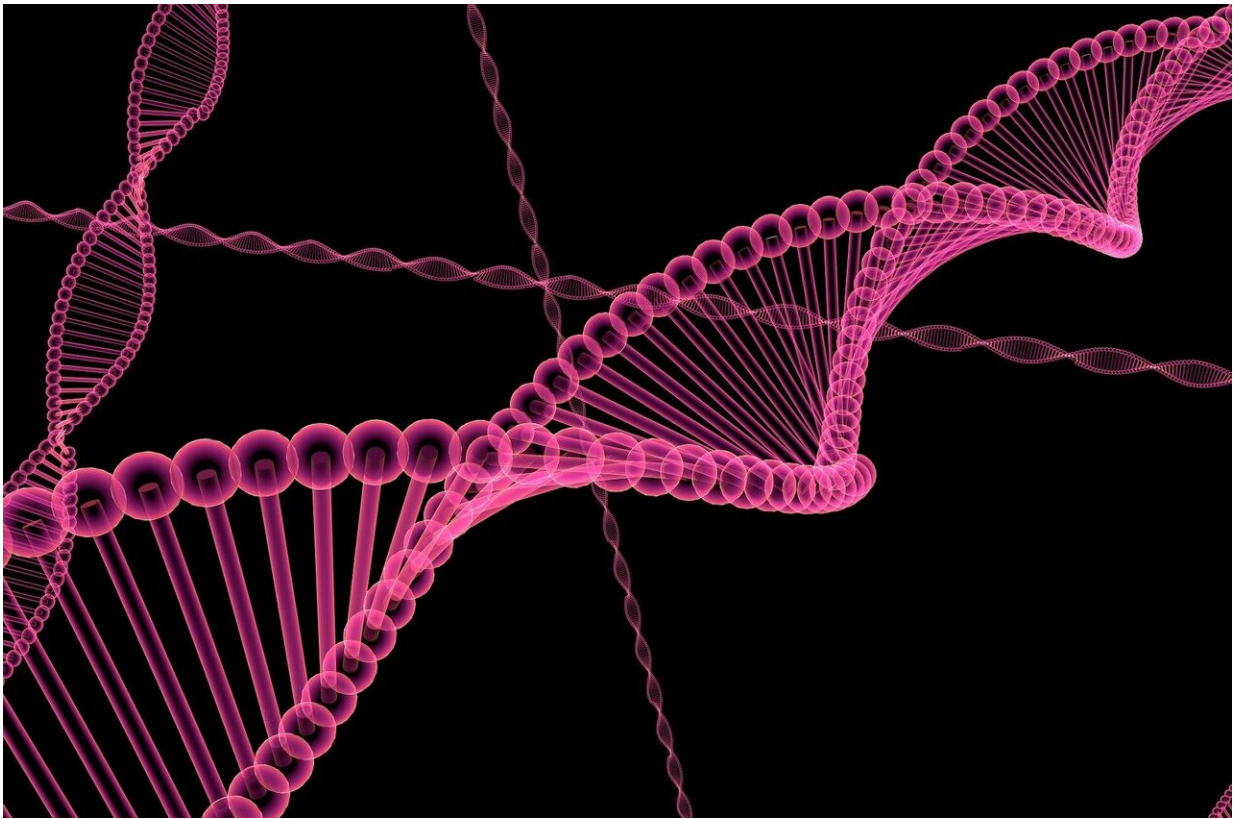


Research helps expand genome sequencing of marine mammals

May 7 2020



Credit: CC0 Public Domain

Researchers will soon have access to the full genomic sequences for 23 marine mammal species preserved by the National Institute of Standards and Technology (NIST), thanks to an ongoing collaboration between

NIST and a scientific consortium called the DNA Zoo.

The specimens come from a longstanding project known as the National Marine Mammal Tissue Bank (NMMTB), which NIST maintains in partnership with the National Oceanic and Atmospheric Administration (NOAA). In 1987, NIST, NOAA and partner organizations began to collect marine mammal specimens in Alaska for [scientific research](#). Two years later this work expanded into the lower 48 states and eventually into the Pacific Islands region. These efforts were formally established as the NMMTB in 1992.

Today, more than 4,500 specimens from 1,182 animals and 50 species of marine mammals are archived at the NIST Biorepository, a national facility located in the Hollings Marine Laboratory in Charleston, South Carolina. Carefully collected and preserved for up to decades, the specimens provide insights into changing environmental conditions. For example, by comparing whale tissue collected in the 1980s to more recent samples from the same species, scientists can learn about changes in pollution levels, whale diet and more.

Now, the biorepository is providing tissue for genomic sequencing that can be used by researchers around the world for a wide variety of research projects, including many in conservation and wildlife management. In the current collaboration, the DNA Zoo requested specimens from 23 species of marine mammals for genomic sequencing.

The instructions of life are contained in the genome's DNA, which can have many billions of base pairs, known by their abbreviations A, T, C and G. By knowing the DNA sequence of the genome, scientists can determine genetic changes that might cause disease or identify which parts of the genome contain the life-sustaining instructions for an organism.

Sequencing has already helped conservation biologists create sustainable management techniques for mitigating wildlife problems and may prove key in the future use of environmental DNA (eDNA), the bits of DNA shed by organisms in the environment. Scientists use eDNA to analyze water or [soil samples](#) containing tiny bits of skin, urine, hair and other biological materials to identify the presence of a given species.

Researchers from the U.S. Forest Service recently announced, for example, that they were able to scoop up snowy footprints and use those specimens to conclusively confirm the presence of a lynx in a forested area in the Northern Rocky Mountains, thanks to having a strong DNA sequence for the wildcats.

Marine biologists want to expand eDNA for use in ocean water to identify the presence of marine mammals, but they will need more high-quality sequences for the hard-to-track animals. NIST is addressing this issue by collaborating with the DNA Zoo. The nonprofit informal consortium uses current technology to assemble DNA sequences quickly and inexpensively. It makes the completed genomes freely available to anyone, without any restrictions.

"We want the scientific community to take full advantage of the information," said Olga Dudchenko, a lead researcher with the DNA Zoo and a research scientist at Baylor College of Medicine in Houston, Texas.

Dudchenko noted that marine mammal samples such as those coming from NIST's Biorepository are usually hard to obtain. At Baylor, the staff at the Center for Genome Architecture works closely with organizations such as the Houston Zoo, Busch Gardens, San Antonio Zoo, the Duke Lemur Center, and Shedd Aquarium to get samples of blood left over from animal exams.

"Marine mammals are much more difficult to sample," she said. The animals are often very large, and not always available at zoos and aquariums. NIST and NOAA's willingness to collaborate and provide small bits of tissue to the consortium has greatly expanded the variety of genomes available for researchers all over the world, she said.

"By providing these samples and working with this consortium, we are expanding access for anyone who wants to study these animals," said Ben Neely, the NIST biochemist who helped to facilitate the transfer of samples for processing.

Recent NIST sample contributions have enabled sequencing of endangered species including the North Atlantic right whale (*Eubalaena glacialis*) and the extremely rare Gulf of Mexico Bryde's whale (*Balaenoptera edeni*). Neely also noted that the data is available immediately after each genome is completed.

Provided by National Institute of Standards and Technology

Citation: Research helps expand genome sequencing of marine mammals (2020, May 7)
retrieved 30 April 2024 from
<https://phys.org/news/2020-05-genome-sequencing-marine-mammals.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.