

THE
Secret World of Slugs
and Snails



Life in the Very Slow Lane

DAVID GEORGE GORDON • Illustrated by KAREN LUKE FILDES

Foreword by Ciscoe Morris

THE
Secret World of Slugs
and Snails



Life in the Very Slow Lane

DAVID GEORGE GORDON • Illustrated by KAREN LUKE FILDES

Foreword by Ciscoe Morris

Table of Contents

[Title Page](#)

[Dedication](#)

[Foreword](#)

[Acknowledgements](#)

[Common and Scientific Names of Land Slugs and Snails in this Book](#)

[Introduction](#)

[CHAPTER I - Slug and Snail Basics](#)

[Meet the Mollusks](#)

[A Trio of Gastropod Types](#)

[Slug and Snail Speciation](#)

[Gastropods Galore](#)

[Pros and Cons of Living with Pulmonates](#)

[CHAPTER II - A Gastropod Gallery](#)

[The Art of Snail-Watching](#)

[The Shell Game](#)

[Some Common Non-Native Snails](#)

[A Fistful of Native Snails](#)

[Common Non-Native Slugs](#)

[An Abundance of Native Slugs](#)

[CHAPTER III - Seven Wonders of Snaildom](#)

[Speed \(or Lack Thereof\)](#)

[Slime](#)

[Stomach](#)

[Senses](#)

[Sex](#)

[Sleep](#)

[Shell](#)

[Spread](#)

[CHAPTER IV - Sharing Our Gardens: Coexisting with Slugs and Snails](#)

[Knowing When \(and How\) to Act](#)

[For Additional Reading](#)

[About the Author](#)

Copyright Page

THE
Secret World of Slugs
and Snails

Life in the Very Slow Lane



DAVID GEORGE GORDON



SASQUATCH BOOKS
SEATTLE

To Jenni, Veia, and Julia

Foreword

by Ciscoe Morris

Let's face it: most folks, especially gardeners, despise slugs and snails. It's hard to appreciate slimy creatures that seem bent on gobbling up edible plants and prized ornamentals. I admit that I was among the ranks of slug and snail haters, until I read *The Secret World of Slugs and Snails*. Thanks to David George Gordon, I'm now so fascinated with these midnight marauders, I actually might even like them!

David George Gordon, a naturalist by education and training, is the perfect guide into the mysterious world of slugs and snails. In this fast and delightful read, you'll learn how these incredible creatures surf on slime, breathe, hitchhike to new places—and even think. You'll learn that the voracious plant-eating brown snail is none other than an escargot, introduced here by a French man in the 1800s (who, in my opinion, should have been taken out and shot for what he did!). You'll also learn about the ingenious ways slugs and snails defend themselves when under attack. There are slugs that can jettison their tail, slugs that can jump, and snails that give off a garlic odor that is effective at repelling hedgehogs and other predators (except maybe Italian ones). If all that doesn't hook you, wait until you read the steamy section on slug and snail love. Oh, la, la!

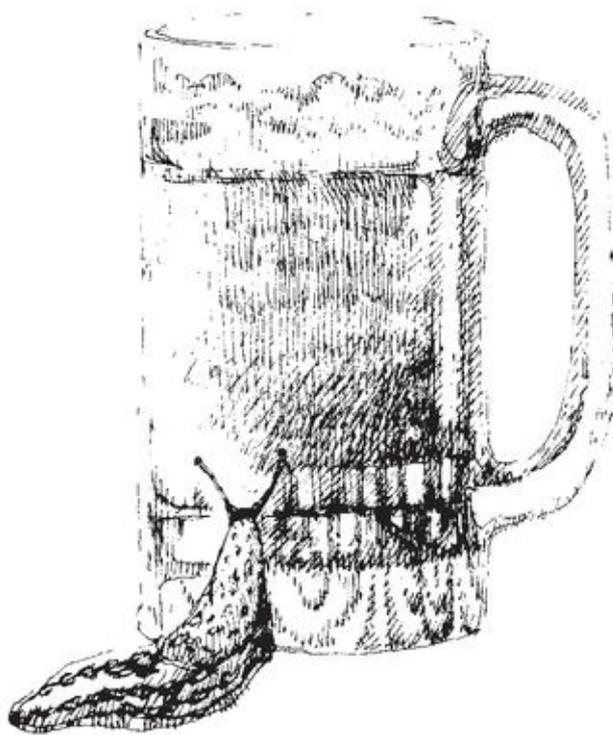
One thing that changed my opinion about slugs and snails was learning the amount of good they do. Their main role in nature is to eat and break down rotting organic substances, turning them into nutrients for plants. They're also a great food source for many mammals, reptiles, insects, and birds, and, of course, humans. Medically, they are proving useful too. Slug slime from our own Northwest native banana slug is being used with cancer drugs to make them much more effective in the fight to cure disease.

