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The Life & Times of the Little Brown Myotis
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The little brown myotis is one of North America's most adaptable and far-ranging bats. It is the most abundant bat in many forested areas of the northern half of the United States, and its range spreads from Maine to California and from Alaska and Labrador south to central Mexico. Little browns thrive from sea level to elevations of at least 11,000 feet (3,355 meters).

These bats (*Myotis lucifugus*) have been so frequently encountered for so long – little browns, for example, are the most common tenants of North American bat houses – that they are often taken for granted by today's researchers. But this remains a fascinating species that's still wrapped in scientific mystery.

Because little brown myotis are found in such extremely varied, often harsh environments and because eastern populations show sharp behavioral differences from those of the West, scientists have long suspected that these visually -indistinguishable bats might, in fact, constitute more than one distinct species. And new tools of genetic analysis are beginning to offer strong hints that this is the case. Northeastern little brown myotis prefer extremely warm nursery roosts, often over 100 degrees F (38 degrees C). Researchers in Kentucky measured little brown myotis' body temperatures of up to 129 degrees F (53.9 degrees C), which is believed to be the highest body temperature survived by any mammal.

And yet, in a laboratory study in the West, ambient temperatures of 112 degrees F (44.5 degrees C) proved fatal to -little brown myotis, supporting the idea that more than a -single species may exist. Throughout their range in eastern North America, they hibernate in caves, abandoned mines or unused railroad tunnels. Hibernating populations of 300,000 to 500,000 are well documented, and some very large, abandoned mines may contain a million or more. Such sites may accommodate most of the species population within an area of 200 miles (325 kilometers) or more in all directions.

In the West, winter roosting habitat of the little brown myotis remains a mystery. In broad areas that are filled with little browns in summer, the species simply disappears in winter. It remains possible that a few appropriate caves or mines could contain large groups of these bats, but if so, they remain undiscovered. I suspect little brown myotis may rely on deep crevices in this area. Like other small bats, the little brown has a large surface area relative to its body size, which makes it highly susceptible to heat and evaporative water loss. Consequently, nursery colonies invest much of their time staying warm to reduce daily energy costs, especially in the northeastern United States and in Canada.

Little brown myotis typically cluster tightly when roosting, take feeding breaks at night roosts and, except when rearing young, will slip into the energy-saving state known as torpor when temperatures fall. (Torpor is similar to hibernation, in that the animal's pulse, respiration and overall metabolism are drastically reduced, with a corresponding reduction in energy needs.) Amazingly, they spend as much as eight months out of the year in hibernation.

Summertime

Little brown myotis colonies, especially nursery colonies, are found under loose bark and in tree hollows. But, faced with dwindling natural roosts, they also adapt well to buildings, especially those with hot and poorly ventilated attics.

Nursery colonies usually include several hundred mothers and young, but can total as many as 30,000 bats. Even in buildings, nursery roosts typically are found within a few hundred yards of a stream, pond or river over which the bats feed.

Males and nonreproductive females typically lead nomadic lives from spring to late summer. They travel alone or in groups (usually of no more than 20 bats) among a variety of cooler roosts: cavities in walls, behind shutters or loose shingles on buildings, bridge or rock crevices, spaces beneath loose bark, tree cavities, caves and mines.

Especially in the East, little browns usually emerge to feed when it is almost dark, apparently to reduce exposure to predators. In the West, they often emerge much earlier. They typically feed for two to three hours after sundown, when favored insects are most abundant, then spend several hours at a night roost, rejoining the hunt before dawn. Nursing mothers, however, often feed most of the night and barely visit night roosts at all.

Although little brown myotis seem to prefer feeding over water, they have been recorded hunting along stream and forest borders, trails, cliff faces, meadows and farmland and in forests from ground to canopy level. They are highly opportunistic in their diet. Major prey, depending on season and location, include aquatic insects, especially midges, mayflies, caddisflies and mosquitoes, as well as a variety of moths, beetles and crane flies.

These bats often feed in groups of 5 to 30 when hunting concentrations of small, swarming insects. They apparently locate insects at a distance of only about three feet (one meter), but can hear each other from 165 feet (50 meters) away, so they can quickly locate insect concentrations by simply eavesdropping on other bats' feeding buzzes (the very rapid burst of echolocation beeps that signal a bat's final approach to its prey).

