

SLIME ME

Terrestrial Gastropods of Maine

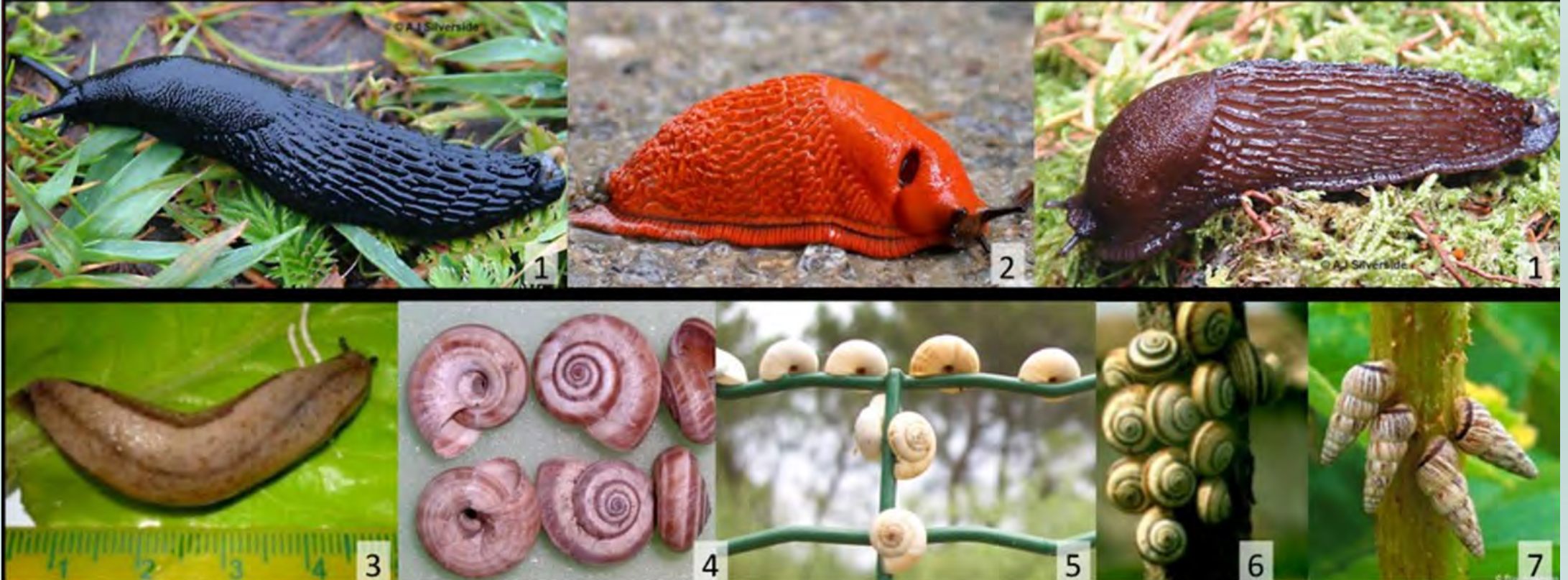


Photo credits: (1) *Arion ater* © A.J. Silverside, lastdragon.org; (2) *Arion rufus* © J. Herder, digitalnature.org; (3) *Meghimatium pictum* © Paulo Lenhard, Project AM, terrslugs.lifedesks.org; (4) *Monacha* sp. © L. Kolouch, biolib.cz; (5) *Cernuella virgata* © Vmenkov, Wikipedia; (6) *Cernuella virgata* © L. Poggiani, HU lavalle delmetauro. itU; (7) *Cochlicella* sp. © Dr. Roy Anderson, MolluscIreland.



Karen Coluzzi, Maine DACF – Merrymeeting Bay, 3/11/2026

Acknowledgements: Haley Depner-Bruce, Maine DACF

Background

- **Master of Science in Entomology** University of Maine, Orono; 2005
 - Researched biocontrol of Colorado potato beetle



- **State Survey Coordinator** Maine Department of Agriculture, Conservation and Forestry
 - 2003 – present
 - Division of Animal and Plant Health (formerly, Plant Industry)
 - Administers CAPS Program
 - Secures federal funding to conduct survey and outreach projects





CAPS

Cooperative Agricultural Pest Survey

- **Funded** through USDA (APHIS PPQ – Animal and Plant Health Inspection Service, Plant Protection Quarantine)
- **Purpose:** to provide a second line of defense behind port inspections against the entry of harmful *plants pests and weeds*.
 - Protects our agriculture and natural resources from exotic organisms that could establish and potentially become invasive
 - Each state has a CAPS Program
- **How it works:**
 - Choose target pests from USDA's priority pest list
 - Develop workplans
 - 12-month projects
 - Survey – traps/lures, sampling, visual





