Land Snails in Illinois

Can snails live outside their shell? Can they bite? Test your knowledge of these under-appreciated slime producers.

Story and Photos
By Marla Coppolino

Mesodon zaletus
toothed globe, shell width 1 inch

The toothed globe snail (also top of page) is widely distributed in Illinois and common in hardwood forests.

Silently and slowly gliding in the damp, hidden nooks are some lowly yet important members of Illinois' natural habitats: the land snails.

Land snails, which include slugs, are one of the most understudied groups of animals, but they are certainly deserving of our attention. Often bearing the reputation as mere pests, Illinois' native land snails play an essential role in the functioning of its ecosystems. Approximately 124 species are currently known to inhabit the state's forests and grasslands, with more than 70 percent of species occupying wooded habitats in southern Illinois.

Very remarkable is their great variety of sizes and shapes. Snail shells can be conical in form to very flat and disc-shaped. The shell of the largest species measures more than an inch in width, while the tiniest is less than 1/16th inch across.

Named for the toothlike structure on the shell, the bladetooth wedge is one of the most common land snails in Illinois.

Xolotrema fosteri
bladetooth wedge, shell width 5/8 inch

Euchemotrema hubrichti
carinate pillsnail, shell width 3/8 inch

(Photo by Eric Johnson.)

Mesomphix friablis
brittle button, shell width 7/8 inch

Previously believed to be extinct, the only place in the world that the carinate pillsnail (above) is known to exist is some limestone bluffs in southern Illinois. Found in moist woodlands, the brittle button (right) has a blue-tinged body and translucent shell.

Also notable is that the majority of Illinois' species are quite small—less than 1/4 inch in shell width—and most of these inhabit the leaf litter of forested areas. They might be hard to detect by the unaided (and unknowing) human eye, but they exist, and are doing their jobs very well.

Land snails and slugs are members of the class Gastropoda, meaning "stomach-foot," because they move upon a large, muscular ventral surface called a foot. The animal's internal organs, which include a digestive gland, lung, heart and reproductive organs, are located within the mantle cavity, inside the shell of the animal. In the case of slugs, the organs are just behind the head region.

Gastropods include both land and aquatic snails, and are members of the phylum Mollusca, a diverse array of invertebrate animals including clams, mussels, limpets, chitons, tusk shells, octopuses and squid. Land snails are special in that they evolved from aquatic ancestors and possess many unique adaptations to survive in terrestrial habitats.

The Shell

Snails are easily recognizable animals because of their distinctive shells. Like those of their aquatic relatives, the land snails' shells offer protection from predators for the soft-bodied animal.

Anguispira alternata
tigersnail, shell width 7/8 inch

But for land snails, the shell also offers protection from desiccation, the most serious threat to terrestrial existence. The snail can withdraw its body far into the shell, and remain inactive for long periods of time when it is hot and dry or in freezing temperatures.

One common misconception about land snails is that they can "crawl away" from their shells. This is not possible because the snail is attached to its shell and it would survive for only a short time if removed. Only when a snail dies does it leave behind an empty shell.

The shell is present from the time the snail develops as an embryo. As a hatchling, it is thin and flexible, and has only about one whorl (a 360 degree coil from the center). As snails eat and grow, the shell thickens and additional coils form around the central axis. In adults of some species, projections grow within the aperture (the opening of the shell), which, when withdrawn into its shell, help protect the snail from predators. The projections are thought to help stabilize the weight of the shell when the snail is actively moving about.

Slugs are snails, too, but have evolved to not require the full shell of

The vivid, rust-color marking on the tigersnail make it easy to identify this common snail.

their shelled relatives. Many slugs actually do have a small bit of shell remaining under the surface of their skin, over the mantle area, but it does little to protect the animal. Instead, slugs have evolved other means of staying hydrated and protected. For one, their bodies produce more mucus than most shelled snails do, and it often is quite thick and resists evaporation. Some slugs curl up when provoked, while others writhe and secrete other chemicals that taste offensive to predators.

Philomycus carolinanus
Carolina mantleslug, body length 2 in.

Found in moist, deciduous woodland habitats, the Carolina mantleslug does not invade gardens.

Slime

Snails exude a slime trail, visible as a silvery path on the surface after they've crawled over it. Slime, or mucus, is an important adaptive mechanism to help the snail survive. Its body and foot have mucous glands, which secrete the mucus as it moves. The mucus makes it easier for snails to glide over any surface, even if rough or sharp. In fact, a snail can even crawl over the edge of a razor blade without getting cut.

Another benefit of mucous trails is that snails can sense and follow them, allowing them to follow other snails to areas of food or for breeding. Like a homing mechanism, the trails prevent snails from wandering off the known paths of safety.

Land snails glide on a large, muscular foot that contracts in waves in the direction the animal is moving. Glands in the foot produce mucus that aids in movement.

