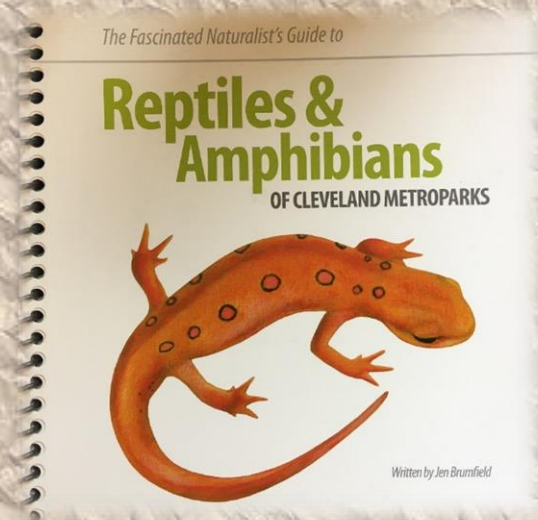
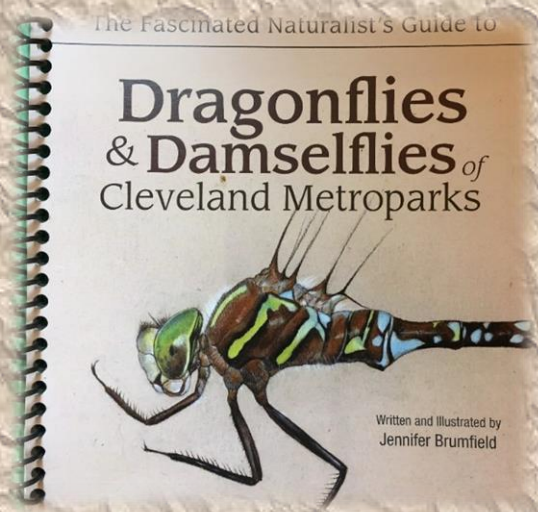
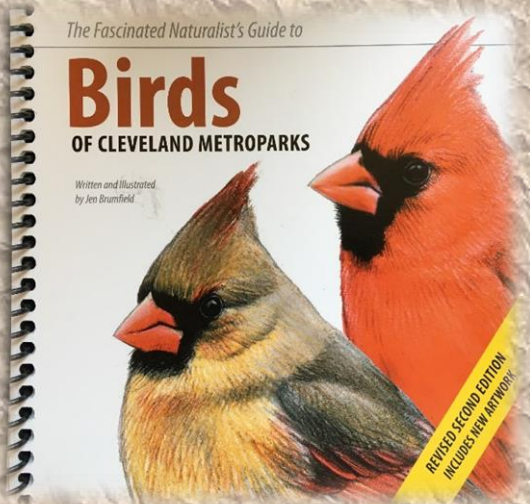


Fascinated Naturalist's
Field Guides

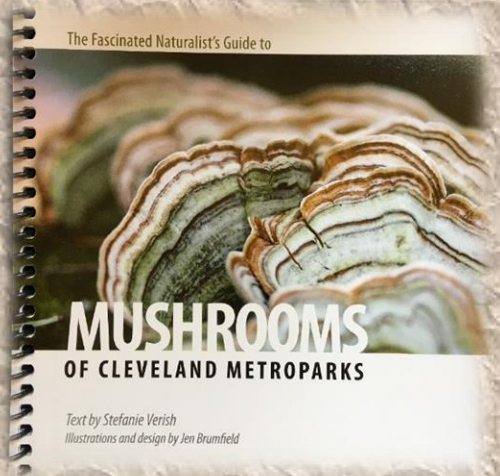
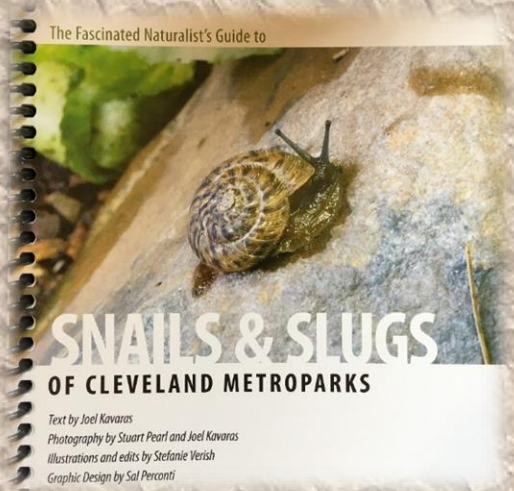
Inspiring Exploration