CAPS

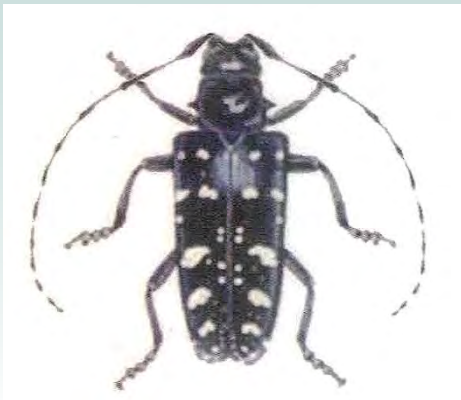
Cooperative Agricultural Pest Survey

- **How it works (continued):**

- Conduct outreach projects
 - Additional work with competitive funds
 - Enhance/increase public awareness
 - *Because private citizens often find things first*

- **Examples of Outreach Projects conducted under CAPS in Maine:**

- Forest Pest Outreach and Survey Project



- Firewood Outreach



- Examples of Outreach Projects (continued):

- Terrestrial Mollusk Outreach (aka Slime ME)



USDA Watchlist

- Terrestrial Snails and Slugs are on the National Priority Pest List over 20 species
 - Invasive species – threats to agriculture and animal health



Giant African Land Snail – in HI and FL



Spanish Slug (*Arion vulgaris*) – in Canada

In Maine

- Arion ater (European black slug)



Spanish Slug (*Arion vulgaris*) – in Canada

- Reported by a citizen; collected and confirmed in Maine, 2018
- Only found on Vinalhaven
- Need molecular analyses to tell apart from *Arion vulgaris*

2021 - CAPS Survey

2021

Survey Project

To determine how widespread *Arion ater* is in Maine

- On islands, near ferry terminals, in garden centers
- Visual survey – 10 sites; using beer-baited cardboard
- Outreach – sent letters and postcards to land trusts, extension offices, etc.

