

Lava attraction: 74 new beetle species found hiding in plain sight on a Hawaiian volcano

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A moss covered ohia tree in Maui rainforest with a *Mecyclothorax rex* beetle inset. These beetles often live and feed within moss mats on trees, thereby escaping the extensive rainfall that floods Haleakala's windward slopes. Credit: Prof. James K. Liebherr

Confined to the limits of Haleakala volcano, Maui Island, Hawaii, the beetle fauna there turns out to be not only extremely diverse, but very abundant as well. When Prof. James Liebherr of the Cornell University Insect Collection thoroughly sampled beetle populations on the volcano, he identified 116 species of round-waisted predatory beetles, including 74 new to science. The taxonomic revision, complete with descriptions of the new species, is now published in the open-access journal *ZooKeys*.

The present discoveries and observations are certainly surprising due to their scale, even though it has been long known that the Hawaiian Islands support disproportionately high levels of biodiversity. For this group of native round-waisted beetles, called *Mecyclothorax* in the zoological naming system, there are 239 species across the Hawaiian Islands, all of them descended from a single colonizing species.

The 116 species known from Haleakala make that volcano the center of biodiversity for this group within Hawaii. These beetles' evolution during the 1.2-million-year lifespan of Haleakala volcano means they have speciated faster than most organisms on Earth, including the Hawaiian *Drosophila* and the cichlid fishes of eastern Africa.

No less striking is the fact that the 74 newly described beetle species previously evaded discovery within the limits of Haleakala's 1,440 km²

of surface area. Reasons for this include the restricted distributions of many of the beetle species, and the previous lack of comprehensive field sampling. During his research, Prof. Liebherr examined all quarters of the mountain to eventually find many places of 1' latitude × 1' longitude where more than 20 *Mecyclothorax* species lived closely together within a limited area of forest.

Most of these diverse microhabitats were discovered in windward rainforests. Moreover, different forest areas, geographically isolated from each other by volcanic lava flows, steep valleys, or extensive mudflows, supported different sets of species. "Haleakala volcano is a large pie with different sets of beetle species living in the different slices," comments Prof. Liebherr. "Actually the different pie slices are just like the original Hawaiian land divisions called ahu pua'a, showing that the Hawaiian people had a keen sense for how their island home was organized."



Mecyclothorax medeirosi, a species that lives in Hawaiian rainforest. This species is named to honor Dr. Art Medeiros, a renowned conservation biologist and project collaborator from Maui. Credit: Prof. James K. Liebherr

Additionally, the round-waisted [beetle species](#) seem to thrive across a wide range of altitudes, with their populations covering the major part of the mountain's height. Historical as well as modern records have identified representatives of these insects from 450-metre elevation up to the volcano's summit at 3000 m. However, given land conversion and the influx of alien invasive plants, habitats below about 1000 m have been seriously disrupted, and these elevations support few native beetles.

Looking to the future, Liebherr points out that "the substantial level of sympatry, associated with occupation of diverse microhabitats by these beetles, provides ample information useful for monitoring biodiversity of the natural areas of Haleakala."

More information: James Liebherr. The *Mecyclothorax* beetles (Coleoptera, Carabidae, Moriomorphini) of Haleakala-, Maui: Keystone of a hyperdiverse Hawaiian radiation, *ZooKeys* (2015). [DOI: 10.3897/zookeys.544.6074](#)

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