

CUBAN SLUG

Scientific name: *Veronicella cubensis* (Pfeiffer)
Clade: Heterobranchia Family: Veronicellidae
Common names: Cuban slug, two-striped slug



Two Cuban slugs

HOST PLANTS

Cuban slugs thrive in humid and wet areas and are pests on fruit trees, fresh and vegetables, plant stems, trunks, leaves, flowers, and roots of ornamentals and landscape plants, fungi and molds, earthworms, and dead or slow moving insects.



DESCRIPTION

Adult Cuban slugs are shades of brown, often with two black or dark brown bands on the back. A thin lighter colored band may appear midline. Skin texture can be smooth or granular in appearance. Young slugs are very small and remain near the place of hatching. Eggs are oval and translucent, about 3 mm in diameter, and are chained together with a black threadlike material.



DAMAGE

Slugs chew irregular holes with smooth edges on leaves and flower parts. They will also feed on plant stems, trunks and fruit. This slug was feeding on plants left in a cull pile. Holes like these and a slime trail confirm the presence of slugs.

LIFE CYCLE / BEHAVIOR:

Egg to Reproducing Adult – averages 14-30 days, depending on weather and species

- Slugs are nocturnal, seeking shelter during the day under plants, refuse, mulch, rocks, and fallen leaves to hide from the sun. They are extremely susceptible to desiccation.
- Slugs have eyes mounted at the tip of stalks on the head, are legless, and move by means of a “foot”. Movement is facilitated by mucus secreted from glands in the foot.
- Although **adults** are hermaphroditic (have both male and female sex organs), they must mate to produce eggs. After mating, both may lay **10-200 eggs** which hatch in 14-30 days (species dependent).
- **Juveniles** reach sexual maturity in 3-5 months, taking up to 2 years to be fully grown.
- In addition to damaging plants, the Cuban slug poses a health hazard as a vector for rat lungworm disease.

SEMI-SLUG

Scientific name: *Parmarion cf. martensi* Simroth
Subclass: Pulmonata Family: Helicarionidae
Common names: Semi-slug

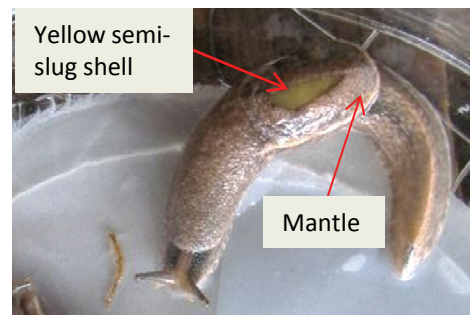


Weeds, culled plants and debris harbor slugs.

HOST PLANTS

Semi-slugs thrive in humid and wet areas and are pests on fruits and vegetables, ornamentals, and landscape plants, preferring soft plant tissue and fruits, over leaves.

Avocado	Lettuce
Banana	Lemongrass
Cabbage	Mango
Citrus	Orchid plants
Dracaena	Papaya fruit
Fennel	Passion fruit
Guava	Pet food
Heliconia sp	Sweet potato
Hibiscus flowers	



DESCRIPTION

Adult semi-slugs are brown and capable of growing up to 50 mm long. A semi-slug has a small soft shell on its back which is yellowish brown, flattened, and fingernail-shaped, but not large enough to cover the entire slug. The shell is often covered by mantle folds. Eggs are oval and translucent, smaller than Cuban slug eggs. Eggs (10-30 per clutch) are not chained together with a black threadlike material as Cuban slug eggs are.



Slug droppings on plant



Side view of semi-slug

Damage to plants from semi-slugs is similar to that of Cuban slugs. Of greater concern is the health hazard of semi-slugs: it is a vector of rat lungworm disease and carries higher concentrations of infectious larvae than other slugs. These infectious nematodes are found in the slug, its feces and slime trails and can be easily ingested. (Hollingsworth et al, 2007)

LIFE CYCLE / BEHAVIOR:

Egg to Reproducing Adult – similar to Cuban Slug

- Semi-slugs were first observed on Oahu in 1996, then later on the island of Hawaii in 2004, where it has begun displacing the Cuban slug in some areas, and is a common pest in papaya, ornamentals and vegetable gardens (Hollingsworth et al, 2007).
- A nocturnal animal, the semi-slug seeks moist shady areas during the day, such as under tarps, inside tires, on or under plastic objects.
- Unlike the Cuban slug, the semi-slug is seldom found in direct contact with soil. It has the tendency to climb drainpipes, water tanks, dwellings and other structures, which is problematic because it is a vector of rat lungworm disease.

