Guam Land Snail ID Booklet

A Simple Guide to Terrestrial Gastropods of Guåhan

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Introduction

Objective

The purpose of this booklet is to provide a quick and easy way to identify common land snails for government biologists and contractors on Guam. In 2015, the US Fish & Wildlife Service (USFWS) gave protected status to three native Guam tree snail species by adding them to the US endangered species list (USFWS, 2015). These species are in the family Partulidae and include the Guam tree snail (*Partula radiolata*), the humped tree snail (*Partula gibba*), and the fragile tree snail (*Samoana fragilis*). Introduced predators, notably the manokwari flatworm (*Platydemus manokwari*), and habitat destruction have contributed to the decline of partulids throughout the region. As development of lands for public and private entities has accelerated, so has the potential impact on populations of all three species. So, there is a need to be able to recognize the protected species to minimize the negative impacts to their dwindling populations. Unfortunately, differentiating these species from each other and other land snails can be difficult for both biologists and non-biologists. This booklet is intended as a concise, authoritative ID guide to Guam's terrestrial snails.

Manokwari Flatworm Attacking *Partula radiolata*

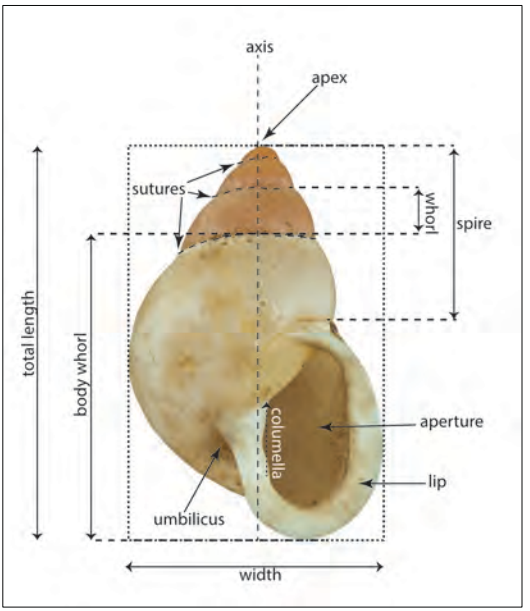
Scope

There are over 100 species of land snails reported from the Marianas (Kerr & Bauman, 2013), including native and introduced species. Most of these occur on Guam, are very small (4 mm or less), and many haven't been seen in decades (perhaps extinct). Many occur in habitats that tree snails aren't likely to occur in. This book will focus on twelve land gastropods that are either likely to be encountered, are similar in size or appearance, or are likely to occur in the same places as native tree snails. All twelve gastropods in this guide are represented by both a concise written description and high-resolution photographs of live animals, including size scales. Both common and scientific names are provided where possible, along with photos of color variants, and alternate views of shells. Diagnostic characteristics are also highlighted. Although it's hoped an electronic (e.g., pdf) version will be utilized, a field edition printed on weather resistant paper will be made available in limited quantities and reprinted when funds are available.

What are Land Snails?

Land (or terrestrial) snails are gastropod mollusks that live exclusively out of water on land, including shell-less forms (i.e., slugs). This grouping excludes both marine and freshwater gastropods, as well as intertidal species that can be found above the water line for extended periods (e.g., periwinkles). Land snails belong to two major lineages, the caenogastropods (Caenogastropoda) and the pulmonates (Pulmonata). The caenogastropods have gills and an operculum, which is a hard "door" that can be closed to protect themselves from water loss and predators. Pulmonates have air-breathing lungs in their mantle cavities and no operculum. All but one of the snail types in this guide are pulmonates. Many pulmonates seal their shells instead with a mucous-like secretion to minimize water loss during dry periods.