Despite all of their good qualities, there are still plenty of good reasons to do battle with slugs. For one thing, they have about 27,000 teeth, and they're good at using them. Slugs and snails eat several times their body weight every day. And, as the author points out, they're good at reproducing. In fact, when pickings get thin at the singles bar, the old adage "love thyself" takes on a whole new meaning with these critters. And don't think for a moment that you'll ever be able to eradicate these mollusk troublemakers from your garden. Studies quoted in this book found that removal of 17,000 slugs from a single garden in one year failed to make an appreciable dip in the slug/snail population. Fortunately David offers plenty of great suggestions on environmentally friendly, yet effective, ways to allow you to coexist with these remarkable creatures without sacrificing your favorite plants. David also includes a list of plants that slugs and snails tend to devour, and a list of ones to use as replacements that gastropods rarely, if ever, touch.

In truth, you'll never completely win the war against slugs and snails, but after

reading David George Gordon's wonderful book and learning what incredibly fascinating creatures they are, you might not even care.

—Ciscoe Morris is the author of *Ask Ciscoe*
and host of *Gardening with Ciscoe*.



Acknowledgments

This book would not be possible without the energies of several dozen friends, associates, and family members. I am deeply indebted to Barry Roth, who so freely shared his knowledge of all things malacological. I am grateful to Anne Depue, who advised and encouraged me at every stage of my literary journey up Mount Fuji. Likewise, I am thankful for Whitney Ricketts, a superb editor with boundless enthusiasm for the slimy subjects of this book, and for Kurt Stephan and Gary Luke of Sasquatch Books, who were helpful at every turn of the page. Thanks, also, to Anna Goldstein for her elegant book design. Last but not least, I thank my beloved wife, Karen Luke Fildes, for her unlimited patience and loving support of my work.



Common and Scientific Names of Land Slugs and Snails in this Book

(PRIMARY SOURCE: *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Mollusks*, 2nd edition, American Fisheries Society.)

Ash-black gardenslug *Limax cinerioniger*
Banana slug *Ariolimax columbianus*
Beaded lancetooth *Ancotrema sportella*
Blue-grey taildropper *Prophysaon coeruleum*
Brown gardensnail *Helix aspersa*
Brushfield hesperian *Vespericola pilosus*
Cellar glass-snail *Oxychilus cellarius*
Chocolate arion *Arion rufus*
Decollate snail *Rumina decollata*
Dromedary jumping-slug *Hemphillia dromedarius*
Earshell slug *Testacella haliotidea*
East African land snail *Achatina fulica*
Garlic glass-snail *Oxychilus alliarius*
Giant gardenslug *Limax maximus*
Giant Ghana tiger snail *Achatina achatina*
Greenhouse slug *Milax gagates*
Grey fieldslug *Deroceras reticulatum*
Grovesnail *Cepaea nemoralis*
Meadow fieldslug *Deroceras laeve*
Northwest hesperian *Vespericola columbianus*
One-ridge fieldslug *Deroceras monentolophus*
Oregon forestsnail *Allogona townsendiana*
Oregon lancetooth *Ancotrema hybridium*
Pacific sideband *Monadenia fidelis*
Pale jumping-slug *Hemphillia camelus*
Reticulate taildropper *Prophysaon andersoni*
Robust lancetooth *Haplotrema vancouverense*
Roman or escargot snail *Helix pomatia*
Scarletback taildropper *Prophysaon vanattae*
Warty jumping-slug *Hemphillia glandulosa*
West African land snail *Achachatina marginata*