GARDEN SLUG

Scientific name: *Deroceros reticulatum* (formerly *Agriolimax meticulatus*)

Subclass: Pulmonata Family: Agriolimacidae

Common name: Gray garden slug

Scientific name: *Meghimatium striatum*
Van Hasselt

Subclass: Pulmonata Family: Philomycidae



Description

The gray garden slug is variable in color: creamy to light coffee colored, rarely blackish with spots. Eggs are white, slightly transparent, similar to other slug eggs (~1mm diameter).

HOST PLANTS

Garden slugs prefer succulent foliage or flowers, pests primarily of seedlings and herbaceous plants, ripening fruits, and foliage plants.



Description

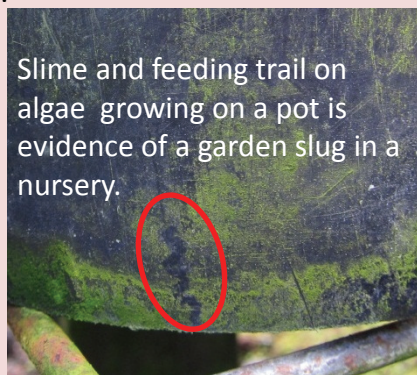
M. striatum is a slender slug (up to 45 mm long) usually having 5 regular and straight black longitudinal dorsal bands with the outer 2 dissolving into dots or absent. Upper tentacles are dark.

Damage

Feeding habits are similar to other slugs. Small irregular holes with smooth edges are commonly found on plants. Slime trails will be visible.



Deroceros sp. feeding on JC Compacta



Slime and feeding trail on algae growing on a pot is evidence of a garden slug in a nursery.



M. striatum and slime trail on Dracaena.

LIFE CYCLE / BEHAVIOR:

Egg to Reproducing Adult – see Cuban Slug

The behavior of *Deroceros reticulatum* and *Meghimatium striatum* is similar to that outlined for Cuban slugs.

References:

- Hata, T.Y, A.H. Hara, B.K.-S. Hu. 1997. Molluscicides and mechanical barriers against slugs, *Vaginula plebia* Fischer and *Veronicella cubensis* (Pfeiffer); Crop Protection Vol. 16, No. 6: 501-506,.
- USDA, APHIS. 2010. Tropical Terrestrial Gastropods: Pest Information. Emergency and Domestic Programs: Chapter 2 and 6. 5/2011-1
- Cowie, R.H. 1990. Non-indigenous land and freshwater molluscs in the islands of the Pacific: conservation impacts and threats; Hawaii Biological Survey Contribution No. 1990-010.
- Hollingsworth, R.G., R. Kaneta, J. F.Sullivan, H. S. Bishop, Y. Qvarnstrom, A. J. Silva, and D. G. Robinson. 2007. Distribution of *Parmarion* cf. *martensis* (Pulmonata:Helicarionidae), A new semi-slug on Hawaii Island, and its potential as a vector for human angiostrongyliasis. Pacific Science, vol 61, No. 4:457-467,.

Slugs: Best Management Practices

	Options Available
<h3>Monitoring Techniques</h3>	<p>Sanitation is the safest and cheapest method to control slugs.</p> <ul style="list-style-type: none"> ▪ Remove debris and stored material where slugs can hide and breed. ▪ Remove culled and rotting plant material that slugs can feed on, hide in and breed. ▪ Control weeds and algae or moss on walkways and benches where slugs might hide. ▪ Check benches in early morning to hand collect slugs. ▪ Natural predators include toads, some predacious beetles and their larvae, planaria (flatworms) and the rosy predator snail (<i>Euglandina rosea</i> (Ferussac)).
<h3>Select Best Control Method</h3>	<ul style="list-style-type: none"> ▪ Create barriers to keep slugs off benches such as: <ul style="list-style-type: none"> ▪ Copper screens ▪ Lime or copper hydroxide ▪ Use repellents to reduce slug populations: <ul style="list-style-type: none"> ▪ Copper Hydroxide, used as a fungicide (Kocide, Champ) ▪ Bordeaux mixture, a fungicide, containing lime and copper sulfate ▪ Spinout (Sepro), used as a root growth regulator, as a pot or groundcover treatment. ▪ Limit watering to reduce moisture, such as using drip irrigation instead of overhead sprinklers. ▪ Pesticides, such as Deadline or Metarex (4% Metaldehyde) effectively control slugs. <ul style="list-style-type: none"> ▪ In a lab trial Deadline remained effective over a longer period of time under wet conditions.
<h3>Treatment Before Market</h3>	<ul style="list-style-type: none"> ▪ Hot water shower treatments before shipping controls slugs: <ul style="list-style-type: none"> • Cuban slug 113°F for 13 minutes • Semi-slug 113°F for 3 minutes • Garden slug 113°F for 3 minutes
<h3>Final Inspection</h3>	<ul style="list-style-type: none"> ▪ Visually inspect all plants for eggs and slugs before shipment.