Snail Anatomy



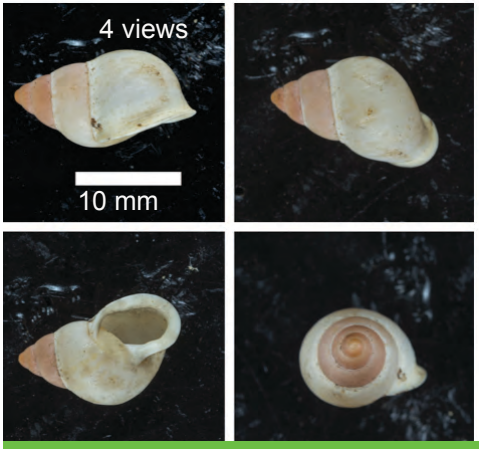
Snail shells are basically tubes that grow in spirals of increasing size, which terminate with the aperture or opening. Most shells coil in a clockwise direction (dextral), but there is counter-clockwise (sinistral) coiling in some species. The apex of the spire includes a protoconch, which is the embryonic shell. Each loop of the shell is called a whorl, ending in the body whorl. Often, a hole in the shell is evident next to the aperture, called the umbilicus. The umbilicus is the exposed center portion of the spiral, which is surrounded by a pillar of shell called the columella that starts in the apex and can be exposed in the aperture lip. This booklet uses TL (total length) for shell height, which is the longest dimension parallel to the axis of the shell. Unless otherwise indicated, size ranges in the descriptions are derived from Kerr and Bauman (2013), Smith et al (2008), and the author's own measurements.

Family Partulidae

Partula gibba (Férussac, 1821) - Humped Tree Snail

Native, endangered, very rare, forest

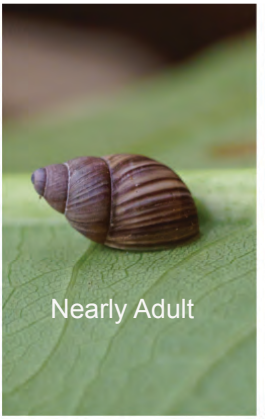
One of three extant partulid species described from the Mariana Islands. Partulids are pulmonates, simultaneous hermaphrodites, and give birth to live young (ovoviviparous). *P. gibba* is reported from Guam and several islands in the CNMI, but is on the decline on nearly all islands. On Guam, it was once common across the island (Crampton, 1925). Currently, it's only known from Haputo in small numbers. *P. gibba* can be distinguished from other Guam partulids by its fattened (or humped) body whorl, and (usually) white bands along the sutures between whorls. Color patterns vary among individuals within and between islands. Adults have a flared lip around the aperture and reach 14-18 mm TL. Juvenile coloration is often varied, with some individuals possessing a dark brown color with pinkish shades toward the apex.



Partula radiolata (Pfeiffer, 1846) - Guam Tree Snail

Native, endangered, somewhat common, forest

This snail is endemic to Guam only and is currently the most common and widespread tree snail on island. There are perhaps 50 populations of varying sizes (Fiedler, unpubl. data). The Guam tree snail is found on both native and non-native plants in a variety of vegetated habitats. It can often be found on the exposed margins of forests along roads or streams. *P. radiolata* can be distinguished from other partulids by its 'radiolate' lines on its shell, particularly the body whorl. The shell is typically pale straw-colored, ranging from 13-18.5 mm TL in adults. Shell color can vary in this species, with juveniles often having darker coloration or darker tones on the apex. Dark shell morphs are also fairly common amongst in southern Guam. Juvenile and some adult *P. radiolata* with mottled color patterns are often mistaken for *S. fragilis*.