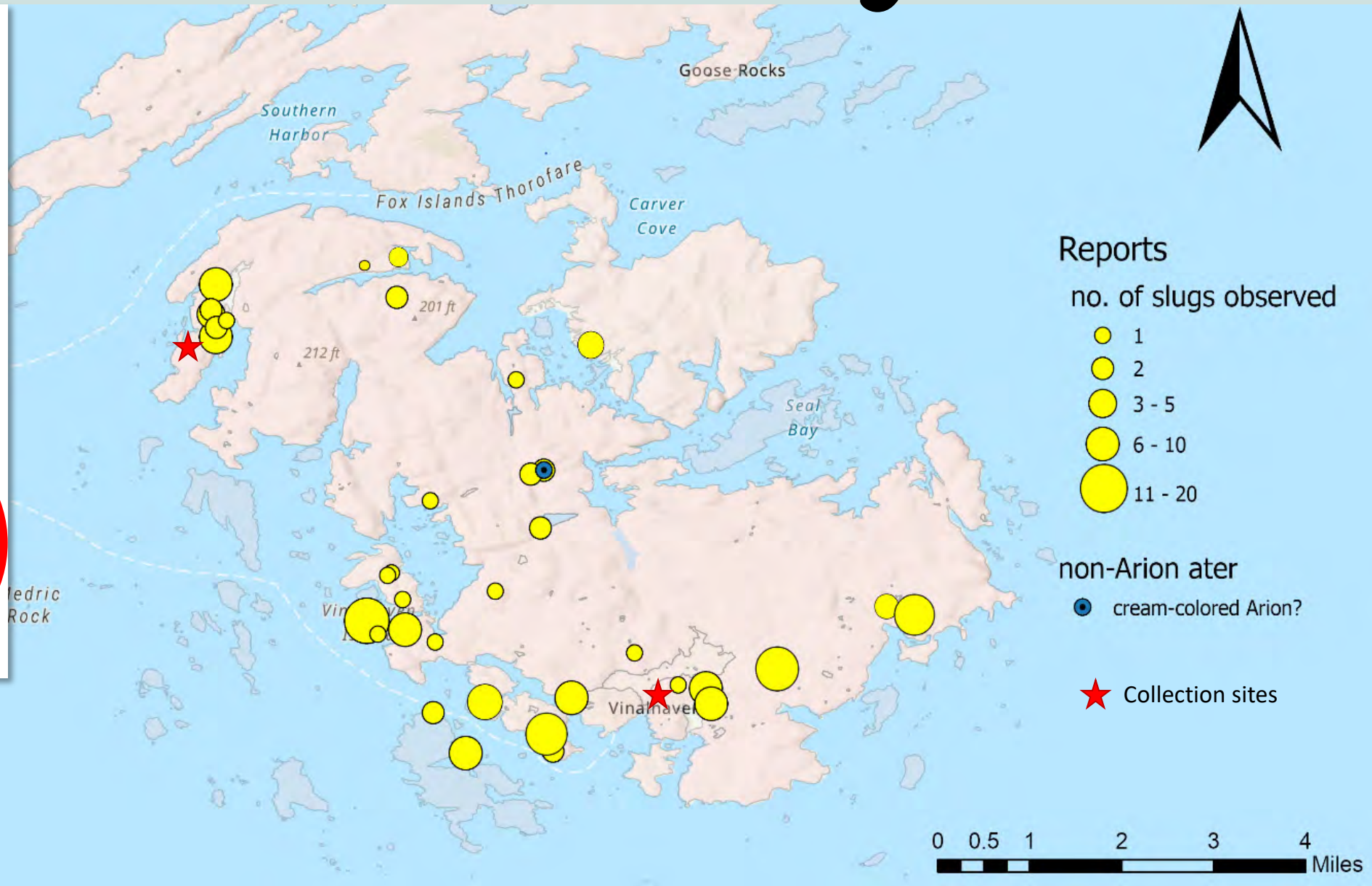


2021 - CAPS Survey

2021

Survey Project Results

- Visual survey – 10 locations; no Arion recovered
- Outreach – 53 reports with photos; most were large black slugs assumed to be Arion ater.



Exotic snails and slugs on USDA Watchlist



Maine's Target List	
Spanish slug	<i>Arion vulgaris</i>
Chinese slug	<i>Meghimatium pictum</i>
Hygromiid snails	<i>Cernuella spp.</i>
Maritime garden snail	<i>Cernuella virgata</i>
Cochlicellid snails	<i>Cochlicella spp.</i>
Hygromiid snails	<i>Monacha spp.</i>

common name	scientific name
Spanish slug	<i>Arion vulgaris</i>
Leatherleaf slugs	<i>Belocaulus spp.</i>
Leatherleaf slugs	<i>Colosius spp.</i>
Leatherleaf slugs	<i>Laevicaulis spp.</i>
Chinese slug	<i>Meghimatium pictum</i>
Leatherleaf slugs	<i>Sarasinula spp.</i>
Leatherleaf slugs	<i>Semperula spp.</i>
Leatherleaf slugs	<i>Veronicella spp.</i>
Wrinkled snail	<i>Candidula intersecta</i>
Brown lipped snail	<i>Cepaea nemoralis</i>
Hygromiid snails	<i>Cernuella spp.</i>
Maritime garden snail	<i>Cernuella virgata</i>
Cochlicellid snails	<i>Cochlicella spp.</i>
Burgundy snail	<i>Helix pomatia</i>
Girdled snail	<i>Hygromia cinctella</i>
Giant African snail	<i>Lissachatina fulica</i>
Hygromiid snails	<i>Monacha spp.</i>
Jumping snail	<i>Ovachlamys fulgens</i>
Golden apple snail	<i>Pomacea canaliculata</i>
Eastern heath snail	<i>Xerolenta obvia</i>
Hygromiid snail	<i>Xerotricha conspurcata</i>

SLIME ME 2024

Citizen Science Project

- To document terrestrial snails and slugs in ME
- While looking for invasive species

1. iNaturalist

- Observers upload photos, location, and tentative i.d. (AI suggested)
- Create project page: SLIME ME - catalogs all the uploads.
- We review the page for accuracy and suspicious snails and slugs.



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2. Outreach materials

- Designed materials to introduce the project to the public

3. Trainings

- Two in-person trainings about exotic mollusks, using iNaturalist, how to photograph specimens properly for ease of identifying...

4. Bioblitz

- Hold two collecting events

Get outdoors!
Help us record slug and snail diversity!

Help the Maine DACF learn more about slug and snail diversity in our state and monitor for invasive species via iNaturalist! Submit your photos to help us collect data.

For even more fun, attend a bioblitz this summer or fall!







To learn more, visit our iNaturalist Page!



Photographing Snails and Slugs for Identification


A minimum of **three photos** are needed to help identify slugs and snails.

Slugs	Snails
View from above to show color and texture of the body and mantle.	View from above to show shape, color and texture of shell.
	
Side profile of RIGHT side. This is where the pneumostome (breathing pore) is located.	Side profile to show height of shell.
	

Snail and Slug BioBlitz

Thursday, August 8th, 9:00 AM to noon
Join us for 1/2 a day of snail and slug hunting at Camden Hills State Park.



For more information:  or email: Bugwatch@maine.gov

Slug and Snail BIOBLITZ

What: Join CELT and Maine Department of Agriculture for a morning of identifying slugs and snails in Cape Elizabeth

Where: Runaway Farm, 1 Gull Crest Dr, Cape Elizabeth

When: September 21st, 9-11am

Visit www.capelandtrust.org/events for more info



Cape Elizabeth Land Trust

SLIME ME 2024

Past vs. Present

- Compare current observations with the terrestrial snails and slugs documented in Maine in 2000.
- Lists 92 species

Though:

- Original identifications could be wrong
- Species names were used interchangeably in the past

2000

NORTHEASTERN NATURALIST

7(1): 33-88

TERRESTRIAL SNAILS AND SLUGS (MOLLUSCA: GASTROPODA) OF MAINE

SCOTT M. MARTIN ¹

ABSTRACT - Some 92 terrestrial gastropods, representing 2 orders and 19 families, have been reported from Maine. These animals consist of 76 species of snails (16 families) and 16 species of slugs (3 families). The taxonomic status of

- This comparison could help determine if some species have gone extinct, have been misidentified, or are new to the state.

