'Voice of the forest': George the snail, last of his kind, dies at age 14

Climate change and invasive predators have taken a heavy toll on native animals and insects in the Hawaiian Islands

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George, who never lived in the actual forest, was still a mascot for endangered Hawaiian snails. Photograph: David Sischo

As New Year's Day broke in the Hawaiian Islands, one rare creature was not there to emerge from his shell and greet it: George, the last snail of his kind and a local celebrity, was dead at age 14.

The passing of George, a member of the *Achatinella apexfulva* species and a tree snail who fed on tree fungus, algae and bacteria, epitomizes the decline of biodiversity on the Hawaiian islands, where climate change and invasive predators have taken a heavy toll on native animals and insects. Snails like

George also played a part in the songs and stories of native Hawaiian culture,which holds that snails make sounds and are “the voice of the forest”.

George, who never lived in an actual forest, was still a mascot for endangered Hawaiian snails. After a pathogen outbreak in the lab where he lived, he became the only surviving member of his species and was visited by hundreds, if not thousands, of schoolchildren. Despite his celebrity status, George wasn’t the prettiest snail to look at. David Sischo, the snail extinction prevention program coordinator for the Hawaii Invertebrate Program, described him as “old and grizzled” and said that George was also “bit of a hermit”, who would stay in his shell at times when most other nocturnal snails emerge. Although scientists had hoped that George, a hermaphrodite, would have offspring, his solitary life ruled out that possibility.

A Hawaiian tree snail, Partulina mighelsiana. Snails like George used to be ubiquitous throughout the islands. Photograph: David Sischo

Snails like George used to be ubiquitous throughout the Hawaiian islands. In fact, the *Achatinella apexfulva* was the very first snail species to be written about by non-native scientists, said Sischo. In the 1780s, when British captain George Dickson arrived in Hawaii, he was given a lei made with the shells of George’s ancestors. Back then, the snails hung from trees in giant clusters, easy pickings for scientists and collectors. “In a few minutes I collected several hundred specimens, picking them from trees and low bushes as rapidly as one would gather huckleberries from a prolific field,” a collector named DD

Baldwin wrote in 1887.

At that time, Hawaiian land snails existed in a mind-boggling 752 varieties – about as many as exist in the mainland US and Canada combined. The snails likely arrived by hitchhiking on sea birds that came to the islands millions of years ago, where they thrived and developed into different species – many of which are only found in a single area of one forest on one island. They had no natural predators, and even after the Polynesians brought rats to the island, still lived in abundance. But when Europeans began arriving, that all changed.

At one time Hawaiian land snails existed in a mind-boggling 752 varieties. Photograph: David Sischo

By the early 1900s, many of the species were "collected" to extinction. Then came the wolfsnail. Like numerous other destructive invasive species, the rosy wolfsnail was introduced to Hawaii on purpose. In 1955, it was brought to the islands in hopes of controlling populations of the giant African snail, a foot-long, "sex-crazed" species with shells that can pierce tires and which had been released there by accident. It didn't. Instead it binged on native snails. Unlike Hawaiian snails, which eat decomposing leaves or the fungus that grows on trees, the wolfsnail eats other snails by tracking their slime and attacking with brutal efficiency.

When Michael G Hadfield, an emeritus professor of biology at the University of Hawaii, began studying Hawaiian snails in the 1970s, he was stunned by their incredible diversity. He and other scientists began making trips into forests on Oahu and other islands where they would mark out a five by five-

meter patch of forest, study and label the population of snails with a fine-pointed pen and some waterproof lacquer. They would return a month or so later to see how the snails were doing, and soon amassed information about the snails' lifespans, behaviors and the role in the ecosystem, where before they had only been appreciated for their attractive shells.

Notably, Hadfield studied a population of *Achatinella apexfulva* – the same species as George – living in the Waianae forest on Oahu for years. The snails were unusual in that they gave birth to large offspring measuring 4 to 5mm in length, but didn't begin reproducing until they reached the age of five, and then only a handful of times a year. On trips to visit the *Achatinella apexfulva*and other snails, Hadfield often witnessed a foreboding site: rosy wolfsnails hunting for prey.

Scientists have begun re-introducing some native adult snails into remote forests where they hope they will thrive. Photograph: David Sischo

The longer Hadfield worked, the more destruction he saw. He and other scientists would often arrive at a study site to find a scattering of empty shells, like little tombstones.

“We were just watching snails disappear, disappear, disappear,” Hadfield said. “We could see them vanishing before our eyes.” By the early 1980s, Hadfield and his colleagues had begun bringing snails into their laboratory to preserve preserving them. In 1997, a group of about 10 *Achatinella apexfulva* was brought to the lab. Two of them were George’s parents.

Despite the sad fate of the *Achatinella apexfulva*, Sischo said that the Oahu lab he works in now has thousands of native snails in residence, and that scientists have begun re-introducing some of the adults into remote forests where they hope they will thrive. So far, the locations have been kept secret, in part, Sischo said, so that humans don’t go trampling around looking for them.

As for George, his shell and body are being preserved, along with a two millimeter live sample of his “foot” which was sent to San Diego’s Frozen Zoo with the goal of one day cloning him and reviving the species. No funeral will be held, scientists said.