WEIRD & WILD

272-Year-Old Shark Is Longest-Lived Vertebrate on Earth

Greenland sharks also don't reproduce until they're around 150 years old, a new study says.

A Greenland shark swims under the ice in Lancaster Sound off Nunavut, Canada.

PHOTOGRAPH BY FRANCO BANFI, NATURE PICTURE LIBRARY/ALAMY

It's no fish tale: The Greenland shark is the longest-lived vertebrate on the planet, a new study says.

The animal, native to the cold, deep waters of the North Atlantic, can live to at least 272 years—and possibly to the ripe old age of 500. (Related: "Meet the Animal That Lives for 11,000 Years.")

“We had an expectation that they would be very long-lived animals, but I was surprised that they turned out to be as old as they did,” says study leader Julius Nielsen, a biologist at the University of Copenhagen.

Because of its remote habitat and elusive nature, the giant shark is poorly understood, including how long it lives.

Some research had suggested they grow extremely slowly, less than half an inch (a centimeter) per year, suggesting a life span well beyond those of other vertebrates.

Unexpected Shark Gives Explorer Shock of His Life

A National Geographic researcher is startled to see a Greenland shark where none has ever been seen before—off Russia's Franz Josef Land.

Determining a bony fish's age can be easily done by analyzing their otoliths, or ear stones. But sharks, which are made mostly of cartilage, lack this kind of hard, calcified tissue. (Read more about sharks, the lords of the sea, in *National Geographic* magazine.)

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So scientists found another way to figure out the age of Greenland sharks: looking into their eyes.

Fishy Estimates

The researchers analyzed 28 female Greenland sharks that had died accidentally during the Greenland Institute for Natural Resources' commercial fish-monitoring program.

"The secret behind the success of this study is that we had young and old animals, medium-sized and large animals, and we could compare them all," Nielsen notes.

Greenland sharks have a unique eye structure in that the lens grows throughout an animal's

lifetime. The older an animal gets, the more layers are added to the lens. Scientists can't count the layers as they would tree rings, but they can remove all the layers that have been added over the years until they reach the center, or the embryonic nucleus, of the lens. (See "Rare Whales Can Live to Nearly 200, Eye Tissue Reveals.")

This tissue is composed of proteins that were formed when the shark was a young pup. Scientists can analyze the chemical composition of the eye lens nucleus to estimate an animal's age.

Radiocarbon dating of the 28 Greenland sharks' lens nuclei revealed a maximum life span of at least 272 years, according to the study, published August 11 in the journal *Science*.

A Greenland was shark accidentally caught as bycatch on a research vessel in southwestern Greenland.

PHOTOGRAPH BY JULIUS NIELSEN

The largest shark in the study, at 16.5 feet (five meters) in length, was estimated to be approximately 392 years old. Nielsen says there is some uncertainty around that estimate. He and his colleagues determined with 95 percent certainty that the shark was between 272 and 512 years old, and it was most likely around 390.

What's more, because female Greenland sharks are reported to reach sexual maturity at lengths greater than 13 feet (four meters), they likely would start breeding at 156 years of age.

It's unknown why they live so long, but cold environments cause low body temperatures, which in turn means slow metabolism—and thus less damage to animals' tissues.

Troubled Waters?

These results are crucial, Nielsen says, because the Greenland shark population is unknown. If the species is rare, the death of even one long-lived animal could be a huge loss. (See "Slow Sharks Sneak Up on Sleeping Seals [and Eat Them]?")

Not only is the shark sometimes caught by accident during fishing—a phenomenon called bycatch—but its habitat may be disturbed by climate change and many countries' increased focus on the Arctic for fishing, oil, and other natural resources.

"The longevity is remarkable, but I hope the public recognizes how important that is with regard to how we manage and conserve Arctic and deepwater ecosystems," says Aaron Fisk, an ecologist at the University of Windsor who was not involved with this research.

"If Greenland sharks live this long and don't reproduce until they are 150 years old, their population is vulnerable to exploitation."

Nielsen agrees: "It's important for policymakers to keep in mind that this is an extremely long-lived and slowly maturing animal.

"Fisheries should do what they can to minimize bycatch. We need to have some respect for them."