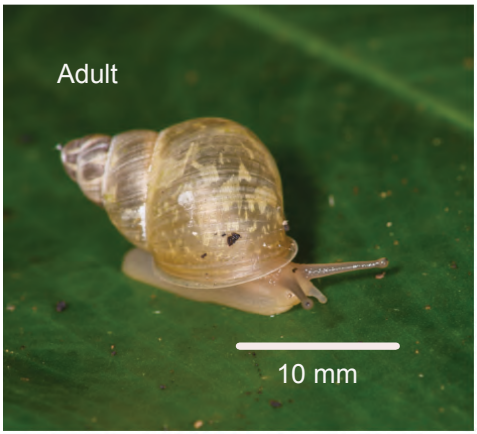


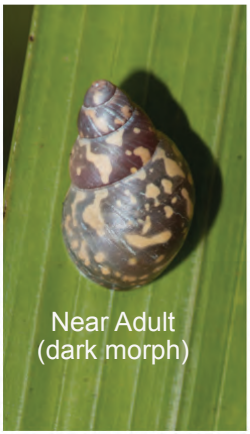
Family Partulidae

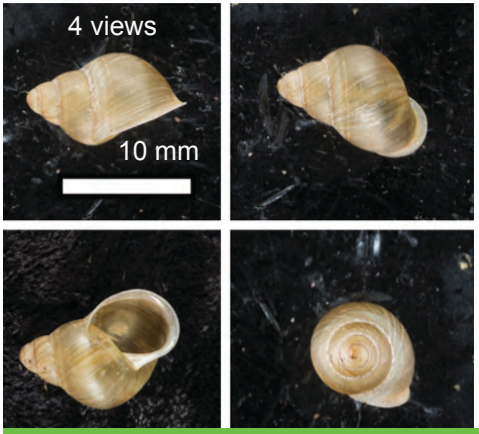
Samoana fragilis (Férussac, 1821) - Fragile Tree Snail

Native, endangered, rare, forest

Endemic to Guam and Rota (Kondo, 1970). Six distinct small populations are known on Guam and one on Rota. On Guam, they often occur with *P. radiolata*. The fragile tree snail is smaller than the other partulids as adults (12-16 mm TL) on Guam, but on Rota, they reach 19 mm (Gerlach, 2016). Their shells are thin and translucent with a brown tint. The whorls are rounded, giving the shell a turban-like appearance and the apex is broader and flatter than other partulid snails. The color and pattern of living snails is mostly due to their bodies. Most often, they have a light, olive-brown base color, punctuated with smoothly margined dark brown blotches. However, color can vary from dark to light brown, sometimes with jagged blotches. Older snails often have whitish, weathered shells. *P. radiolata* subadults with mottled patterns are often misidentified as *S. fragilis.*