**Cleveland
Metroparks®**

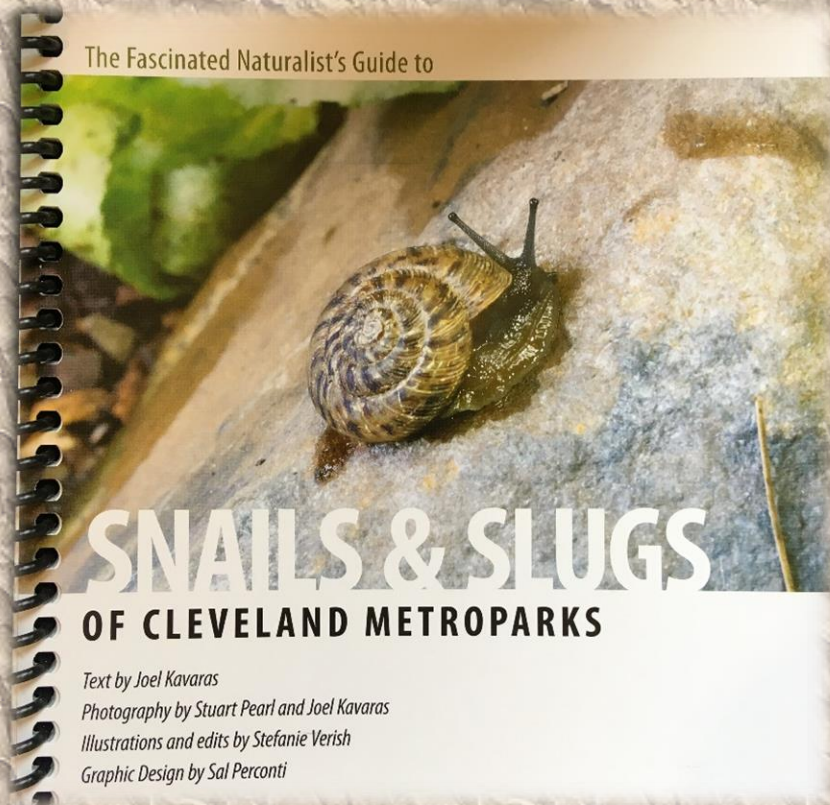


The Collection



Coming soon... *Fish of Cleveland Metroparks*





Fascinated Naturalist's Guides

- Affordable (\$5/book)
- Convenient (pocket-sized)
- Features wildlife in our parks
- Unique or popular topics
- Checklists to encourage exploration

Making nature accessible to visitors!

A truly collaborative effort!

Credits

**For use of their stunning photography,
we offer our enormous thanks to:
Stuart Pearl and Joel Kavaras**

**Text by
Joel Kavaras**

**Illustrations and Edits by
Stefanie Verish**

**Graphic Design by
Sal Perconti**

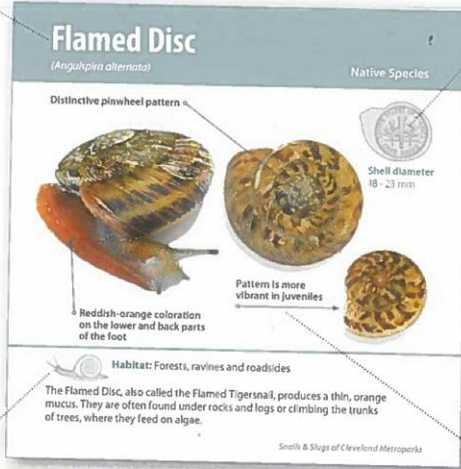
**Special thanks to
Debra Shankland,
Bethany Majeski and
Selby Majewski for their
help on this book.**



Using This Guide

Common and scientific name

Adult size comparison



Habitat and species information

Field marks

Glossary

Denticle: a calcium carbonate "tooth" inside the opening of a snail's shell, typically for predator defense or calcium storage.

