

Pathways, Considerations and Collaborations of Traditional Knowledge and Science to Describe Narwhal Tusk Function

Martin T. Nweeia, Cornelius Nutarak, Frederick C. Eichmiller, David Angnatsiak, Pavia Nielsen, Peter V. Hauschka

Traditional knowledge on the narwhal has been collected through video interviews, map renderings, written records and audio recordings in the High Arctic communities of Nunavut and Greenland where narwhal hunting is prevalent. Observations of migration, anatomy, population and behavior have been useful at various points along the line of scientific inquiry about narwhal tusk function. Since the writings of Albertus Magnus over 500 years ago, the function of the narwhal tusk has eluded scientific discovery. The 2-3 meter, straight, spiraled tooth, horizontally erupting outward through the upper lip of most males, is one of two formed tusks, the other remaining impacted in the upper jaw. Such anatomy, morphology, asymmetry and dimorphic attributes are unprecedented among mammals. Likewise, the evolutionary link to Artiodactyl origins, and the embryologic loss of four pairs of potential teeth provide few clues to understand tusk function. Despite eating large fish, there are no teeth in a narwhal's mouth for functional considerations of biting and chewing.

Inuit and Inughuit elders and hunters have assisted on scientific field expeditions, in the collection of specimens, and by sharing knowledge. Field expedition teams in Nunavut have included at least four Inuit hunters each field season to help capture and restrain narwhal that are tested for tusk sensitivity. Hunters have also been trained and enlisted to prepare specimens for laboratory analysis that are shipped from these established scientific High Arctic outposts. Knowledge and observations from hunters has been offered and shared for the tusk research, and in prepared publications, workshops and conferences. Full inclusion of elders and hunters as collaborators, authors and presenters is held as a model for information exchange and presentation. Participation, preservation, and presentation of this knowledge have been completed and continue to be sought in an effort to extend outreach and bring these collected insights to a wider audience. Collaboration which utilizes different methodologies from scientists, elders and hunters, though useful and important, may also present difficulties. Each group has identified issues with the acceptance and appreciation of the other's methods. Discussion of the different ways of thinking, sharing and holding knowledge within scientific and indigenous cultures is useful for future investigations seeking to combine such different approaches and participant views. Difficult questions in organismal biology can benefit from such collaborative models which seek different perspectives. Sensitivity to the methodologies and values of each contributing group by the other is needed to reinforce successful outcomes and ongoing positive collaborations.