales. Lesions of 4 individuals stranded dead (three calves and one adult) were analyzed. Macroscopically, the lesions were rounded, with irregular edges and a slightly

raised center (Fig 1). Histopathological analysis showed typical intracytoplasmic inclusion bodies in epidermis cells (Fig 2). The sample was processed for transmission electronic microscopy (TEM). Viral particles were observed with morphology compatible with poxvirus (Fig 3). PCR assay was performed with positive results.

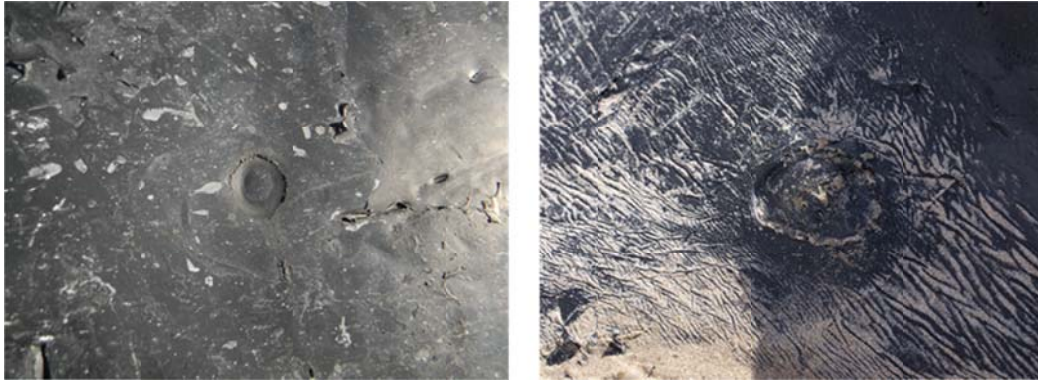


Figure 1. Macroscopic aspect of pox virus lesions from Southern Right Whales.

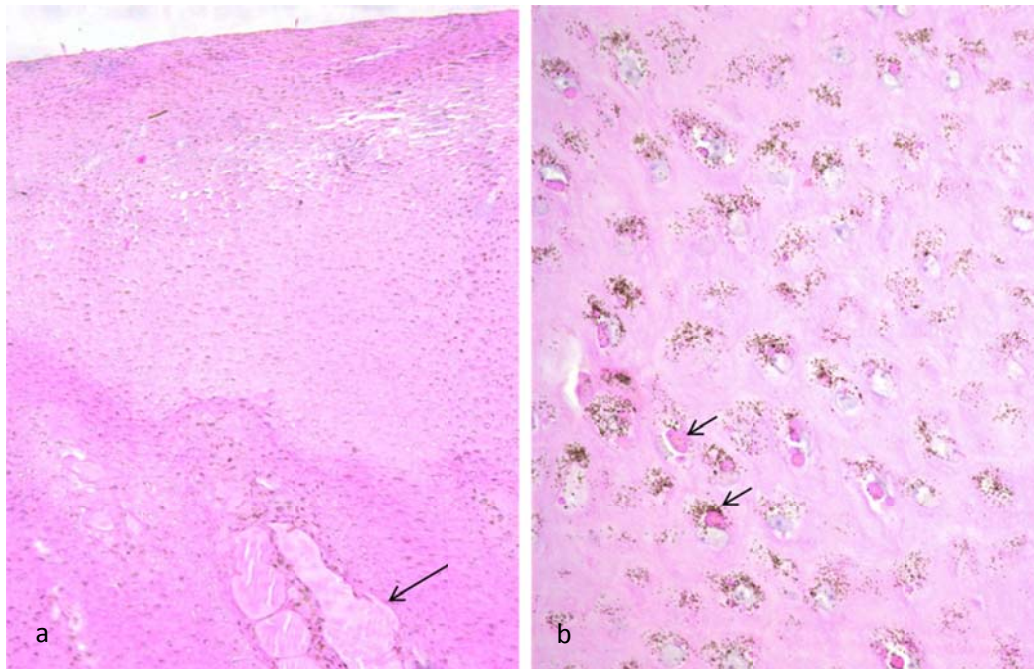


Figure 2. histological Section from lesion. (a) Note the microvesicles. (arrow) and the pale vacuolated zone. HE, 50X (b) eosinophilic inclusion bodies in the cytoplasm of the epithelial cells. HE, 400X