What are snails and slugs?

Kingdom: Animal = multicellular, eukaryotic organisms

Phylum: Mollusca = invertebrates; mantle covering the internal organs

Class: **Gastropoda** = “belly foot”; snails and slugs

Some famous mollusks:



Bivalves (clams)



Cephalopods



Gastropods

What are snails and slugs?

- **Gastropods:** second only to the insects in terms of diversity
- 65,000 to 80,000 living species
- found in saltwater, freshwater, and terrestrial habitats

Marine (saltwater)



whelks,
conchs,
periwinkles



nudibranchs
(sea slugs)

Aquatic (freshwater)



apple and
mystery
snails



rare

Terrestrial (land)



garden
snails,
amber
snails



leopard,
garden,
round-
back

Snails vs. Slugs

snails: can withdraw into an external shell

- Protection from predators
- Protection from desiccation



white-lipped snail; *Cepea hortensis*.
Photo by: Arnstein Rønning

semislug: retains a partial external shell

- No apparent benefits



Semi-slug, *Helicarion nigra*.
Photo by: Adnan Moussalli

slugs: without an external shell

- No calcium environment
- Hide in small holes

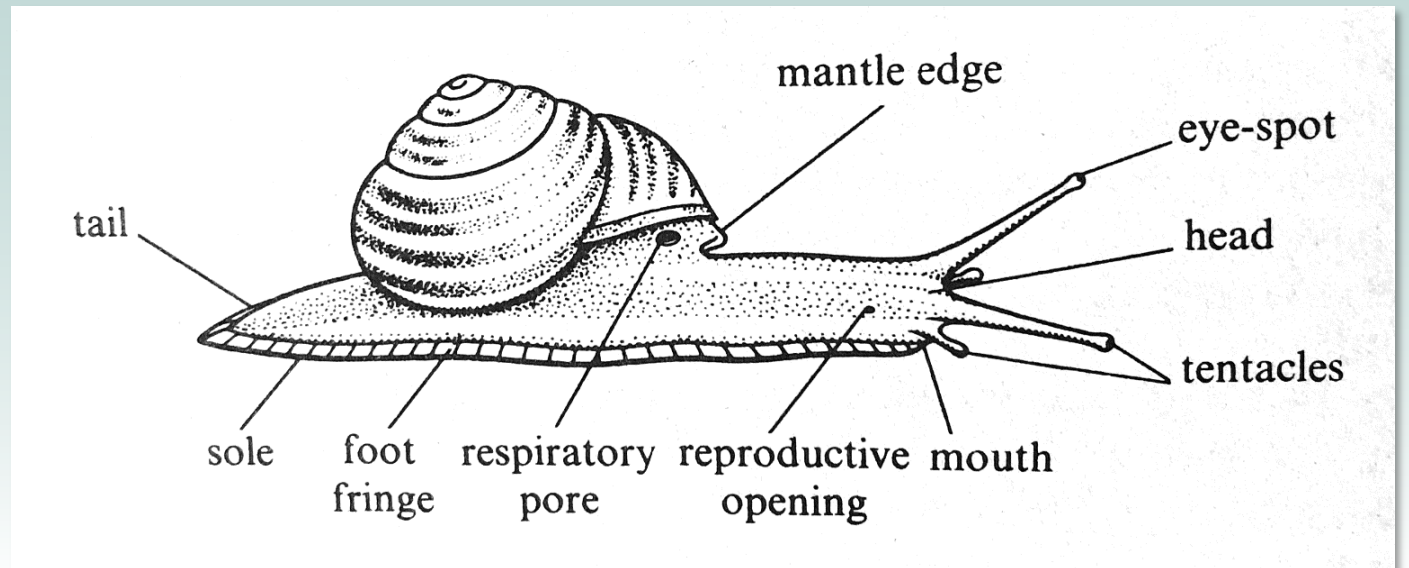
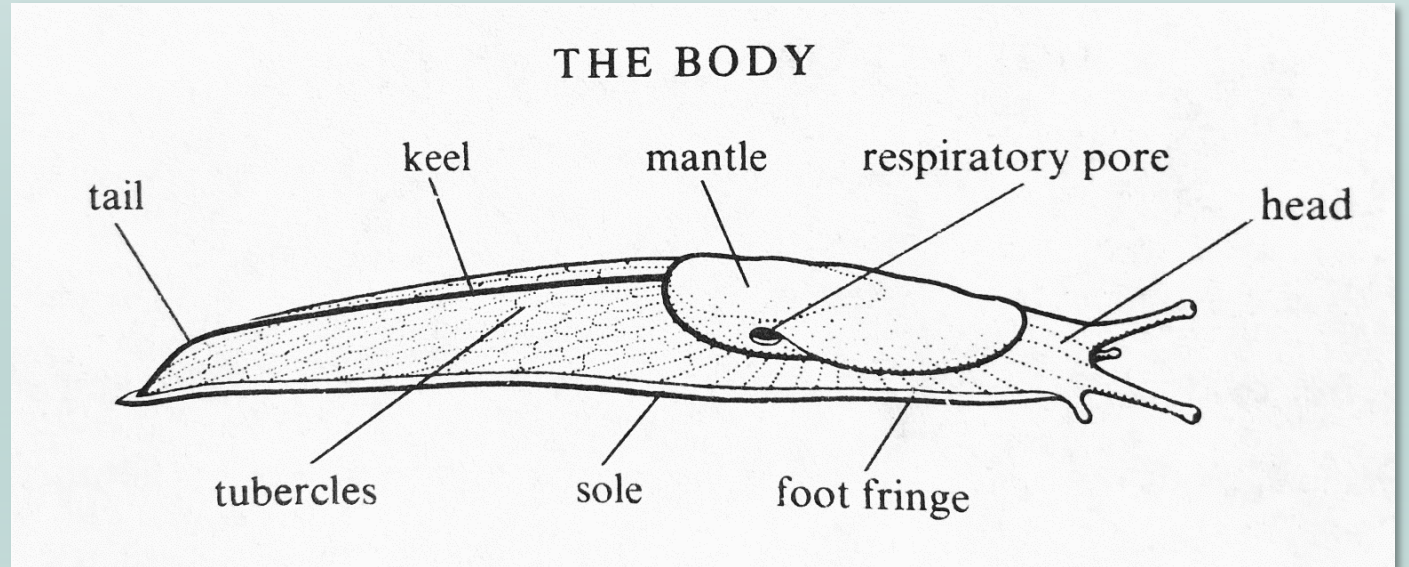