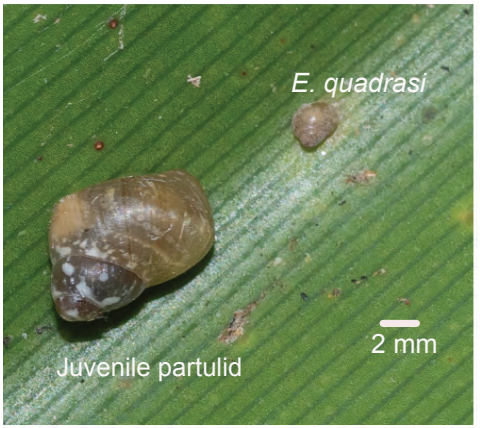


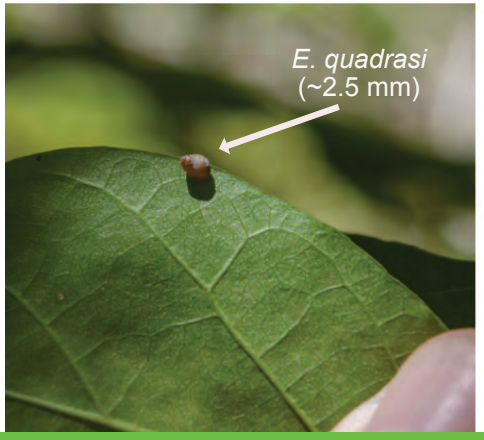
Family Achatinellidae

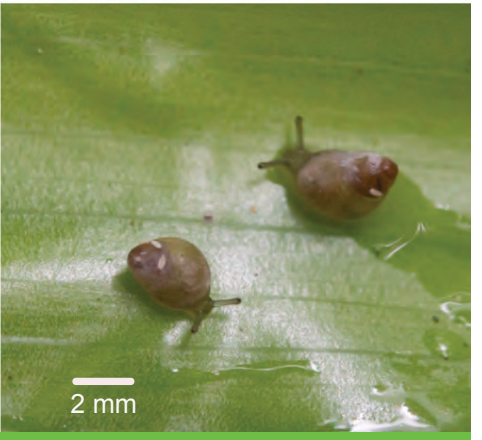
Elasmias quadrasi (Möllendorff, 1894) - No Common Name

Native, not protected, uncommon, forest

Achatinellids are pulmonates, and in the Marianas are all very small (3-4 mm TL for adults) and include snails from three different genera: *Lamellidea*, *Pacificella* and *Elasmias* (Kerr & Bauman, 2013). Snails of the first two genera are narrowly conical, and less likely to be confused with partulid snails. However, *Elasmias quadrasi* is similar in size and shape to newborn partulids and is often misidentified as such. *E. quadrasi* is reported from the southern Mariana Islands (incl. Saipan), with a similar undescribed species on northern islands (Kerr & Bauman, 2013). It can be common in some limestone forests on Guam. *E. quadrasi* is very small (<3 mm TL), and globose with only 2.5 whorls in the shell. The shells often appear fuzzy in live snails, perhaps because of attached debris to faint striations. They are found on leaves of forest plants and often co-occur with partulid snails.





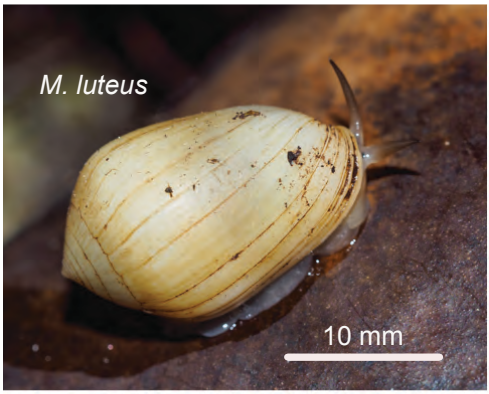


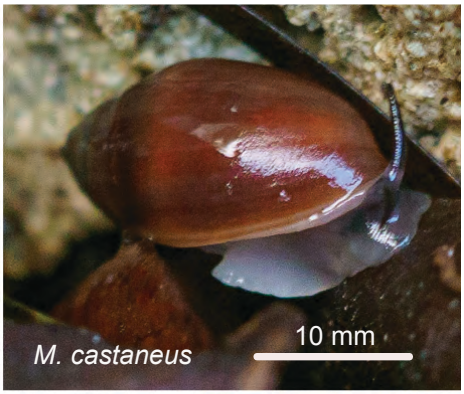
Family Ellobiidae

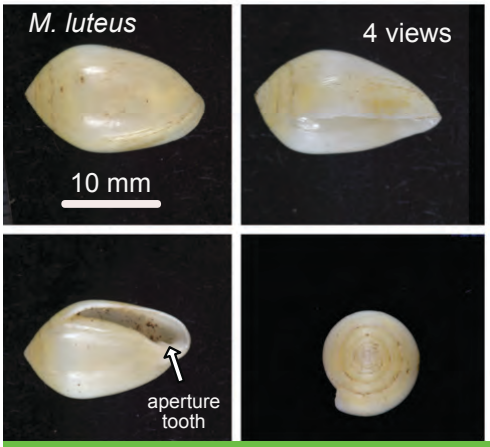
Melampus spp. (Montfort, 1810) - Coffee Bean Snails

