Can Whales Get the Bends?

Scuba divers can get decompression sickness, or the bends, a painful and potentially fatal condition, from ascending too quickly from a deep dive. That causes dissolved gas to come out of solution and form bubbles in the body. But can whales and dolphins, for whom deep diving is a way of life, ever get the bends?

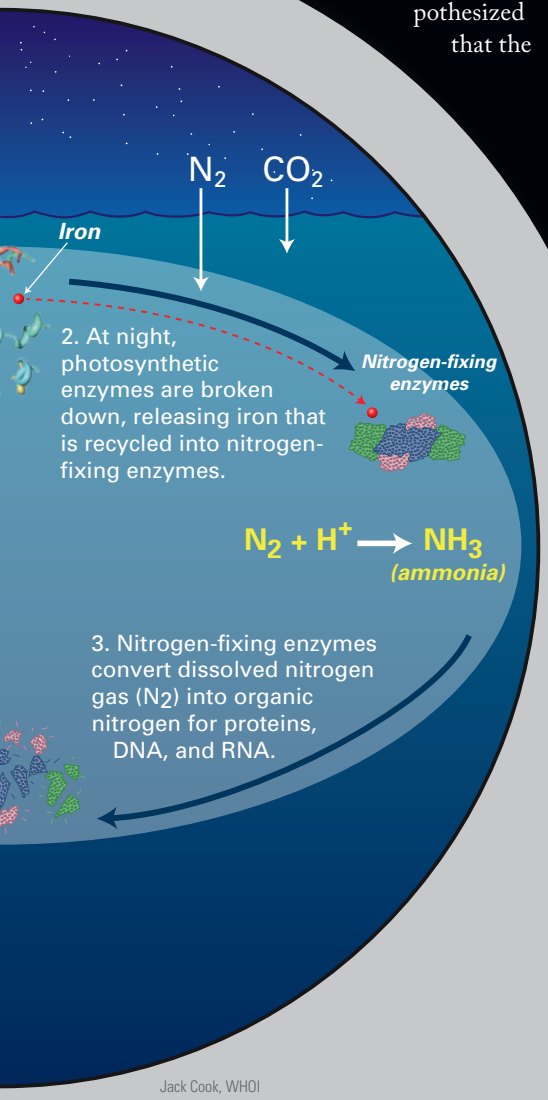
To learn how marine mammals manage gas under pressure in the depths, biologist Michael Moore and colleagues at Woods Hole Oceanographic Institution examined animals that had stranded ashore and reported evidence of bubbles in seemingly healthy live animals.

The finding, published November 2011 in *Proceedings of The Royal Society B*, informs previous research in which they found lesions in a rib of a dead sperm whale that had washed ashore on Nantucket (right). They hypothesized that the lesions were caused by tiny bubbles circulating in the whale's body that had obstructed blood flow and led to bone damage.

Tom Kleindinst, WHOI

"Until recently the dogma was that marine mammals have anatomical, physiological, and behavioral adaptations to make the bends not a problem," said Moore, who is director of the Marine Mammal Center at WHOI. "There is no evidence that marine mammals get the bends routinely, but the most recent studies suggest that they are actively *avoiding* decompression, rather than simply not having issues with it."

In other words, unusual circumstances, such as exposure to sonar, might cause animals to alter their usual diving behavior in ways that result in their getting the bends. But, as yet, there is no proof.



Jack Cook, WHOI

"*Crocosphaera* have a bit of a Dr. Jekyll and Mr. Hyde lifestyle," said Mak Saito, a WHOI biogeochemist and lead author of the *PNAS* paper. Scientists previously knew cyanobacteria had this unusual dual-metabolic capacity, but they did not know how they could accomplish it with meager iron supplies.

The scientists called the strategy "hot bunking," referring to the practice of ships sailing with fewer bunks than sailors on board. The bunks are kept continuously in use, as sailors finishing night shifts hop into bunks newly emptied by sailors arising for day shifts.

Crocosphaera expend energy to destroy and rebuild the two sets of enzymes each day, but it's worth it to maximize the use of scarce iron. The scientists estimated that by using the hot-bunking strategy, the organisms can survive with about 40 percent less iron than they would otherwise need. That allows *Crocosphaera* to thrive and produce life-sustaining organic nitrogen in iron-poor waters that would otherwise be far less productive.

—Lonny Lippsett

Funding for this research came from the National Science Foundation, an Environmental Protection Agency Star Fellowship, the WHOI Ocean Life Institute, the NSF-funded Center for Microbial Research and Education, and the Center for Environmental Bioinorganic Chemistry at Princeton University.