dusky slug; *Arion subfuscus*
Photo by: Gary Bernon, USDA APHIS

Snail and Slug Anatomy

External anatomy similar

- Mantle
- Pneumostome (breathing pore)
- Tentacles
 - upper pair with eyes
 - lower pair sensory
- Mouth with *radula* (toothed tongue)
- Foot
 - foot fringe
 - sole

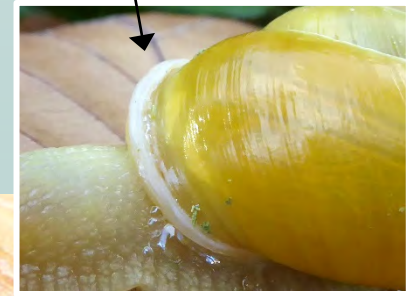


Life Cycle of Snails

Oviparous (mostly; fertilized eggs are laid)

- Some snails (and slugs) mate once then die; some can mate multiple times
- Egg-laying usually occurs in summer or fall
- They hatch with a small translucent shell
- The shell grows by adding calcium to the outer edge

Snails reach adulthood when a lip is formed



Life Cycle of Slugs

Oviparous (mostly; fertilized eggs are laid)

- Laid singly or in clusters
 - Where they won't dry out (soil, under wood or leaf litter...)
- Eggs hatch in 2-4 weeks
- Juveniles are active and feed as soon as they hatch
- Adults are bigger versions of juveniles – *in appearance*



Photo by: J. Obermeyer



Deroceras laeve Photo:
Charlene Donahue

What do they eat?

- Herbivores
 - Plant material – leaves, stems, fruit, bark, wood
- Fungivores
 - Fungi, algae, mushrooms
- Detritivores
 - Animal scat, carcasses, rotting organic matter
- Carnivores
 - Insects, nematodes, earthworms, other slugs
- Inorganic material
 - Soil and rock particles, especially snails



Are snails and slugs bad?

The PROS:

- Help decompose organic matter – nature's recyclers
- Food for birds, amphibians, beneficial insects, and *humans!*
- Pollinators and spore dispersers



Photo by: Karl H. Switak

Are snails and slugs bad?

The CONS:

- Some feed on important ornamental and agricultural crops
- Can transmit harmful diseases; e.g. rat lungworm



Snails in Maine (Martin, 2000)

76 species are known

- 72 species are native to U.S.
- **4 are non-native** (*pictured here*). P.S. “non-native” doesn’t equal invasive.