Epiphragm: a film of mucus secreted across the opening of a snail's shell to prevent desiccation during long periods of dry weather.

Keel: a ridge that runs along the top of a snail or slug's tail.

Love Dart: a tiny spear-like structure that carries reproductive hormones and is thrust into a mate's body during copulation.

Mantle: the membranous organ that produces the shell in snails and protects the dorsal surface in slugs.

Pneumostome: an opening in the mantle that allows gas exchange; the breathing pore.

Protoconch: the larval shell of a snail when it hatches; the original shell from which the rest will grow throughout the snail's life.

Radula: the chitinous tongue-like organ in the mouth that is covered in tiny teeth and is used to rasp at food.

Tentacles: retractable sensory appendages on the snail's head. They function as chemical sensory receptors; the longer tentacles also contain the eyespots.

Tubercles: the raised sections on a snail or slug's body that appear as small elongated bumps.

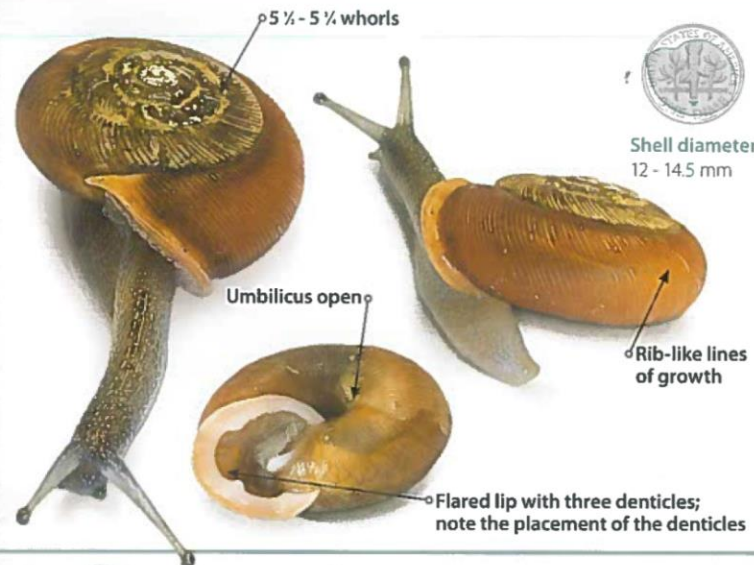
Umbilicus: a depression or opening at the base of the snail's shell. The umbilicus can be large enough to see up into the spire of the shell, small as a pinhole next to the aperture, or completely covered by the lip of the aperture.

A teaching tool

Northern Threetooth

(*Triodopsis tridentata*)

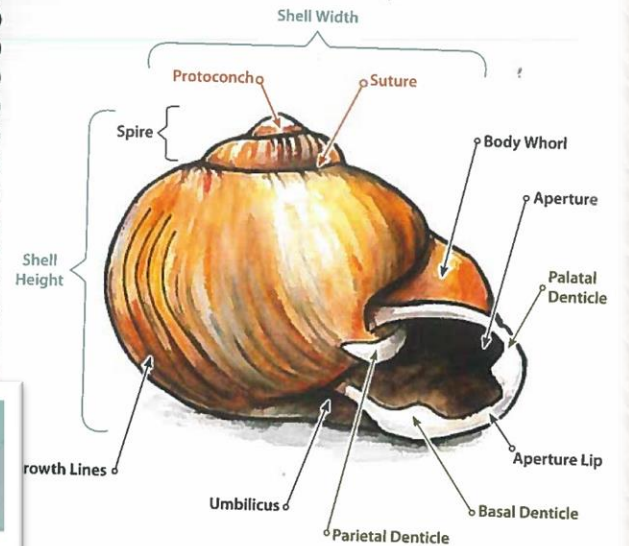
Native Species



Habitat: Forests, meadows and roadsides

Northern Threetooth snails are common in leaf litter and under rotting logs.

