

Real-World Biology: Analysis

CHAPTER 25 Jewels of the Forest

You have probably seen land snails that are gray, brown, or tan in color. There is, however, another type of interesting snail. It is a tree snail with a conical, tapered shape and a beautifully colored spiral shell. These snails live in only one place in the world—on the island of Oahu, Hawaii. They live in moist-to-wet forests on isolated mountain ridges above 457 meters. The snails cannot travel easily, so there are many separate groups of snails. The snails eat a sooty, black mold off the leaves of trees. The removal of this fungus assists in photosynthesis. Rob Pacheco, a nature writer, said, “Their story is a classic Hawaiian natural history drama, punctuated with exceeding beauty, unusual biology, spectacular speciation, and tragic loss.”



Part A: Snails in Peril

Oahu tree snails belong to the genus *Achatinella*, which consists of 41 species. Today 32 of these species are extinct, and the remaining species are classified as endangered. In the 1800s, these so-called “jewels of the forest” were so beautiful and plentiful that local residents collected them by the thousands.

The snails hung from trees like bunches of grapes. It has been estimated there were thousands per tree. Today there might be one to 40 per tree. Often, no snails are seen.

The following table lists historical events that have caused the decline and extinction of *Achatinella* populations.

Date	Event	Cause
1850s	massive shell collecting	collectors, ornament producers
1850s–2000s	habitat destruction, leading to the death of snails	forest clearing, agricultural development, grazing, fire, construction projects
1800s(?) 1900s(?)	introduction of rats, which destroy more than 80% of snail populations	ships carrying rats from other countries docking at the island
1955	introduction of a carnivorous snail, <i>Euglandina</i> (in an effort to control the alien African snail, an agricultural pest), which eats tree snails	a biological control decision
1990s	pigs chewing the tops of mountain trees and spitting out the leaves	periods of drought

Analyze and Conclude

Respond to each question.

- Summarize** How did the introduction of rats affect the snails?

2. **Speculate** How did such a large number of species of *Achatinella* evolve on a single island?

3. **Infer** Pigs chew leaves for water when the land is dry. Leaves that the pigs were chewing were from trees on a mountaintop that had always been wet. What does this tell you about the local climate?

Part B: Saving the Snails

Dr. Michael Hadfield, Director of the University of Hawaii Kewalo Marine Laboratory, resembles a shopkeeper showing off a box full of precious jewels as he pulls a branch out of a small terrarium. Clinging to the leaves like ornaments are brilliantly colored tree snails.

Since 1991, scientists at the Kewalo Lab have been removing members of severely threatened wild populations and bringing them into captivity for propagation. Laboratory populations can then serve as stock for reintroduction or to augment existing natural populations.

Analyze and Conclude

Respond to each question.

1. **Infer** The laboratory staff is also maintaining captive breeding operations outdoors in the Makua Valley with enclosures protecting snail populations. The construction of the enclosures includes 1.2 m high walls with barbed wire and bait boxes filled with poison. What things is the staff trying to keep out?

2. **Evaluate** How might the preservation of *Achatinella* snails contribute to the overall health of the trees the snails inhabit?

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