Rotund disc (small)



Discus rotundatus
Photo: Roy Anderson

Cellar glass snail (small)



Oxychilus cellarius
Photo: Roy Anderson

Hairy hellicellid (small)



Trochulus hispidus
Photo: Roy Anderson

Brown garden snail (big)



Cornu aspersum
Photo: juliegraham173

Native Snails (Martin, 2000)

72 species are native to U.S.

Here are some



Vertigo Snails
(*Vertigo* spp.)



Glyph Snails
(*Glyphyalinia rhoadsi/indentata*)



White-Lipped Garden Snail
(*Cepaea hortensis*)



Pillar Snails
(*Cochlicopa* spp.)



White-Lip Globe
(*Mesodon thyroidus*)



Boreal Top
(*Zoogenetes harpa*)



Blue Glass Snail
(*Perpolita binneyana*)



Pill Snails
(*Euchemotrema* spp.)



Flamed Tigersnail
(*Anguispira alternata*)

Slugs in Maine (Martin, 2000)

16 species are known

- 5 species are native to U.S. (pictured here)

Mantleslugs – the mantle covers the whole body.

Meadow slug > 1”



Pale mantleslug > 1”



Redfoot mantleslug ~1.5”



Winding mantleslug ~3”



Carolina mantleslug ~3.5”



Non-native Slugs (Martin, 2000)

- 11 species are non-native

Limacids – “keelback” slugs

Milky slug ~ 2”



Deroceras reticulatum
Photo: Bruce Martin

Tree slug ~ 3”



Lehmanna marginata
Photo: Elliot, eskybar123

Yellow cellar slug ~ 3”



Limacus flavus
Photo: James Calder

Leopard slug > 5”



Limax maximus
Photo: Surry Docks Farm

Non-native Slugs (Martin, 2000)

Arionids – “roundback” slugs – 7 species

Black slug > 3.5”

Hedgehog slug < 1”



Arion intermedius
Photo: Jesse Rorabaugh

Brown-banded Arion ~ 1.5”



Arion circumscriptus
Photo: AJ Dreves

Garden Arion ~ 1.5”



Arion hortensis
Photo: Peter Wilson

Dusky slug ~ 2.5”

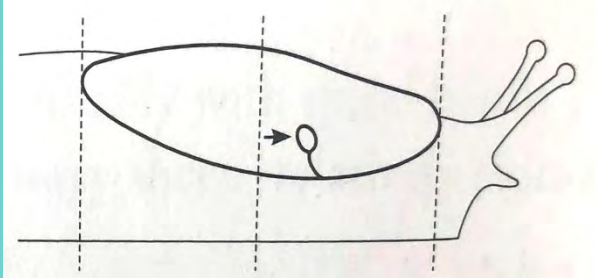

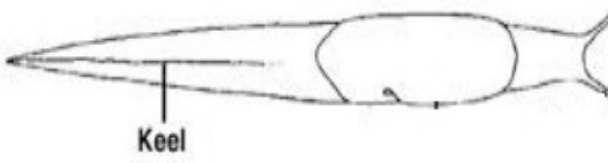
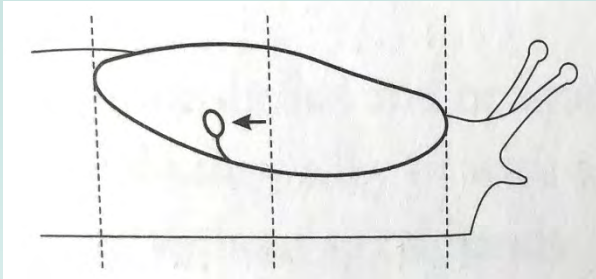



Arion subfuscus
Photo: Gary Bernon



Arion ater?
Photo: Juan I. Dean

Limacid vs. Arion

	Keel	<u>Breathing pore (pneumostome)</u>	
Arion spp.	none	 <p>Anterior half of mantle</p>	
Limacid spp.	 <p>Keel</p>	 <p>Posterior half of mantle</p>	

Photographing Slugs for Identification



View from **above** to show color and texture of the body and mantel.



Side profile of **RIGHT** side. This is where the pneumostome (breathing pore) is located.



Include the **sole** (underside) of the slug to show the color of the sole and the mucus .

Photographing Snails for Identification



View from **above** to show shape, color and texture of shell.



Side profile to show height of shell.



Include the **shell opening** to illustrate the shape of the aperture.

