

## **Extinction of Icelandic walrus coincides with Norse settlement**

**An international collaboration of scientists in Iceland, Denmark and the Netherlands has for the first time used ancient DNA analyses and C14-dating to demonstrate the past existence of a unique population of Icelandic walrus that went extinct shortly after Norse settlement some 1100 years ago. Walrus hunting and ivory trade was probably the principal cause of extinction, being one of the earliest examples of commercially driven overexploitation of marine resources.**



Prehistoric and historic walrus skulls, tusks and bone fragments often wash ashore on the southern coast of Snæfellsnes peninsula in Iceland. Photo by H.J. Malmquist.

The presence of walrus in Iceland in the past and its apparent disappearance as early as in the Settlement and Commonwealth periods (870–1262 AD) has long puzzled the scientific world. In a study recently published in the journal *Molecular Biology and Evolution* the scientists addressed the question by analysing ancient and contemporary DNA along with carbon-14 dating of walrus remains, supplemented with detailed studies of finding localities of the remains, place names and references to walrus hunting in the Icelandic Mediaeval literature, including the Icelandic Sagas.

“Natural History Museum collections provide a remarkable window into the past, which with modern day technology allow us to explore the past effects of human activities and environmental change on species and ecosystems. This can be further put into context by studying the Icelandic Mediaeval literature, historic place names and zooarchaeological sites,” explains instigator of the research Hilmar J. Malmquist, Director of the Icelandic Museum of Natural History, Reykjavik, Iceland.

### **A long-term population of genetically unique walrus in Iceland**

The scientists used carbon-14 dating of walrus remains found in Iceland to reveal that walrus inhabited Iceland for thousands of years, but disappeared shortly after the country’s settlement around 870 AD by the Norse. DNA was extracted from natural finding sites and archaeological excavations of walrus samples, and compared to data from contemporary walruses, documenting that the Icelandic walrus constituted a genetically unique lineage, distinct from all other historic and contemporary walrus populations in the North Atlantic.

“Our study provides one of the earliest examples of local extinction of a marine species following human arrival and overexploitation. It further adds to the debate about the role of humans in the extinction of megafauna, supporting a growing body of evidence that wherever humans turn up, the local environment and ecosystem suffers”, says Morten Tange Olsen, Assistant Professor at Globe Institute, University of Copenhagen.

### **Walrus ivory was a luxury good**

Walrus ivory was a luxury good in high demand and widely traded across Viking Age and Medieval Europe with beautifully ornamented tusks documented as far away as the Middle East and India. Most examples of trade and human overexploitation and extinction of local marine resources are of much more recent date, such as overfishing, and commercial whaling for the past three centuries or so.

Lead author Xénia Keighley, who is completing a PhD at the GLOBE Institute in Copenhagen and the Arctic Centre in Groningen concludes that; “We show that already in the Viking Age, more than 1000 years ago, commercial hunting, economic incentives and trade networks were of sufficient scale and intensity to result in significant, irreversible ecological impacts on the marine environment, potentially exacerbated by a warming climate and volcanism. The reliance on marine mammal resources for both consumption and trade has so far been underestimated

The research was conducted by Xénia Keighley (University of Copenhagen and University of Groningen), Snæbjörn Pálsson (University of Iceland), Bjarni F. Einarsson (Archaeological Office in Iceland), Aevan Petersen, Meritxell Fernández-Coll (Icelandic Museum of Natural History), Peter Jordan (University of Groningen), Morten Tange Olsen (University of Copenhagen), and Hilmar J. Malmquist (Icelandic Museum of Natural History). It forms part of the ArchSci2020 PhD Training

Network which has received funding from the European Union's Framework Programme for Research and Innovation Horizon 2020, as well as the National Science Foundation, USA.

## **Facts**

- The walrus (*Odobenus rosmarus*) grows up to three meters in length and live up to 40 years. The male weighs up to 1500 kg, while the female is slightly smaller. Both males and females have tusks.
- The walrus occurs throughout the Arctic, divided in two subspecies, the Atlantic and Pacific walrus. The Atlantic walrus to which the Icelandic belonged numbers approximately 30.000 animals and occurs in north-eastern Canada, Greenland, Svalbard and north-western Russia.
- The Norse of the Viking Age were the first people to settle permanently in Iceland around 870 AD, and later colonised Greenland, where they also hunted walruses for food and trade with walrus tusks and hides.

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