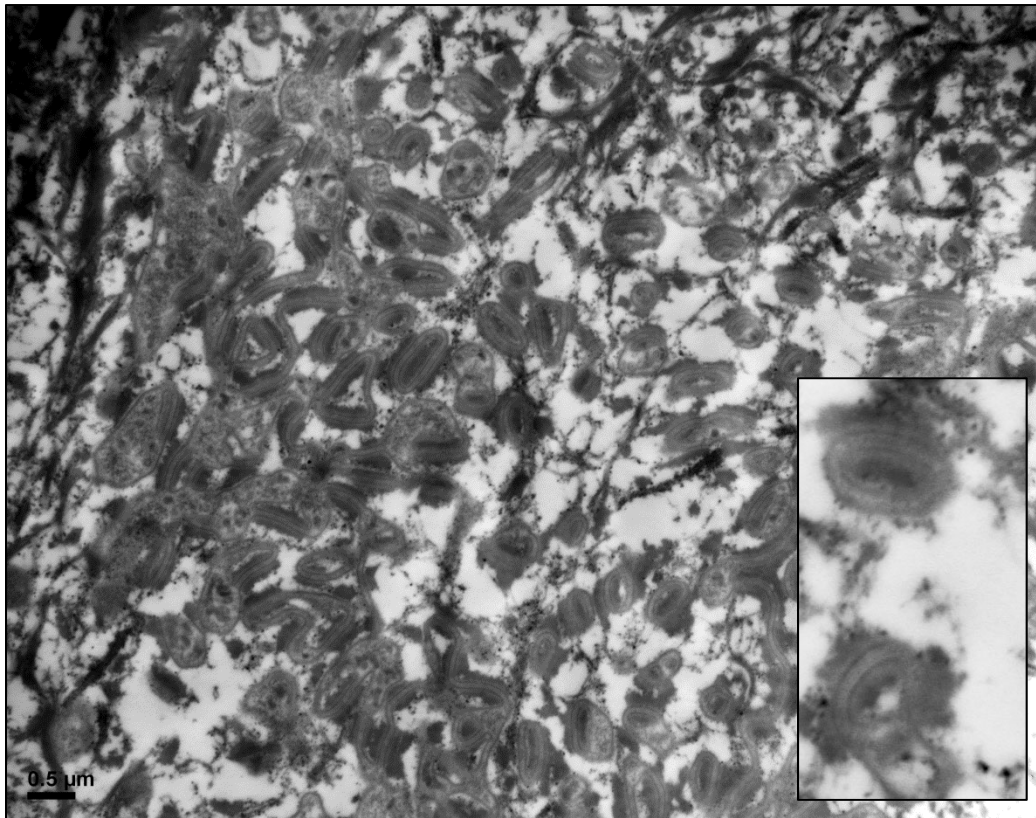


Fig. 3. Cluster of mature and immature poxvirus particles in cytoplasm of infected epithelial cell. Dumb-bell shaped core surrounded by two lateral bodies and enclosed by an outer membrane is visible in mature virions.

Bacterial agents: bacteria were isolated from swabs of wounds caused by seagulls. *Erysipelothrix* spp was isolated from wounds in a stranded and in a live whale. These wounds had a characteristic square edge (Fig 4). *Erysipelothrix* spp. is a facultative anaerobic, slender, Gram-positive, rod-shaped bacterium. The clinical disease associated with *Erysipelothrix* spp. is called erysipelas in birds and mammals or erysipeloid in humans. The pathognomonic sign of erysipelas in many species is the presence of diamond-shaped skin lesions (Wang et al. 2010). *Erysipelothrix* spp have been reported in several Cetaceans (Melero et al. 2011). It is generally believed that marine mammals acquire *Erysipelothrix* from the fish in their diet. But, opportunistic colonization of wounds could also be another route of infection. Also other bacteria were isolated, as *Enterococcus faecalis*, *Staphylococcus epidermidis*, *Streptococcus* spp.



Fig. 4. Wounds caused by seagulls with particular square shaped. *Erysipelotrix* spp was isolated from this wounds in a stranded and in a live whale.

Southern right whale is considered Least Concern by the IUCN. However, in Argentina, whales are exposed to other threats that could affect their conservation status. Each year, whales come to Península Valdés waters to breed. On these coasts with high human population, whales are exposed to various anthropogenic threats such as pollution, collision with vessels, and other stressors, such as seagull's attack, which could act by promoting the emergence of diseases.

The increasing appearance of skin lesions in the population of southern right whales could act as an indicator of impairment and alteration of the marine ecosystem in which they developed.

The discoveries of new pathogens that affect the population of southern right whales are within the main priorities for the conservation of the species. In this sense, confirmation of poxvirus and isolation of potentially pathogenic bacteria from wounds caused by

seagulls, open a new chapter in the study of threats that affect the whales in Península Valdés. The presence of poxvirus in cetacean populations is strongly linked to stressors and is postulated which is a clear sign of environmental degradation. While the prevalence is still under analysis, preliminary results show that a large percentage of whales have at least one Poxvirus like lesion. Another concern issue is related to the effect of kelp gulls attack on right whales. Isolation of bacteria from wounds caused by gulls, shows that those wounds are a route of entry for pathogens, which could even be causing the death of some individuals.

We believe it is necessary to continue these studies in order to identify the etiology of skin lesions in whales. Efforts should be directed towards a proper sample collection, mainly in live whales. In this sense, the swab has proved a useful tool for the isolation of bacteria from wounds in living whales. It is currently developing a new device by which sampling will be more efficient. Monitoring and diagnosis of the health status of the southern right whale is of crucial importance, as it would provide tools for the proper management of this resource that has significant ecological, economic and social value.

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