Illinois is home to six different shrew species—including the world's smallest mammal.

Who Knew a Sh

Story By George Feldhamer and Joseph Whittaker

It would be difficult to find many Illinois residents who have not seen, or could not easily recognize, a white-tailed deer. Likewise, gray and fox squirrels are usually fixtures in suburban or rural backyards. Equally as common and widespread is a group of mammals that most people are much less familiar with—the shrews.

Unlike the closely related moles, whose tunneling activities in lawns are all too familiar to homeowners, shrews create few problems and are much less well known than their larger cousins.

There are more than 300 species of shrews worldwide, with six species occurring in Illinois. Several species of Illinois' shrews are common but rarely observed as they forage for insects in leaf litter and dense understory.

(Photo courtesy James F. Parnell.)

(Copyright C. C. Lockwood, 2006.)

nrew?

Secretive and seldom seen, North American shrews share one characteristic—red-tipped teeth.

Shrews have tiny eyes, long, pointed snouts, and short, dense dark fur. On those rare occasions when these cryptic animals are seen, people may mistake it for a mouse or vole.

The most common species in Illinois—and the largest—are the northern short-tailed shrew (*Blarina brevicauda*) and the southern short-tailed shrew (*B. carolinensis*), so similar in appearance that they are almost impossible to tell apart. Both have dark gray to black fur. Although "large" by shrew standards, they are only about 3 inches long, and weigh about 0.6 ounce.

Bodies of the smaller species in Illinois, including the pygmy shrew (*Sorex hoyi*) and closely related southeastern shrew (*S. longirostris*), are 2 inches long. Weighing no more than 0.1 ounce, it would take 160 pygmy shrews to equal 1 pound. Pygmy shrews are the smallest mammals in the world, and only a few have ever been found in Illinois.

From shrews to elephants, there is an inverse relationship between body size and metabolic rate in mammals. This is reflected in the number of heartbeats and breaths per minute. Because they are so small, shrews have extremely high metabolic rates that is directly responsible for their reputation as voracious predators.

Some of the smaller species probably forage throughout much of the day and night, eating close to their body weight in prey every 24 hours. Because they are so small, the normal heart rate of a pygmy shrew is 1,030 beats per minute, which gets even faster when an animal is stressed or exerts itself. Shrews represent the upper limit for how quickly a mammalian heart can beat. Physiologically, an animal cannot get any smaller and still be a mammal. These relationships also dictate the habitats where shrews are found. Because they lose so much water through rapid breathing, they are often associated with moist microhabitats in forests, grasslands, marshes and backyard gardens.

Weighing no more than 0.1 ounce, it would take 160 pygmy shrews to equal 1 pound.

Shrews are fascinating animals not only because of their tiny size but also because of how they make a living—their life history adaptations.

Generally solitary, shrews are too small to hibernate or migrate, and their average life span is only about one year. Short-tailed shrews secrete a neurotoxin—chemically similar to the venom

(Photo courtesy Southern Illinois University in Carbondale.)

To learn more about the daily activities of shrews, Joseph Whittaker live-captured and marked hundreds of the tiny mammals.

found in cobras—from one of their salivary glands that they use to immobilize invertebrate prey. Fortunately, because shrews are so small, being bitten poses no risk to people. Short-tailed shrews are among the very few mammals that use a toxin as part of their life history strategy (the duck-billed platypus is another).

All North American shrews have red-tipped teeth. The color results from iron deposits in the teeth that slow tooth wear from eating hard-shelled insects. Biologists can use the amount of tooth wear to estimate the age of individuals. If a shrew lived for two years (and almost none of them do), the teeth would be worn down to the gumline.

Shrews use echolocation to augment what they see. Like bats, they emit high frequency sound pulses above the range of human hearing. The returning echoes help them maneuver through habitat, communicate with other shrews, and detect their insect prey.

Shrews are active periodically throughout the day and night, but average activity is highly dependent on season of the year, at least in southern Illinois. To better understand how activity of individuals varies daily, seasonally or with the weather, researchers studied a population of southern short-tailed shrews in a forest in Jackson County.

Over a 30-month period, 313 individuals were live captured, marked and released more than 3,400 times. Because of the shrew's high metabolic rate, traps were checked every three hours to ensure that captured animals did not starve or die from stress.

The number of individuals on the site fluctuated throughout the year, but was highest following the spring breeding season when there were about 23 per acre. Many of these individuals were transients who failed to establish a territory and quickly disappeared from the population. With the exception of nursing females, it is difficult to determine the sex of living shrews, but we believe the sex ratio was about equal.

Although they must forage throughout much of the day, the activity patterns of resident shrews were closely related to seasonal temperatures. In the summer, shrews were much more active at night, when it was slightly cooler than during the day. Conversely, during winter, shrews were more active during the day, even though there were fewer hours of daylight. During autumn months, shrews were most active during twilight hours of dawn and dusk, while during spring there was no apparent pattern. Throughout the year, then, shrews are continually active but exhibit a tendency to reduce activity during temperature extremes. Likewise, activity was reduced during precipitation, but increased somewhat with increased humidity. Both weather factors probably resulted from direct effects on invertebrate prey.

Although few people are aware of it, a great drama continues day and night throughout the year in Illinois and elsewhere, as shrews in the leaf litter of forests and the mulch of gardens, live out their highly energetic, largely secretive and extremely short lives.

We have much more to learn about our tiny, fascinating neighbors.

Dr. George Feldhamer is a zoologist at Southern Illinois University in Carbondale (SIU-C). Dr. Joseph Whittaker earned his doctorate in zoology at SIU-C and now teaches at Pikeville College in Kentucky.