The softer side of bats, a crucial component of many ecosystems

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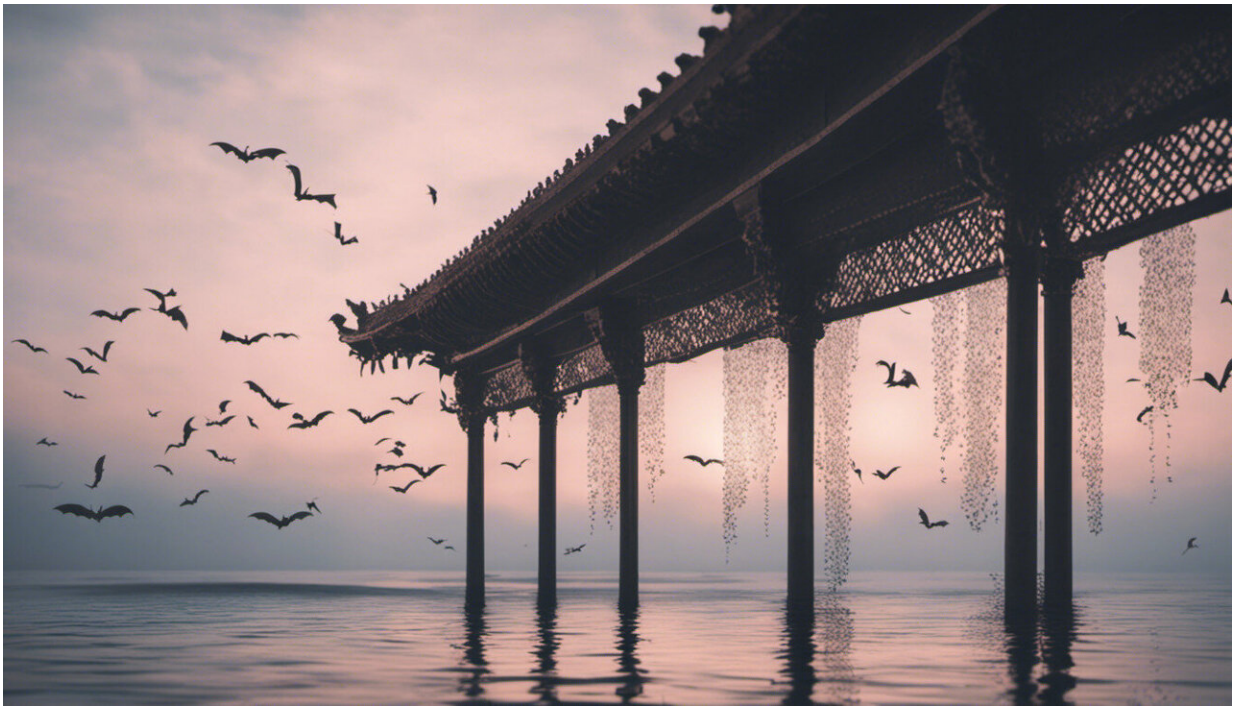

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A group of bats is often called a colony. But did you know it's also referred to as a cauldron? With that kind of language, it's easy to understand how these winged mammals came to be associated with Halloween. Long portrayed in media as blood-thirsty, disease-carrying night-stalkers, real bats don't quite live up to their notorious reputation.

While it's true they're nocturnal, most bats do not drink blood or attack humans, with rare exceptions. Though they may not be cute or cuddly, bats make important contributions to the ecosystem as well as to the fields of human medicine and technology.

Alison Robbins, V92, is assistant director for the Master's in Conservation Medicine (MCM) program and research assistant professor in the Department of Infectious Disease and Global Health at Cummings School of Veterinary Medicine at Tufts University. She has been at Tufts for nearly 30 years and has been researching bats for 15 years.

Much of her work has focused on white nose syndrome, a fungal disease first detected in New York in 2006 that has killed millions of northern long-eared, little brown, and tri-colored bats across the United States—with some populations declining by as much as a 95%, she says. Still, bats are the second largest group of mammals after rodents, spread on all continents except Antarctica, and found in various ecosystems from forests to deserts.

These days, she has shifted gears to population monitoring using a method for finding bats called acoustic monitoring. The work is part of the North American Bat Monitoring Program, or NABat, a continental-wide effort to collect data and look at population trends long term.