Using This Guide: Snail Anatomy



Checklist: Snails



Amber Snail (pg. 23)



Glossy Pillar (pg. 20)



Disc Snail (pg. 24)



Gloss Snail (pg. 21)



Dome Snail (pg. 22)



Northern Threetooth (pg. 19)



Flamed Disc (pg. 17)



Velvet Wedge (pg. 25)



Glass Snail (pg. 26)



White-lip Globe (pg. 18)



41

Go out and observe!

Where to Find Them

Land snails are found in a variety of habitats, each niche therein harboring a different assortment of species. The best land snail diversity is in forested river valleys and floodplains. Snails abound under rotting logs, loose bark, and among leaf litter. If it is especially humid or raining, you will see them crawling up the trunks of trees.

Other suitable habitats include swamp forests, the edges of fields and prairies, and even graveled roadsides, railroad tracks, and paved trails. The edges of wetlands and ponds are a niche for Amber Snails, which can be found on the stems of cattails and other emergent plants.

When looking for land snails, it is important to remember that a certain level of moisture is required for these animals to thrive. Even during dry spells (*and winter*), it is possible — though not easy — to find land snails. They survive difficult conditions by receding completely into their shell and forming a leathery film of mucus called an **epiphragm** over the aperture (*opening*), which retains moisture but has a tiny hole for gas exchange. Look for dormant snails deep in leaf litter or fastened to a rock or tree via their epiphragm. Searching for dormant slugs can be a challenge, as they retreat deep into crevices in rocks or rotting logs, where their surroundings retain moisture.



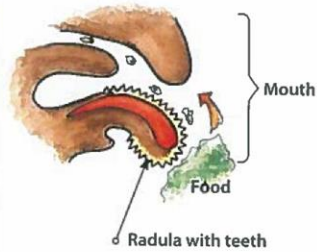
Food and Feeding Habits

The majority of native land snails in Cleveland Metroparks feed on plants, lichens, fungi, and decaying plants and animals. Non-native species will also feed on a variety of cultivated plants and are considered crop and garden pests.



Radula patterns on bark

Land snails have a mouth which contains a tongue-like structure known as a radula. The radula is made of chitin—the same material as insect exoskeletons—and is covered in thousands of tiny teeth arranged in rows. It is used to scrape or rasp food particles against the cartilage of the mouth, breaking them down into manageable pieces for the snail's digestive system.



5

Predators and Defenses

Land snails are small, slow, and soft-bodied, so they are often prey for other animals. Common predators include beetles and their larvae, flies, nematodes, mice, shrews, birds (especially ground foragers like wild turkey), turtles, and other snails. Land snails, however, are not defenseless and have evolved a variety of mechanisms to thwart predators.

For snails, defense against fellow invertebrates includes thick shell apertures (openings), and sometimes a set of teeth known as denticles that guard the aperture. Denticles are an effective means of blocking entry to the snail's shell, protecting the animal inside. For larger predators like birds, who can peck through the shell, the snail relies upon camouflage to avoid them. Most snail shells are dull shades of green, brown, or are translucent by design, and some have minute hairs which snare cobwebs and other debris to hide the animal.

Defensive mucus is a common adaptation amongst all land snails, and some species utilize showy colors to advertise their unpalatability. For example, the Dusky Arion slug is bright orange or yellow—a warning to predators that it produces a revolting and toxic mucus. In contrast, most native slugs are cryptically colored to blend in with the tree bark upon which they forage.

A snail may not escape the grasp of a predator unscathed. Cracks in the shell and severed tentacles are common injuries, but land snails are resilient. They use their shell-building mantle to repair damage, and severed tentacles can be regenerated.



8 Snails & Slugs of Cleveland Metroparks

Life Cycle and Reproduction

Most land snails are hermaphrodites, possessing both male and female reproductive organs, so after mating, both snails can lay eggs. In scattered populations, some species can self-fertilize. Certain land snails have mating rituals that employ "love darts." The darts are sharp, spear-shaped structures launched from the dart sac, into the mating partner's flesh. The dart transfers reproductive hormones that increase the odds of fertilization. In the case of the Leopard Slug (*Limax maximus*), partners coil around one another while suspended from a slime cord.