Yellow slug *Limax flavus*

Yellow-bordered tailedropper *Prophysaon foliolatum*



INTRODUCTION:

Why Slow and Steady Wins the Race



*O Snail
Climb Mount Fuji,
But slowly, slowly!*

—KOBASHI ISSA

Fast food, fast cars, fast relief from headaches and muscle pain—it appears that our species is obsessed with speed. Getting the job done quickly, whatever it may be, has become the mantra of many of us. We reach out for anything that will save us a few

minutes, whether it's a fast-acting oven cleaner, a cup of coffee to go, an even higher-speed Internet connection, or a ride in the corporate Learjet.

And why shouldn't we want things to move as quickly as possible? After all, life is short, and anything that gives us more time to enjoy it is unquestionably an asset. Driving 65 miles per hour on the interstate will save several hours that might otherwise be wasted while traveling the same distance on a two-lane country road. So the choice for speed is clear—even if it means losing the opportunity to stop and smell the roses along the way.

Our love of speed is not solely linked to practicality. At its root is a seemingly innate appreciation for anything that moves faster than we can. Our heartbeats quicken at the sight of a galloping thoroughbred or the sound of a Formula One race car's roaring engine. We award Olympic medals to the fastest speed skaters, swimmers, and skiers, reinforcing the idea that the race belongs to the swift.

There are, however, other forms of life on our planet that don't necessarily feel this way. For these oft-overlooked creatures, it is slow and steady that wins the race—a notion proposed by Aesop more than 2,500 years ago. Although the tortoise gets the glory in Aesop's fabled contest with the hare, the story could just have easily gone to a slug or snail, two closely related organisms that, throughout their lives, refrain from doing anything that could even remotely be classified as speedy.

Snails move slowly, eat slowly, reproduce, grow, and die slowly. When threatened by a predator, they don't make a dash for the door. A land snail will slowly retract its body into the protective confines of its shell and wait for the invading bird, snake, beetle, or human to get bored and move on. This strategy may seem simplistic, but it works surprisingly well.

Slugs lead equally languid lifestyles. The current holder of the land speed record for slugs is the yellow slug (*Limax flavus*), a strapping 3-4-inch (7.5-10 cm) specimen from Eastern Europe. It clocks at peak speeds of 0.039 miles (0.063 km) per hour. At this rate, the yellow slug could finish the 100-yard dash in a little under an hour and a half, assuming it didn't stop for snacks along the way. Incidentally, the Olympic champion for slowness among so-called "higher" life forms is the three-toed sloth, a generally torpid South American mammal that, at 0.15 miles (0.24 km) per hour, could rapidly outdistance the yellow slug in a similar competition.

The inability to outpace enemies has not lessened either the slug's or the snail's capacity for survival through the ages. Rather, both animals have existed comfortably, fairly unchanged from their ancestral prototypes, for hundreds of millions of years. Over that time, they've been forced to endure a succession of ice ages, earthquakes, volcanoes, and lesser climate events. Such conditions spelled doom for thousands of considerably larger, more biologically advanced, and significantly speedier species, including *Tyrannosaurus rex*, the woolly mammoth, and our hominid forebear, Neanderthal Man. In other words, the slug's and snail's slow-paced way of life has been time-tested, unlike our own rapid-paced bipedal approach, which began, geologically speaking, some mere 160,000 years ago.

By perseverance, the snail reached the Ark.

—C. H. SPURGEON, *Salt Cellars* (1889)

This seeming predisposition for life in the slow lane is just one way that slugs and snails lead lives vastly different from our own. Like all other members of the phylum Mollusca, slugs and snails are not blessed with any of the physical characteristics that we humans attribute to our species' success. First off, snails and slugs do not have big brains. In fact, like the Scarecrow in *The Wizard of Oz*, they lack them altogether. In place of a complex central processor with 100 billion interconnected nerve cells, a snail relies on its local control centers, called *ganglia*, to call the shots.