How to use iNaturalist



- Download app or log on to [inaturalist.com](https://www.inaturalist.com)
- Create an account
- Take photos directly from phone in app or upload from a photo gallery or desktop computer
- Click SHARE
 - All terrestrial gastropod observations in Maine automatically added to project.
- Join project to see what others have found!
<https://www.inaturalist.org/projects/slime-me-terrestrial-gastropods-of-maine>





SLIME ME: Terrestrial Gastropods of Maine

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About

Leave 👤 13

This citizen science project aims to catalogue terrestrial gastropods found in Maine to better understand our local biodiversity and to screen for newly introduced invasive slugs and snails. The reliance on targeted surveys to look for potentially harmful slugs and snails can be time consuming, inefficient, and ineffective for a

Read More >

⚙️ Your Membership

🌱 Edit Project

📖 Project Journal

Overview **5,613**
OBSERVATIONS

62
SPECIES

438
IDENTIFIERS

2,498
OBSERVERS

⚡ Stats



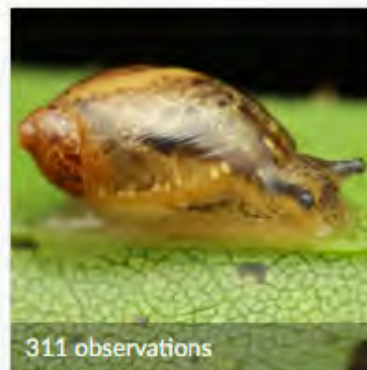
760 observations

Western Dusky Slug
Arion subfuscus



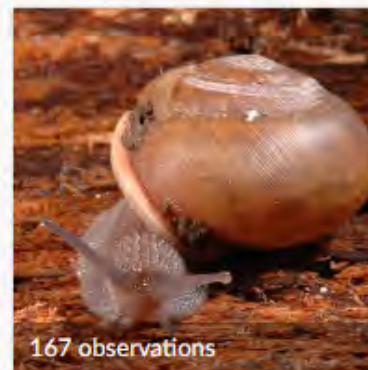
536 observations

Leopard Slug
Limax maximus



311 observations

Oval Ambersnail
Novisuccinea ovalis



167 observations

Eastern Whitelip
Neohelix albolabris



134 observations

Tree Slug
Lehmannia marginata

SLIME ME Terrestrial Gastropods of Maine

iNaturalist page

- Watchlist:

Maine's Target List	
Spanish slug	<i>Arion vulgaris</i>
Chinese slug	<i>Meghimatium pictum</i>
Hygromiid snails	<i>Ceruella spp.</i>
Maritime garden snail	<i>Ceruella virgata</i>
Cochlicellid snails	<i>Cochlicella spp.</i>
Hygromiid snails	<i>Monacha spp.</i>

Species: Location: Go Filters

5,614 OBSERVATIONS 62 SPECIES 438 IDENTIFIERS 2,499 OBSERVERS

Places of Interest Redo search in map

Western Dusky Slug (*Arion subfuscus*)
Garlan... Today 1 2h

Glossy Pillar (*Cochlicopa lubrica*)
Orono... Mar 9, 2026 1 2d

Boreal Top (*Zoogenetes harpa*)
Orono... Mar 9, 2026 1 2d

Oval Ambersnail (*Novisuccinea ovalis*)
Orono... Mar 9, 2026

SLIME ME Terrestrial Gastropods of Maine

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No results found for all targets on watchlist

Spanish Slug

Location

Go

Filters

0 OBSERVATIONS

0 SPECIES

0 IDENTIFIERS

0 OBSERVERS

Places of Interest

Redo search in map

No results found

MAINE

NEW BRUNSWICK

NOVA SCOTIA

NEW PSHIRE

PRINC EDWAR ISLANI

Québec City

Edmundston

Rivière-du-Loup

Saguenay

Rimouski

Percé

Carleton-sur-mer

Bathurst

Summerside

Moncton

Fredericton

Saint John

Truro

Lunenburg

Portland

Sherbrooke

Rivières

urentides Wildlife Reserve

SLIME ME Terrestrial Gastropods of Maine

iNaturalist page

- Search for *Arion ater*
- 21 observations of *Arion ater*
- all on Vinalhaven

Black Slug

Location

Go

Filters ²

21 OBSERVATIONS

1 SPECIES

12 IDENTIFIERS

19 OBSERVERS

Places of Interest

Redo search in map

Black Slug (*Arion ater*)
Vinalh...
Jun 11, 2025
RG 2

Black Slug (*Arion ater*)
Tip To...
Jul 24, 2025
RG 3

Black Slug (*Arion ater*)
Greens...
Jul 21, 2025
RG 3

Black Slug (*Arion ater*)
Vinalh...
Sep 16, 2024
RG 3

SLIME ME Terrestrial Gastropods of Maine

Future Work

1. Compare iNaturalist observation species with Martin, 2000
 - 92 species vs. 62
 - Which species are missing
 - Which species have been renamed or lumped together
 - Are there any species differences?
2. Continue monitoring page for any new species / verify identifications
3. Finish Field Guide!