Copulation involves extrusion of the reproductive organs through an opening on the right side of the animal's head. For this reason, mating pairs align facing opposite directions, then expel and entwine their reproductive organs, which are sky-blue in color. In Cleveland Metroparks, mating is tied to seasonal weather patterns, so many species will mate in early summer when it is warm and damp, though mating can occur whenever conditions are viable. After mating, the snails separate and lay eggs, ovipositing either single eggs or clusters of eggs (depending on species) in damp, sheltered locations. Some species mate once before dying at the end of the season; others mate several times throughout their lives and may live for many years.



6 Snails & Slugs of Cleveland Metroparks

Becoming fascinated...

5 Things You Never Knew About Snails and Slugs

- Snails and slugs have a toothed tongue called a radula
- Heliculture harvests their mucus for skincare products
- They have both male and female reproductive parts
- Love darts transfer hormones to increase odds of reproduction
- Mucus makes them unpalatable but is also for transportation

Snails, Slugs and You

For those in Northeast Ohio, daily interactions with snails and slugs may consist of seeing slime trails on the sidewalk or combating a slug infestation in one's garden. It is important to note that the "pest" species that prefer to dine on garden plants are non-native, introduced from Europe. The non-native species struggle to survive beyond the habitats of human influence, whereas the native species inhabit woodlands, fields, and marshes, feeding on algae, lichens, fungi, and detritus that are usually not found in cities and suburbs.

Non-native snails and slugs are resilient and multiply quickly. Vigilant gardeners might remove dozens of slugs each night (*when the animals are most active*) and have no noticeable impact on the slug population. An array of anti-slug products is marketed, but the best way to protect one's garden is to use simple home remedies. Try attracting toads, or use a beer trap — a shallow tub dug into the ground and filled with beer— to deter or eliminate slugs without adding harmful poisons to your garden. The beer trap attracts and drowns nearby slugs, and toads feast on slugs at night.

If you have handled or picked slugs off your plants, you have probably wondered, "*How do I get this slime off my hands?*" The mucus produced by land snails absorbs water, so trying to wash it off is not very effective. Use a dry paper towel to rub off most of the mucus, then wash with soap and water afterwards. Before you get mad at the snail for sliming you, consider this: the mucus has cosmetic applications. There is an entire heliculture (*snail farming*) industry based on harvesting snail slime for use in skincare products.



Curiosity seeks knowledge

Knowledge is understanding

Understanding can lead to stewardship



Cuteness photos!



Which slug would you be?



Leopard slug



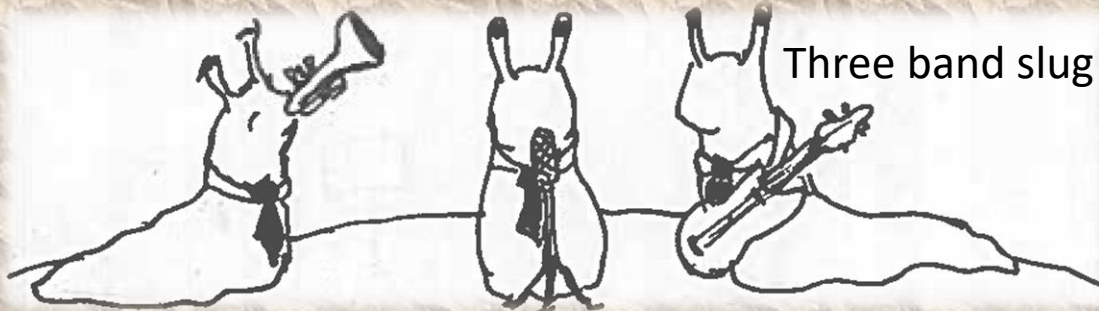
Toga mantleslug



Garden arion slug



Hedgehog slug



Three band slug