On a good summer night, just one little brown myotis can capture more than 1,000 mosquito-sized insects in a single hour. And scientists have found that more than three-fourths of the little brown myotis they sampled (typically via droppings) had been eating mosquitoes, ranking these pests among the bats' three most important prey groups. A nursing mother bat eats up to 125 percent of her total body weight nightly.

Wintertime

Primarily in August and September, large numbers of little brown myotis and several other species visit caves, especially those in which they will hibernate later in the year. They fly in and out of the cave from dusk till dawn. This is known as swarming. The first phase of swarming occurs in August and appears to be exploratory, while the second phase begins with mating in September. During this period, females begin to enter hibernation. Both males and females arrive at hibernation sites together. In northern areas, females enter hibernation in September, followed by males in October, although a few bats may remain active as late as mid-November. They start emerging again in April and May. Hibernation season seems to begin about a month later in the South.

Once settled into hibernation, the bats typically remain in their caves until spring unless severely disturbed. They will, however, move about the cave in response to changing temperatures.

Most hibernation roosts range from 35 to 41 degrees F (2-5 degrees C) in the North and 41 to 50 degrees F (5-10 degrees C) in the South. The bats usually choose the most humid locations within that temperature range. Little brown myotis in the South will roost on cave walls that range from damp to wet, with bats sometimes completely covered with condensed-water droplets on their fur. By selecting appropriately low temperatures, hibernating little brown bats can reduce their metabolic rate to about 1 percent of their resting rate at 95 degrees F (35 degrees C). Heart rates, which are around 210 beats per minute at 95 degrees F, fall to 20 beats per minute at 44.5 degrees F (7 degrees C). A little brown in flight might have a heart rate of 1,365 beats per minute. Researchers also find that little brown myotis in hibernation commonly go for 45 minutes or more without taking a single breath.

Arousals from hibernation are extremely costly. It takes a hibernating bat about 44 minutes to wake up, and each arousal and associated activity cycle cost the bat about 107.9 milligrams of fat – enough to last 67 days during hibernation. Canadian researchers found that little brown myotis spent 84 percent of total fat reserves on arousals; the remaining 16 percent was spent on 193 days of hibernation. The spring migration usually begins in April in the North and March in the South, with females and young bats leaving first, followed by adult males. Travel to summer nursery sites is rather direct and usually completed by the end of May. In contrast, late summer and fall movements to hibernacula appear to be more leisurely and far less direct.

Reproduction

Reproduction is less complicated among little brown myotis than in other bats. Most mate in caves or mines at the beginning of hibernation, and no evidence of courtship has been reported. Mating is believed to be random and promiscuous. Males, in fact, mate not only with active females, but also with those in torpor.

After mating, the female retains the viable sperm in her uterus for seven or eight months. Females ovulate within hours of emerging from hibernation in spring, and that's when the egg is fertilized. Average gestation time is 50 to 60 days, but the timing is profoundly affected by feeding success and roost temperatures and may vary by as much as two to four weeks.

Just prior to giving birth, mothers reverse their normal roosting position to hang head-up, using their tail membrane to form a "basket" into which the baby emerges. Pups make their first flights 14 to 17 days after birth and are nursed for about 26 days.

It is clear that infants recognize and respond preferentially to their own mothers' voices. Although pups will try to nurse from any available female, they are usually rebuffed by all but their own mothers.

Little brown myotis that were banded and released by researchers have followed humans carrying other bats of the same group in cages for more than a quarter-mile (0.5 kilometer). Some trailing bats, quite possibly mothers of young inside the cages, even landed on the researchers' shoulders. The oldest reported little brown was a banded New York male that was still in apparently excellent health when last captured 34 years and eight months later. For their size, bats of this genus are the world's longest-lived mammals.

Conservation

Although this is one of the most abundant bats in North America, more than 90 percent of its known population relies on sanctuaries created in old mines for hibernation. Most have lost their original roosts in caves. Winter populations that numbered in the tens and even hundreds of thousands have been lost through careless disturbances of caves and closures of old mines. More bats are lost each year through extermination by needlessly frightened homeowners who fear them as rabies carriers – although this species is not known to have transmitted a single case to humans or other animals in all of recorded history. As consumers of countless yard and garden pests, including mosquitoes, the plight of the little brown myotis is our loss.

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