Native, not protected, uncommon, coastal

Ellobiids are pulmonates and some species retain links to aquatic habitats. Their shells have a narrow aperture, often with tooth-like projections. They are hermaphroditic egg layers. Two genera of ellobiid snails occur in the Marianas: *Melampus* and *Pythia.* There are at least two *Melampus* species in the Marianas: *M. luteus* and *M. castaneus*. Both occur in shaded beach wrack zones and above the high tide line, often under stones and leaf litter, sometimes on exposed portions of trees and driftwood. Their shells are oblong and ovate with a relatively blunt apex, reaching 13-18 mm TL (Cowie et al, 2017). *M. luteus* is solid yellowish to cream colored, while *M. castaneus* varies from solid light to dark brown or even light brown with darker bands. They are terrestrial, though their eggs hatch out as larvae that develop in the ocean. *Melampus* are similar in size to partulids and occur along coastal forests.



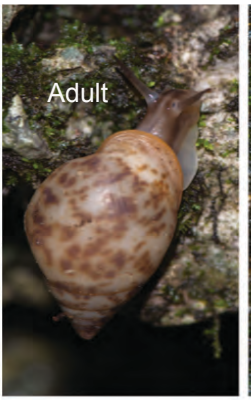


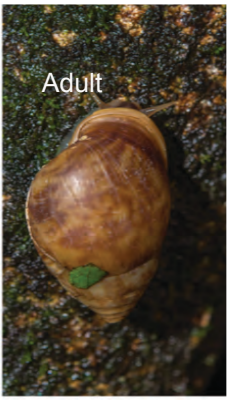


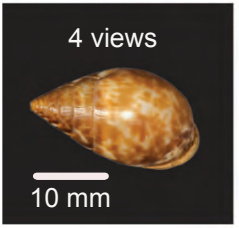
Pythia scarabaeus (Linnaeus, 1758) - Common Pythia

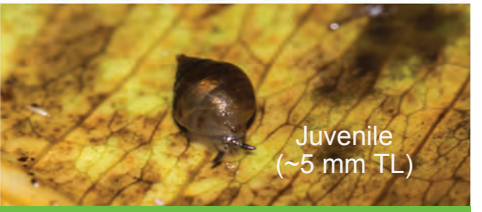
Native, not protected, rare, forest

P. scarabaeus is a ground snail native to the Marianas and throughout the western, tropical Pacific (Kerr & Bauman, 2013). They can reach 30 mm TL (Cowie et al, 2017). The shell is flattened with a narrow, toothed aperture and can range in color from solid dark brown to mottled brown or beige. Live *Pythia* are typically seen on wet days near shaded limestone features or in damp leaf litter (Fiedler, unpubl. data), sometimes along the margins of coastal limestone forests with *Melampus*. They may be confused with native tree snails due to their similar sizes and occasional presence on the bases of trees and plants, including false taro, when they occur inland. Their old empty shells are ubiquitous on the ground and in leaf litter all over Guam and other islands. Now they are rare, only observed live at a handful of locations (Fiedler, unpubl. data). They are hermaphroditic, and lay their eggs under leaf litter in gelatinous strands.







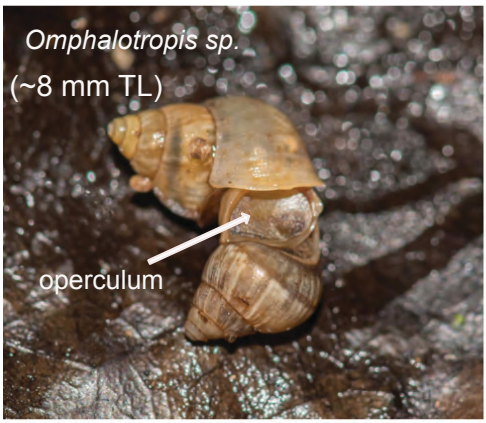


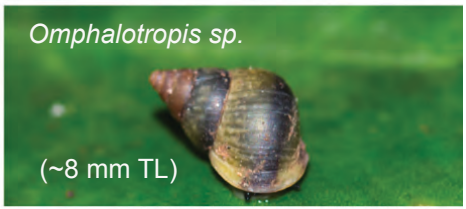
Family Assimineidae

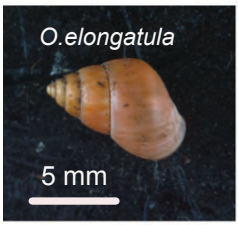
Omphalotropis spp. (L.Pfeiffer, 1851) - No Common Name

