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### Dental materials science meets the 'unicorn' tooth *National Geographic Society films story of narwhal tooth*

Posted 06/23/2004

By Craig Palmer

Gaithersburg, Md. — They would tell a story of the narwhal, the Arctic explorer dentist, the National Geographic Society and the ADA Foundation [Paffenbarger Research Center](#).

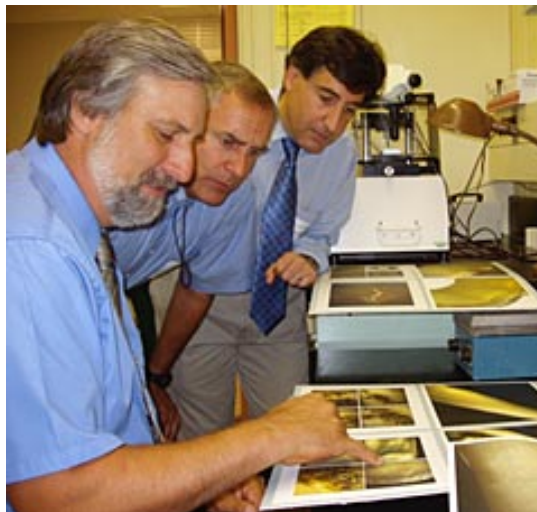
First they would better understand "the most extraordinary tooth in nature," whose mysteries have captured the imagination while eluding the inquisition of science.

Players on a stage of "serious adventure science," they met June 21 at PRC labs to film a sequence, mere footage, in the story of the spiraled unicorn tusk protruding as tooth from the upper jaw and through the lip to and through the seas of icy mystery navigated by the arctic whale, *Monodon monoceros*. The narwhal is often referred to as the "unicorn" whale for its six- to nine-foot off-center tooth.

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[Tracking nature's 'most extraordinary tooth'](#)

[Web site follows narwhal tooth through history](#)



Dr. Martin T. Nweeia, a private practice dentist, explorer, anthropologist and teacher, is principal investigator for the Narwhal Tooth Expedition and Research Investigation. One phase of this multi-faceted, multi-funded, cross-cultural international investigation, a tooth analysis by ADAF research scientists in collaboration with the National Geographic Society, brings dental materials research to bear on the mysteries of the narwhal.

"We started a project about a year ago with Dr. Nweeia and the NGS doing analysis of the tooth of the narwhal," said Dr. Frederick Eichmiller, director of the ADA Foundation PRC. "Our lab is doing the structural composition and properties of the tooth tissue from samples collected during an

**Expert eyes:** Drs. Eichmiller (left) and Nweeia (right) examine micro-spectroscopic images of the tip of the narwhal tooth with National Geographic executive producer Greg Marshall. (Photo by Anna Ng Delort)

expedition (the second of Dr. Nweeia's continuing expeditions)."

Drs. Eichmiller and Nweeia, joined by ADAF PRC staff, explained their various technological investigations as a National Geographic crew filmed their discussions

around visual images produced to date. These investigations in PRC labs at the National Institute of Standards and Technology use infrared micro-spectroscopy to examine the crystalline structure and formation of narwhal teeth for insight on composition and growth. Other institutions are conducting CAT (computed axial tomography) scans, soft tissue and DNA (genetic information) analysis and other tests.

"The overall goal is to determine what this tooth is and what function or role it plays for the whale," said Dr. Eichmiller. "Among the theories is that it could be an acoustic or electromagnetic antenna of some sort, or that it's used for feeding or has some other mechanical function."

There is no endpoint here at the beginning of an analysis that may well go beyond the singularly spectacular if poorly understood tooth of a lesser known member of the family of whales. The story line could take us to the very nature of teeth. "It might provide some insight to how we can strengthen human teeth," said Dr. Eichmiller of the ADAF PRC.

"We're putting a story together," he said. In a sense, it's a story of the tooth in nature as well as the nature of teeth. Dr. Eichmiller and colleagues wonder aloud of this whale's tooth, its purpose, its function, its genesis, "At what point is it no longer a tooth?" Might it be more sensor than tooth? "It broadens our definition of what teeth are for, not so much what a tooth is."

More information on Dr. Nweeia's narwhal tooth research is posted at [www.narwhal.org](http://www.narwhal.org).

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### Tracking nature's 'most extraordinary tooth'

Posted 06/23/2004

By *Craig Palmer*

*Gaithersburg, Md.* — Dr. Martin T. Nweeia returns to the ice floe in August for international investigation of "one of nature's most intriguing mysteries," the unicorn tooth of the narwhal.

"The narwhal's tooth is really, without question, the most extraordinary tooth in nature," he said between takes of a National Geographic Society filming of one phase of his Narwhal Tooth Expedition and Research Investigation ([see related report](#)). The project takes him for a third time to tracking narwhals where ice meets habitat between Arctic Circle and North Pole, polar bear watch mandatory by all hands 24/7.



**Extraordinary tooth:** The narwhal is often referred to as the "unicorn" whale for its six- to nine-foot off-center tooth.

Dr. Nweeia draws little distinction between the practice of dentistry and his explorations on the nature of teeth, curiosity and professional pride coming quick to explanation.

"I'd like to see the dental profession figure this out. It's extraordinary what's going on here. Teeth are incredibly fascinating organs and the most unique of all is this particular tooth of the narwhal. I want to figure out this mystery of nature which has eluded scientists for hundreds of years. I want to know what the purpose and function of this tooth is. It's only unconventional research because it's never been done."

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He describes his first expedition as a cultural entry point to narwhal habitat, see for example, "On Meeting David" at [www.narwhal.org](http://www.narwhal.org). The second expedition took a museum collection direction with institutional support from the Smithsonian Institution, The Harvard Museum of Comparative Zoology and Harvard School of Dental Medicine and a corporate grant from the Sunstar Butler Company.

"What possible answers and findings may come from such an investigation?" he asks. "As there is no other precedent set for such an unusual expression of teeth in nature, the insights gained will help us understand both the narwhal and possible properties of human teeth. Questions will be formulated to address possible associations and functions of narwhal teeth."

A 13-member team of Canadian, Danish and U.S. researchers with Inuit guides takes the investigation directly to the functioning, performing narwhal tooth Aug. 6-25 on the outer edge of the ice floe of Admiralty Inlet, Territory of Nunavut, Canada.

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## Web site follows narwhal tooth through history

Posted 06/23/2004

*By Craig Palmer*

What is it about the narwhal tooth that captures the imagination? Dr. Martin T. Nweeia takes us through a history of the legend and lore of "the fabled tooth of the unicorn" at the [Narwhal Tooth Expedition and Research Investigation Web site](#).

"The famous Unicorn Tapestries, six from the Lady and the Unicorn hanging at the Cluny Museum in Paris and seven from the Hunt of the Unicorn at the Cloisters Museum in New York, are among the most famous and well known tapestries in the world," he explains. "The unicorn and its narwhal tooth protruding from the head, continues as an endless source of fascination in modern culture."

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