"We have bat detectors that can detect bat calls via monitors we put in the environment for a long period of time," says Robbins. "Similar to a camera trap, they are sound activated and automatically collect and record ultra-sonic audio calls that bats make while hunting insects. We download and analyze the data. Often, we can tell what species made the call, though some bats have overlapping calls."

She recently sat down with Tufts Now to talk about some of the many benefits to having 1,400 species of bats on our planet—even if

occasionally, they still give us the creeps.

Bats are pollinators. They drink nectar from plants and flowers and then spread the pollen as they fly from flower to flower. They're important for seed dispersal, too. For example, fruit-eating bats in subtropical and tropical regions eat fruits and spread the seeds around in their guano, or excrement. Agave, a plant used to make tequila and grown in Mexico and Southern California, is pollinated solely by bats.

"Many plants have co-evolved with bats," says Robbins. "For example, they flower at night, which wouldn't work for a nectar-seeking bird that flies during the day. Such plants also have special attractions for the bats so they can find the flowering plants. The shape of the flower fits the exact shape of the bats' faces. This co-evolution is very complicated and millions of years old."

They eat so many bugs. Bats eat enough bugs to save more than $3 billion per year across all agricultural production in the United States, according to the U.S. Fish and Wildlife Service. By some estimates, one little brown bat can eat up to 1,000 bugs in one hour, and nursing mothers may devour 4,000 bugs in an evening.

"Everybody always wants to know how many mosquitoes bats eat, which I can't exactly confirm," says Robbins. "But I think they prefer to hunt larger-bodied insects, like moths, because the mosquito does not provide much for a meal."

They help humans learn about flight. "Bats are the only true flighted mammals," says Robbins, noting that flying squirrels aren't technically flying, they're gliding. "Bats provide a biological mechanism for scientists to study in terms of how flight developed."

Bats have some impressive abilities that other flighted animals don't

have. For example, they can turn 180 degrees mid-flight with just three wing beats, according to the National Science Foundation (NSF). And their dexterous wings are designed to fold during flight, which is much different than bird wings. The NSF reports that ongoing research on bat wings may lead to better maneuverability of airplanes.

They're useful in biomedical research. Flight is an incredibly energetic process, and bats—like some birds—use torpor to help conserve energy. It's a survival mechanism similar to hibernation in which some warm-blooded animals can lower their heart rates and body temperatures. Bats can survive long periods of time in torpor, which historically has allowed bats to evade virus infection, Robbins says.

"However, this is a double-edged sword for bats because they also can harbor many viral infections, such as rabies, and not succumb to the diseases. Coronaviruses are very common in bats but may not cause any problems in infected bats, so they have mechanisms for suppressing the viruses."

They're also useful for technological development. Bats use echolocation to navigate flight patterns and find prey. Echolocation works when bats emit a high-frequency sound which bounces off their environment, sending echoes back to the bat. The bat uses the echoes to determine where it is in location to objects from which the echoes came, as well as the size of the objects. Modern technology such as ship sonar and ultrasound imaging were partly inspired by bat echolocation.

About the sucking blood thing. Only vampire bats consume blood, which they prefer to get from birds, cows, pigs, and other livestock. And they don't suck the blood; they bite an animal and lick the wound. Found in Central and South America, vampire bats are unlikely to cause problems for most people in North America.

How humans can help bats

Robbins outlined a few ways that humans can be bat friendly, like, for example, when bats get into a house. "A lot of bats prefer houses for their maternal colonies or overwintering," she says. "Bats will roost in houses where they'll have babies, usually at the end of May and June, and the young emerge in July and August, which is when most people get random bats flying in their houses. It's like the young teenager bats that don't listen to their parents and go the wrong way."

In most U.S. states, it's illegal to try to remove bats from your own house during the summer when the young are present, to help protect the population—and it's not a good idea anyway, Robbins says. Call a licensed animal control officer instead.

Not using pesticides or insecticides on yards and landscaping can help because bats eat insects that may have high levels of pesticides. Also, bats like the crevasses and cracked bark in old trees, so consider leaving them in the yard instead of chopping them down. For those folks who really love bats, Robbins suggests building a bat house on your property. Here are instructions from the National Wildlife Foundation.

Lastly, a note of caution that bat-friendliness is in spirit only. "Do not handle a downed bat," Robbins stresses, "because they are much more likely to have rabies than a bat that is flying around the house, which is a normal behavior."

Provided by Tufts University