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RESOURCES

HAWAII'S ENVIRONMENT

Shrimp are genetic marvels



By [Jan TenBruggencate](#)
Advertiser Columnist

The tiny red shrimp found in Hawai'i's coastal brackish ponds appear to be locked into very small habitats, and although they look the same across the island chain, there is very little genetic mixing with populations even just a few miles away.

"Basically what we're seeing in most cases is, when you go to a site, what you find is unique to it," said Scott Santos, an Auburn University assistant professor of biological sciences who is from Maui and still does research in the Islands.

Santos has conducted detailed genetic studies on the quarter-inch-long, red shrimp, 'opae 'ula, or *Halocaridina rubra*, as part of research into the biology of anchialine ponds. These ponds often are found in rocky coastal regions. They are often brackish, have no surface connection to the sea, but rise and fall with the tides.

Santos said genetic studies suggest all the Hawaiian *Halocaridina* shrimp originated from a single ancestral arrival, probably from the western Pacific. When compared with relatives in Okinawa and East Timor, it appears the Hawaiian shrimp diverged from

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those animals between 9 million and 50 million years ago.

But they are also widely separated within Hawai'i. Santos said he has identified seven genetic lineages on Maui, O'ahu and Hawai'i.

"Based on the amount of genetic difference between them, these seven distinct lineages appear to have been separated from each other for at least 1 (million) to 6 million years," he said. Although they are currently all considered the same species, that kind of genetic distance should qualify them for being distinct species, he said.

The shrimp have a larval stage that makes them capable of traveling in the open ocean. That's how they must have gotten to Hawai'i. But once they are established in a water table, they can go through an entire life cycle without leaving, Santos said. They seldom, if ever, return to the sea, and if they do, the chance that they will move into another water table or aquifer is slim, he said.


Thus, not only are they different from island to island, but between distinct water tables on the same island: The shrimp on the Hamakua coast are genetically isolated from those on the Kona coast; the 'opae 'ula from south Maui are different from the ones in the Hana area; the ones at Wai'anae are unique, as are the ones in the Pearl Harbor area, as well as those in Windward O'ahu.

"It really is pretty amazing how the genetics of Halocaridina so closely follow the aquifers of the islands," Santos said.

If you have a question or concern about the Hawaiian environment, drop a note to Jan TenBruggencate at P.O. Box 524, Lihu'e, HI 96766 or jant@honoluluadvertiser.com. Or call him at (808) 245-3074.

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