SLIME ME 2024

Field Guide

- Create a pictorial guide of terrestrial snails and slugs in Maine
 - Based on Martin's document
 - New observations in iNaturalist
 - Including species that are exotic and on the "watch list"
- Not ready
 - Federal government disruptions halted vetting process
 - Grant funding ended

Taxonomy
Taxonomy is the branch of zoology with the systematic classification relationships between organisms. Snails and slugs belong to the phylum Mollusca. Scientists who study mollusks are called molluscologists. Mollusks are the second most diverse phylum after arthropods.¹⁶ Mollusks include snails, slugs, squids, cuttlefish and other cephalopods, scallops, oysters and other bivalves, and a number of other organisms.¹⁶ Most are characterized by soft bodies with a muscular foot. Many have a shell and secrete protective calcareous plates that are either internal or external. The nervous system is organized into two nerve cords. This guide is focused on terrestrial gastropods. The gastropods consist of slugs and snails. Gastropods get their name from how the word translates from Greek to "stomach".

Lifecycle
Terrestrial snails and slugs lay their eggs either left on a surface or buried in soil or detritus. Eggs may appear as small, round, or oval objects. When the eggs hatch, the young emerge as miniature versions of adults. In some species, immature life stages may have different characteristics.
Snails and slugs are hermaphrodites, meaning both male and female reproductive organs are present. Usually, during mating, both animals exchange sperm.
When eggs are laid, they are often covered in a protective mucus. A single slug or snail can lay dozens of eggs per clutch.

Terrestrial Slugs of Maine

Agriolimacidae	p. 29
Arietidae	p. 33
Limacidae	p. 41
Philomycidae	p. 44

Hedgehog Slug
Arieton intermedium Normand, 1852
Introduced¹³



Top: Rob Crowl, iNaturalist; Center: Museum of Natural History; Bottom: iNaturalist

Size: <1 inch (25mm) (1-1.5)¹³

Characteristics: Name inspired by the texture of the dorsal surface.^{13,12} When contracted, dorsal tubercles appear "spiny." Dorsal color is variable, grey, white, or yellow, and may be banded. Tentacles dark. Distinctive yellow sole and slime. Body profile is "bell shaped" in cross section.

Habitat: Found in disturbed habitats, woodlands and wetlands.^{8,13,12}

Diet: Primarily fungivorous, will feed on other plant material and carrion.^{13,12}

Lifecycle: Overwinters as eggs or juveniles.¹² Reproduces in summer through fall.



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Spanish Slug
Arieton vulgare Moquin-Tandon, 1856
Invasive Watch List¹⁰



© iNaturalist, iNaturalist

Size: 5-6 inches (150mm) (10-12)^{10,11}

Characteristics: Found in Quebec (2022)¹⁰. Very similar to the invasive European black slug (*A. ater*) and red slug (*A. rufus*) and can hybridize with these species, needs dissection to confirm identification¹⁰. Dorsal color ranges from orange to black^{10,11}. Often rusty brown with dark tentacles. Mantle has granular texture. Pneumostome very prominent. Skirt is yellowish and cross with dark transverse lines. Sole is gray with sticky and clear to yellow mucus.

Habitat: Found in grasslands and disturbed habitats.^{10,11}

Diet: Herbivorous. Serious horticultural pest, particularly to brassicas.^{10,11}

Lifecycle: Overwinters as eggs. Reproduces summer through fall.^{10,11}

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Hive Snails
Euconulus spp.)
Euconulidae (hive snails)
Native¹²: *E. chersinus*, *E. polygratus*
Introduced¹²: *E. fulvus*



© iNaturalist, iNaturalist

Size: 0.08-0.13 inch (2.2-3.5mm) tall, 0.09-0.12 inch (2.4-3.2mm) wide, 5+ whorls¹².

Characteristics: Named for its "beehive" shape¹². Fragile, conical shaped, translucent amber colored shell with small open umbilicus. The wild hive (*E. chersinus* Say, 1821) is taller than the other hive snails found in Maine and has a slightly angulate body whorl and has 6-8 whorls¹². The brown hive (*E. fulvus* Møller, 1774) is glossy and may have faint raised spiral ridges. The fat hive (*E. polygratus* Pilsbry, 1899) has sutures that are more shallow than the other hive snails found in Maine. Dark colored body, tentacles and sole.

Habitat: Found in leaf litter¹². The brown hive is a habitat generalist¹².

62

Monacha Snails
Monacha spp.)
Hygromiidae (hairy snails)
Invasive Watch List¹⁰



© iNaturalist, iNaturalist

Habitat: Gregarious, may gather on plant tops¹⁴. Found in open dry habitats.

Size: 0.4-0.55 inch (10.5-14mm) tall, 0.6-0.8 inch (15.5-20mm) wide, 4.5-5.5 whorls¹⁰.

Characteristics: Not yet found in North America¹⁰. Shell translucent brown with opaque white stripes, smooth. Aperture variable. Umbilicus narrow to closed. Body color variable; buff to light brown to gray. Tentacles dark gray. Sole lighter in color than body.

Habitat: Hides in cool places, dense populations aggregate¹⁰.

76

Questions?



Image: vetexplainspets.com