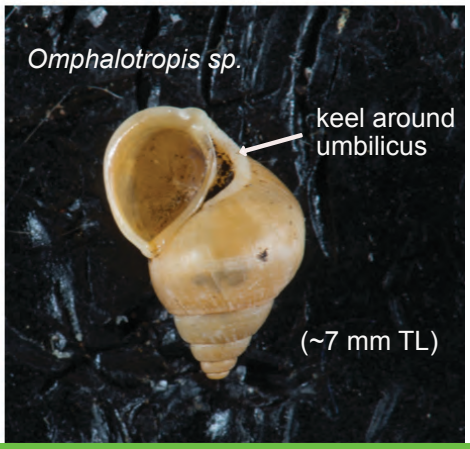
Native, not protected, uncommon, various locations

Assimineid snails aren't pulmonates and have an operculum. Most assimineids occur in salt marshes and estuaries, but some are terrestrial. In the Marianas, there are 25 described assimineid species (Smith, 2003), 16 of these are *Omphalotropis* species from Guam. There are eight more undescribed Omphalotropis from the Marianas (Bauman, 1996). Several *Omphalotropis* can resemble small partulid snails, because they are conical with similar size (5-8 mm) and colors. They can be distinguished by the presence of a flattened keel around the umbilicus. They are often exposed on plants, rocks and the ground during wet and rainy periods or in moist leaf litter. Partulid snails can be seen on plants during most any weather, though they are more active when it's wet. Partulid shells of similar sizes are less conical than *Omphalotropis*, with fewer whorls.









Family Achatinidae

Lissachatina fulica (Férussac, 1821) - Giant African Snail

Introduced, invasive, common, cultivated areas and more

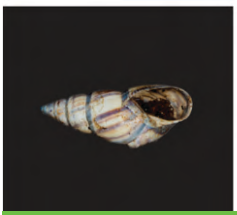
Lissachatina fulica (formerly *Achatina fulica*) is a large land snail (>20 cm TL), originally from east Africa, and was introduced to Guam in the 1940s, but earlier to the CNMI (Cowie, 2000). It is an invasive species outside its native range. *L. fulica* is both an agricultural pest and vector for human diseases (USDA, 2007). On Guam, it can be found on a variety of plants (e.g., ornamental hibiscus) and sometimes on the sides of buildings. Adults are much larger than partulids, but small juveniles may sometimes be confused with tree snails. Unlike partulids they have a relatively large, aperture and a streaked, mottled-brown color pattern. Juvenile *L. fulica* have rounder shells compared to partulids. Adults are hermaphroditic and egg layers. Their numbers on Guam and other islands may be lower now, due to the introduction of the manokwari flatworm.

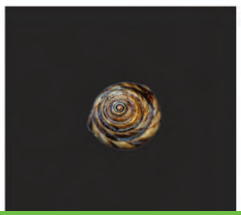
Family Bulimulidae

Drymaeus multilineatus (Say, 1825) - Lined Tree Snail

Introduced, invasive?, common, various habitats

The lined tree snail (*Drymaeus multilineatus*) is native to the tropical New World. They are in the pulmonate family Bulimulidae and reportedly deposit eggs on the ground (Deisler, 1983). This snail was inadvertently introduced to Guam before 1978 (Kerr & Bauman, 2013). It can often be found on trees in relatively dry (often exposed) habitats, where it is usually attached to tree trunks and branches. They are very active during wet periods. Adult *D. multilineatus* grow larger than the partulids, at 18-25 mm TL. The lined snail is often mistaken with partulids. Their general shape is similar, except that the lined snail's shell apex is pointier and the aperture is more elongate. Their shells also have dark brown to black axial lines with dark bands on sutures. Occasionally, it co-occurs with native partulid snails.



