

Insights into Brucella and other gram negative bacteria infecting marine mammals

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As with their terrestrial counterparts, marine mammals are colonized by a range of bacteria, some of which are friendly and others which can cause disease.

The [bacteria](#) from cetaceans and [seals](#) however are poorly documented in contrast to most land-based species. PhD candidate Geoffrey Foster has studied in detail the Gram negative bacteria recovered from marine mammals and found that some of those have significance beyond the host animals from which they were recovered.

Geoffrey Foster's doctoral research has investigated the Gram negative bacteria infecting marine mammals. The precise identification of

organisms is a fundamental basis for the study of disease in animals. While bacteriology is a well-developed discipline for medical and terrestrial animals, much less is known about the organisms which infect marine mammals, the significance for their hosts and potential to act as zoonotic agents.

Bacteria were isolated from cetaceans and seals which had stranded around the Scottish coastline, while others came from material submitted from elsewhere in Europe, the Caspian Sea and Antarctica. Detailed phenotypic and phylogenetic analysis has resulted in the description of two new genera and five new species. Some of the bacteria investigated reside within groups already considered to be zoonotic, including the first isolations of *Brucella* from several species of cetacean and seal.

Brucellosis is endemic amongst marine mammals

The WHO/FAO regard brucellosis as the most important bacterial zoonosis in the world. The first isolation of *Brucella* from a marine mammal was made at Inverness and evidence from follow-up research and surveillance around the world has demonstrated that these organisms are endemic amongst cetaceans and seals. [Marine mammal](#) *Brucella* were shown to be distinct from species that infect terrestrial animals, moreover differences were also found between those with cetaceans as preferred and those from seals.

Salmonella and Campylobacter adapted to marine mammals

Salmonella and *Campylobacter* represent two other bacterial genera which are regarded as zoonotic, causing gastroenteritis, septicaemia and occasionally other disease conditions. A surprise finding has been a *Salmonella* species which is host-adapted to harbor porpoises and is

atypical in many respects compared to other members of the genus. Most notably, this organism appears to reside mostly in lung tissue, which is in stark contrast to other Salmonellae which typically colonise the intestine.

Campylobacter is a genus of bacteria which has members associated with gastroenteritis in humans and with abortion in livestock. A new species of Campylobacter was detected from seals and a porpoise in Scotland. The organism has since been reported from elsewhere in the world, but whether it has the potential to cause disease for marine mammals or any other species remains unknown at present.

Host-adapted Pasteurellaceae

Members of the Pasteurellaceae are common residents of the mucous membranes of mammals and many species are adapted to particular host species, sometimes as commensals while others can be pathogenic. Three new species of Pasteurellaceae have been described from cetaceans. One of these *Actinobacillus delphinicola* is frequently recovered from various cetacean species, while another, *Actinobacillus scotiae* is much less commonly found and in the three porpoise carcasses from which it was recovered it appeared to be a cause of septicaemia.

A unique ribotype of *Bordetella bronchiseptica* infects seals in the North Sea

Bordetella bronchiseptica was a major cause of secondary bacterial infection and death during morbillivirus outbreaks of seals. A collection of isolates from morbillivirus epidemics of North Sea seals in 1988 and 2002 as well as isolates collected during non-outbreak years and one isolate from Denmark were all found to belong to a single ribotype. This contrasts with other [species](#) for which ribotyping had proved more discriminatory.

Geoffrey Foster defended his doctoral thesis on 8th September 2011 for the title of Dr. Philos at The Norwegian School of Veterinary Science. The thesis is entitled: [Gram Negative Bacteria](#) Infecting Marine Mammals.

Provided by Norwegian School of Veterinary Science

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