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The Oldest Bat
Longest-lived mammals offer clues to better aging in humans
Robert Locke

A tiny bat from Siberia set a new world record: The male Brandt's myotis is the oldest bat – and the oldest small mammal – ever documented. He has lived at least 41 years in the wild, a "really, really amazing" feat that has scientists wondering what this bat can tell us about healthy aging in humans.

The bat, part of a population of very long-lived Brandt's myotis (Myotis brandtii) that roost in caves of the Siberian region of Russia, was captured last year. It bore a numbered band that had been attached by researchers who first captured the bat in 1964. The old bat was examined and released.

The remarkable longevity of this new record holder was reported in the Journal of Gerontology by Andrej J. Podlutsky and Steven N. Austad of the University of Texas Health Science Center at San Antonio, and Alexander M. Khritankov and Nikolai D. Ovodov of the State Nature Reserve Stolby in Krasnoyarsk, Russia.

Until Khritankov and Ovodov reported their discovery of a different 38-year-old Brandt's myotis a few years ago, the record had been at least 34 years, held by a little brown myotis (Myotis lucifugus) in the United States.

Bats, Podlutsky said in an interview, break the rules of longevity. "They are the grand champions. It is very well established that in mammals, longevity depends on size. You have this correlation between body mass and longevity: [the smaller the animal, the shorter the life span]. Except for bats. With a very small body size, they live much, much longer."

The Gerontology paper said longevity of more than 20 years is documented for 22 bat species and more than 30 years for six species.

"That is why bats are so interesting to gerontologists, because of this paradox," said Podlutsky, associate professor of cellular and structural biology. "If you want to learn to swim, you take lessons from someone who swims well. Studying [aging in] bats is like having an Olympic champion as your swimming teacher."

The scientists said that the Brandt's myotis had lived 9.8 times longer than would have been expected based on its "longevity quotient" (maximum age standardized by body size). That is the highest value ever reported for any mammal, including those maintained in captivity. The human longevity quotient, with a record documented life span of 122 years, is 4.5, Podlutsky said.

And as important as the bat's great age is the fact that it reached that age in the wild, not in the protected and well-fed captivity of a laboratory. Even after 41 years, Podlutsky said, the bat's physical functions must have been very well preserved. Its ability to hear, to echolocate and to fly and maneuver rapidly had to remain at very high levels in order to capture prey and escape predators every day. "It is," he said, "like a human living to be 100 and still being as agile and fast and healthy as when he or she was young."

That secret, perhaps, is where these old bats might have some clues to share with us. How bats manage to live so long is a fascinating question that, the scientists said in their report, "should make bats of special interest for researchers studying mechanisms of slow aging."

One possibility is hibernation. Brandt's myotis in Siberia, for instance, hibernate from late

September to the middle of June, remaining active for only about three months a year. Bat species that hibernate live, on average, six years longer than those that do not hibernate. But even nonhibernating bats are unusually long-lived.

All the longest-lived Brandt's myotis and little brown myotis have been males, although it is unclear why that should be, the report notes. Males hibernate a bit longer, however, and females pay high energy costs for giving birth and nursing very large offspring.

Based on purely anecdotal reports, the study said, "long-lived animals seem to choose hibernation sites within caves that are highly buffered from the outside environment, and they also seem exceptionally placid, not struggling hard when being handled and returning to hibernation very quickly."

Environmental factors could figure in. While Brandt's myotis in Siberia are routinely very long-lived, a well-studied population of the species near Leningrad has much shorter individual life spans. Podlutsky said no explanation is clear, but the Leningrad population could face more predators or a less-secure food supply.

The precise mechanisms that might enable such longevity are of great interest to gerontologists, of course. Some reports suggest that bats, specifically little brown myotis, are resistant to cellular damage from oxidation.

And Podlutsky has taken skin cells from little brown myotis, grown them in the laboratory and stressed them with precise doses of gamma and ultraviolet radiation and with hydrogen peroxide. The bat cells survive these affronts with much less damage than mouse cells exposed to the same stresses.

Such results remain mostly speculative, but the re-searchers note, "Our results at least suggest that bats might have exceptional defense mechanisms against cellular damage."

Podlutsky is pushing bats as a better animal model for studying human aging. Mice currently are by far the most often used, even though their maximum life span in captivity is just three years and 90 of 100 mice in the wild die within nine months. Even laboratory mice kept in a protected environment, he said, show all the signs of aging at 2 years old.

Contrast that with bats, which weigh half what a mouse does and are still hunting successfully day after day at 30 or 40 years of age. "Studying mice [in aging research]," he said, "is like taking swimming lessons from someone who's never been in the water."

ROBERT LOCKE is Director of Publications for Bat Conservation International.