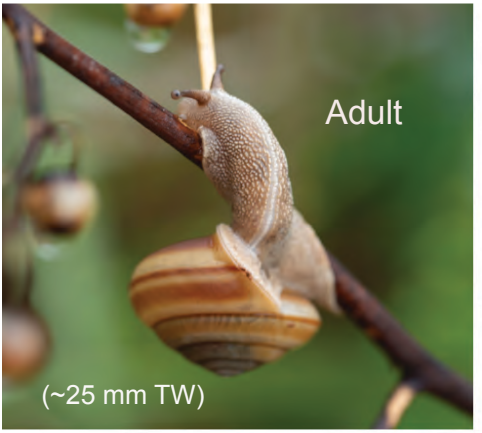


Family Camaenidae

Satsuma succincta (H. Adams, 1866) - Cinnamon Bun Snail

Introduced, invasive, very common, various habitats

Satsuma succincta is an introduced snail that came to Guam around 1982 (Kerr & Bauman, 2013) and is native to Taiwan. It is not known from other Mariana islands. Its shape is very different from any partulid snail. It has a flattened spire with brown bands that parallel its whorls. It also grows larger than any of the partulids, up to 30mm in diameter. Very small *S. succincta* look like flattened coils. This is a very widespread snail in most forested and vegetated habitats, and a common garden pest. It can be found on herbaceous plants, trees, shrubs as well as the ground. These snails are hermaphroditic and egg-layers. Another larger, camaenid species (probably *Satsuma mercatoria*) may occur on Guam, but has not yet been formally confirmed.



Family Succineidae

Calcisuccinea luteola (H. Adams, 1866) - Mexican Ambersnail

Introduced, invasive?, uncommon, sporadic locations

The Mexican ambersnail is an introduced pulmonate snail from the southern US, first reported on Guam around 2003 and sporadically since then (Kerr & Bauman, 2013; Fiedler, unpubl. data). It is an agricultural pest of papaya. Its distribution appears to be limited on Guam so far. However, it has shown up in some plant nurseries and is common around the Ritidian Wildlife Refuge building. This snail occurs on plants, in the soil below plants, or on outdoor walls. Adults reach 12.5 mm TL and may be confused with partulid snails, because the coloration of some individuals resembles *P. radiolata*. *C. luteola*, however, have shells that are more elongated with a large oval aperture. The shell whorls and apex are a bit bulbous. A few native succineids are historically known from the Marianas, but have not been seen in decades on Guam and are presumably extinct.

Family Veronicellidae

Veronicella cubensis (Pfeiffer, 1840) - Cuban Slug

Introduced, invasive, very common, various habitats

These pulmonate mollusks are native to Cuba, as their name implies, and are now circumtropical . They were introduced to Guam via Hawaii before 1993 and Rota in 1997 (Kerr & Bauman, 2013), but it's unknown if they occur elsewhere in the Marianas. They are common on Guam, and are agricultural, garden, and ecological pests. They are rather large, reaching 12 cm, and display a variety of white to brown shades with varying patterns. One feature that doesn't vary is an obvious light (or white) mid-dorsal line that extends over most of the body. Often this mid-dorsal line is flanked by a parallel line of dark dots on either side. Unlike partulids and other snails, they lack a shell. They lay eggs in leaf litter and under other substrate on the ground. There may be other veronicellids on Guam and other Mariana islands that have not yet been confirmed.

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Need Snail Help?

Need an ID or have other questions?

Email Dr. G. Curt Fiedler: gcfiedler@triton.uog.edu

Call Guam US Fish & Wildlife Service: (671) 989-6743