Mesodon zaletus
toothed globe, shell width 1 inch

Senses

Snails' bodies have well-developed tactile responses, one of the most important adaptations for soft-bodied animals. With one touch of your finger, most will quickly retreat into their shells.

Two pairs of tentacles (often mistakenly called "antennae") on the snail's head contain chemoreceptors at their tips. The longer pair also usually bears eye spots that don't form images but are capable of detecting changes in light. The lower pair is shorter, and used primarily for chemoreception, guiding the snail to food or to congregate with other snails. Snails have no ears, but they can detect vibrations.

Reproduction

Most of the land snails of Illinois are hermaphrodites, organisms that have both male and female reproductive organs. Although they are capable of self-fertilizing, most seek a mate with which they exchange sperm to fertilize the partner's eggs. Eggs are deposited in soil, or under logs or woody debris and then abandoned. Depending on the species, embryos develop and hatch in one to a few weeks, emerging as small snails with just one whorl of shell. Juvenile snails begin to feed immediately.

Feeding

Most land snails are generalist herbivores, consuming the detritus (decomposing plant material) of their environment. They also are known to consume soil directly and some fungi.

Snails eat by means of a structure in the mouth called the radula, a chitinous (similar to fingernail tissue) ribbon bearing fine teeth, with which it rasps off bits of food.

A few snail species in Illinois are carnivorous, either in part or as specialists.

Haplotrema concavum
gray-footed lancetooth snail, shell width 3/4 inch

Haplotrema concavum, the gray-footed lancetooth snail, feeds upon other land snails. Its radula is specially adapted with barb-like teeth, which enable it to tear the flesh of other snails. With this elongated "neck," it crawls inside the shell of its prey as it tries—unsuccessfully—to withdraw from the lancetooth. In addition to its carnivorous feeding abilities, these snails locate their prey by following mucous trails.

Land Snail Ecology

What makes land snails so important to Illinois' ecosystems?

Snails serve an essential role in the breakdown of plant material because they assimilate nutrients such as calcium, magnesium and potassium, and pass them to higher trophic levels when they are consumed by predators.

Snails are only one step above the

The only predatory land snail in Illinois, the gray-footed lancetooth (above) extends its long neck into the shell of other snails.

Euchemotrema hubrichti
carinate pillsnail, shell width 3/8 inch

The rare carinate pillsnail possesses a flying saucer-shaped shell (left). The author's (right) research focus has been the land snails of Illinois.

(Photo by Stephanie Clark.)

base of the food chain, meaning there are plenty of predators relying on snails for their dietary needs. A great diversity of animal life feeds upon land snails, from insects to lizards and snakes, salamanders, birds and mammals. Some species of fireflies consume snails exclusively during their larval stage.

Many birds rely on snails for the extra calcium they provide. One study showed that during egg-laying season, female wild turkeys consumed as much as 40 percent more snails than normal. The snails provide calcium and other nutrients vital to the formation of shells and embryos.

Some speculation exists that the decline of some snail predator species is related to the decline of land snails. A European study suggests the decline of forest birds is related to the decline of snails, whose populations have been adversely affected by acid rain.

Triangular-shaped bristles on the surface of its shell are used to identify the shagreen (right). Believed to have originated in western Europe, the gray fieldslug (below) has invaded many parts of the world and has become a garden pest.

The Fragile Existence of Land Snails in Illinois

Frank Collins Baker, a famous malacologist (someone who studies mollusks), lived in Illinois during the 1930s and wrote the "Fieldbook of Land Snails of Illinois," published in 1939 (Illinois Natural History Survey, Manual 2). Although most of the species names are outdated, it remains a useful guide.

Notable from Baker's range descriptions, as well as other field studies, land snail diversity and numbers appear to be on the decline. Many species that once occupied habitats in the Chicago area no longer exist (according to recent observations by the author and malacologists Stephanie Clark, Chicago Academy of Science and Jochen Gerber, The Field Museum), and some that Baker personally observed in southern Illinois have not been recorded again. Habitat destruction is likely the main cause. Because snails are slow-moving organisms with a "survive-where-you-are" strategy, they cannot escape clearing of their habitat, nor can they tolerate chemicals that run off our roads and lawns. Some species occupy very specific microhabitats, and tend to be very patchy in their distribution—another factor that can be detrimental if their niches are harmed.

Inflectarius inflectus
shagreen, shell width 1/2 inch

Certainly, more research is needed on land snails and their habitat requirements, but awareness is critical for anyone interested in preserving wildlife.

Land snails, and the vital role they play in ecosystems as a food source for many animals, deserve our respect, admiration and efforts to preserve habitat.

Preservation of natural habitats is necessary if snails are to thrive in Illinois.

Deroceras reticulatum
gray fieldslug, body length 2 in.

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