Second, slugs and snails do not have opposable thumbs. People are quick to point out that our thumbs give us the ability to make, grip, and use hand tools. Slugs and snails lack hands entirely—not to mention arms, legs, and toes. Yet they've found myriad ways to compensate for the dearth of corkscrews, electric drills, and other implements. Likewise, they've circumvented the need for a written or spoken language. Slugs and snails are capable of communicating with each other, but they do so through minute chemical clues contained in their silvery trails of slime.

Slugs and snails are cold-blooded creatures and, as such, do not reap the rewards of a reliable internal heat source like we warm-blooded organisms do. Neither of these mollusks has what we would consider a heart, and what passes for one is bathed in a pale blue fluid called *hemocyanin*, a copper-based protein that serves the same function as *hemoglobin*—the iron-based protein that carries oxygen to our bodies' cells and tinges our own blood bright red.

The alleged advantage of live birth? Forget that. The slugs and snails of our forests, fields, and gardens are egg-layers, depositing clutches of internally fertilized eggs protected by hard outer shells in nests beneath the leaf litter or first few inches of topsoil. Weeks or months later the eggs hatch, and the offspring are on their own. There's no parental involvement, no "bringing up baby" whatsoever—the hatchlings are fully equipped at birth to pursue identical paths to those of their parents. Speaking of which, many snails and slugs are *hermaphroditic*, meaning they are outfitted with both male and female reproductive systems (for a detailed discussion of this, see "Seven Wonders of Snaildom" later in this book). If no other options are available, such a snail or slug may be able to fertilize itself. Among humans, this feat is inconceivable—and offered as an option to others only as an insult. However, as many gardeners can attest, there's no shortage of land snails or slugs in nature, even without participation in the mammalian dating game.

What good are slow-going slugs and snails? This question implies that these creatures were created to serve humankind in some way. Fossil land snails taken from coal beds in America's Midwest, New Brunswick, and Nova Scotia indicate that they predate us by 260-350 million years. For this reason alone, it's preposterous to presume that such servitude could have been written into the grand scheme of things. "When we try to pick out anything by itself, we find it hitched to everything in the universe," observed the great American conservationist, John Muir. With this in mind, it might be more valuable to ask in what ways slugs and snails are "hitched" to us all.

Perhaps because of their physical and behavioral differences to us—or because most of our encounters with them involve disputes over grazing rights—people tend to overlook the many positive contributions of the native snail and slug species, perhaps not so much in our gardens, but certainly in the wild. In their natural settings, these unassuming invertebrates help disperse seeds and spores, break down decaying plant

matter, and quite possibly keep other populations of small pests in check. Many are food for other invertebrates, as well as for amphibians, reptiles, birds, and mammals, including human beings.

Some snails are prized for their beautiful calciumcarbonate shells and others, including the charismatic East African land snail (*Achatina fulica*), have been invited into our homes as pets. They work their way into our folk-tales, feature films, and decorative motifs. Slugs and snails fill all these niches, providing ecological and cultural services without even once feeling the urge to step on the gas. Believe me, we would miss slugs and snails should we somehow eliminate them from our rapidly accelerating world.

An authority on West Coast land slugs and snails, Barry Roth, tells the story of a coworker who, early in his life, decided to abandon his path of religious study, leaving the seminary to become a student of *malacology*—the branch of biology that includes slugs and snails. Such a lifestyle change met with skepticism and a bit of hostility by the ex-seminarian’s parents. “But why study snails, of all things?” they asked their son. Roth’s coworker is said to have replied, “Slugs and snails are living reminders that not everyone gets to be an eagle.”

Truly, there are important lessons to be learned from even the lowliest of land slugs and snails. More and more of us are seeing the wisdom of slowing down and succumbing to the quiet appeal of a more relaxed-pace approach to life’s challenges. Global support for the slow food movement (which uses the land snail as its symbol) has inspired other “slow” subcultures, among them slow travel, slow shopping, and slow parenting. Each of these “slow” choices is fueled by the desire to lead intentional, moderate-speed existences with ample time for self-enrichment and internal growth.

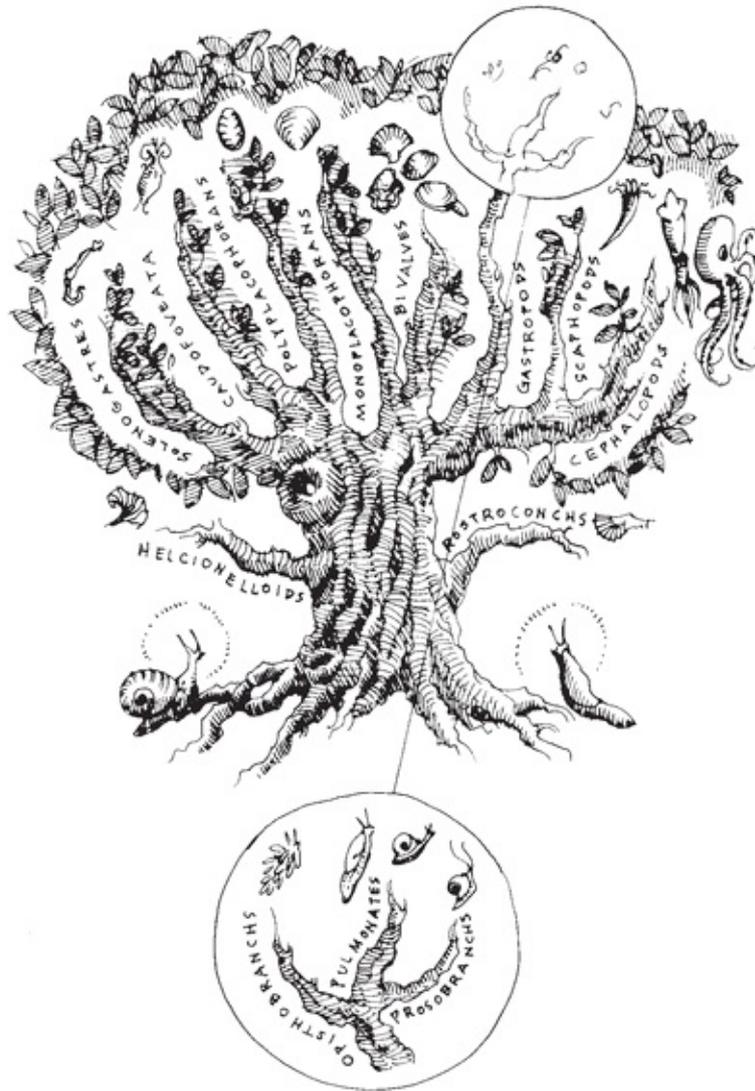
“Ain’t nobody slowing down no way; everybody’s stepping on their accelerator,” Mick Jagger howls in the Rolling Stones’ song “Ventilator Blues.” As we are seeing, survival of the fittest is not necessarily the same as survival of the fastest. Stuck in rush-hour traffic on a Los Angeles freeway, it’s easy to recognize that, in the words of an anonymous sage, “the hurrier we go, the behinder we get.”

The race is not to the swift or the battle to the strong, nor does food come to the wise or wealth to the brilliant or favor to the learned; but time and chance happen to them all.

—ECCLESIASTES 9:11

CHAPTER I

Slug and Snail Basics



GASTROPOD FAMILY TREE

*How ingenious an animal is a snail.
When it encounters a bad neighbor, it
takes up its house and moves away.*

—PHILEMON (C. 300 BC)

Unlike warm-blooded humans, slugs and snails are cold-blooded organisms. Their bodies are boneless, lacking a backbone and spinal cord—conditions that put them in the collection of animals known as invertebrates. Ninety-five percent of all animate life on our planet, from nearly invisible roundworm parasites to 40-foot giant squids, falls into this category.

We vertebrates have divided the invertebrates among twelve smaller categories, or *phyla*, the largest of which (that is, the one with the most members) is the Arthropoda. This phylum of “joint-footed” animals contains a dizzying array of species—some 1,200,000 by most recent count—and includes common critters such as crabs and lobsters, scorpions, spiders, centipedes, millipedes, and insects. In terms of sheer numbers, the insects rule, with an estimated 350,000 species of beetle alone. That’s more than 800 times the number of primate species, a statistic that inspired the British biologist J.B.S. Haldane to remark that “the Creator, if He exists, has an inordinate fondness for beetles.”



Meet the Mollusks

The second largest invertebrate phylum, the Mollusca, is composed of so-called “soft-bodied” animals. Some 93,000 recognized species of living mollusks are scattered across every continent, including Antarctica. They occupy nearly every conceivable niche on earth. Mollusks have been found atop mountains and at the bottom of the sea, in barren deserts and moist tropical rainforests, on wave-battered beaches and in the gently watered flowerbeds and vegetable patches of our own backyards.

DYAKIA STRIATA is the only land snail capable of true bioluminescence. But the function or functions of the bioluminescent glow of *D. striata* eggs and newly hatched snails is not known. Neither is the function of flashing in juveniles and most adults, according to J. J. Counsilman and P. P. Ong, whose study of these phenomena appeared in the *Journal of Ethology* in June 1988. Adults, juveniles, and eggs can be collected fairly easily in Singapore, where the snail with the eerie green glow was discovered in 1943.

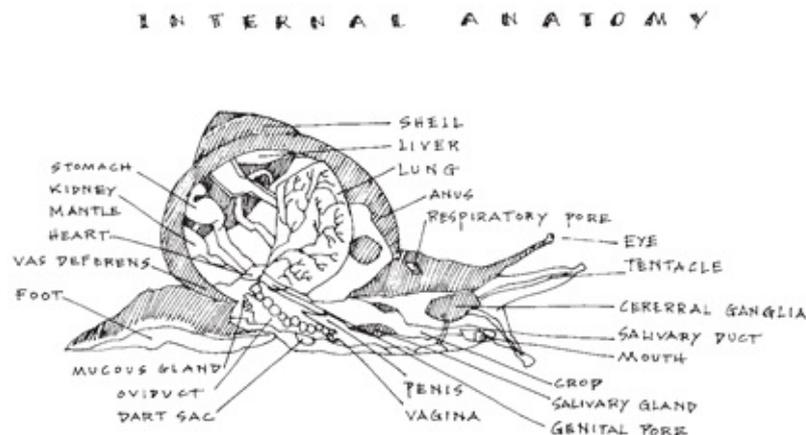
Mollusks have soft, unsegmented bodies and a mantle—the organ that, in most species, secretes the materials for making the animal’s solid outer shell. The shell is made of calcium carbonate crystals, and the blood of mollusks contains high

concentrations of this salt in liquid form. The crystals are interspersed with organic materials, which give the shell added strength. *Conchology* is the study of mollusk shells, whereas *malacology* is the study of their makers. Like *oology* and *ornithology*, the separate studies of eggs and those that laid them, this distinction is clearly a product of the vertebrate mind.

*See what a lovely shell,
Small and pure as pearl,
Lying close to my foot,
Frail, but a work divine,
Made so fairly well,
With delicate spire and whorl,
How exquisitely minute,
A miracle of design!*

—ALFRED, LORD TENNYSON, “The Shell,” from *Maud* (1855)

Directly beneath the mantle is a fluid-filled chamber containing the internal organs of the respiratory, digestive, reproductive, and excretory systems. Most marine mollusks are what are known as broadcast spawners. When the time is right for making whoopee, they release eggs and sperm into the water column and let oceanic waves and currents bring the two together. The newly formed larvae from fertilized eggs usually go through a succession of anatomical and physiological changes, with each intermediate form more closely resembling that of their moms and dads.



A snail's innards are well positioned to do what the animal does best, namely eating, breathing, and reproducing.

Other mollusks, especially those living on land, are hermaphroditic, possessing both male and female sex organs. While exempted from the war of the sexes, these animals have elaborate courtship and mating rituals that, in many instances, can end with mutual exchanges of genetic materials and produce two separate clutches of fertilized eggs.