First Record of the Terrestrial Species *Geonemertes pelaensis* (Nemertea: Hoplonemertea) in Hawaii

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Five unidentified specimens of *Geonemertes pelaensis* Semper, 1863, collected by M. Mathis from houseplants in Waikiki on 30 September 1990, were passed along to me by B. Kumashiro of the Hawaii Department of Agriculture, Honolulu. In May 1992, through the hospitality of M. Hadfield, I collected 6 more individuals on the northeast outskirts of Honolulu, in a shaded and regularly misted outdoor concrete patio area with potted plants; 5 were found during the day under pots and 1 was found at night, crawling through exposed plant litter. All specimens discussed below are deposited in the National Museum of Natural History, Washington, DC.

Geonemertes pelaensis Semper, 1863

The body of *G. pelaensis* is darkish cream-white dorsally, somewhat paler ventrally, with a conspicuous brown mid-dorsal stripe extending from just behind the eyes to the posterior tip of the body. This agrees with the most commonly described appearance of specimens from other locations (cf. Moore & Gibson 1985). Undisturbed, gliding specimens ranged in length from 18–40 mm and were about 1 mm in diameter. A pair of large eyes near the tip of the head is easily visible to the unaided eye. Shortly posterior, 2 or 3 pairs of much smaller, closely spaced eyes give the superficial appearance of a single pair of eyes. Identity was established by histological study, which demonstrated the presence of "binucleate" flame cells and of an accessory lateral nerve cord.

Geonemertes pelaensis is widely distributed among Indo-Pacific islands, from Japan to Papua New Guinea to Samoa (Moore & Gibson 1985). Oki *et al*. (1987) cite Hawaii, apparently in error and without specific reference, as a location where it has been found; there does not appear to be any prior published record.

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First Record of the Land Snail Subfamily Achatinellinae on Kauai

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In May 1942, the late C. Montague Cooke, Jr. mapped 4 regions on Kauai where fossil forms of the land snail genus *Carelia* (family Amastridae) might occur: Moloaa, Lihue,

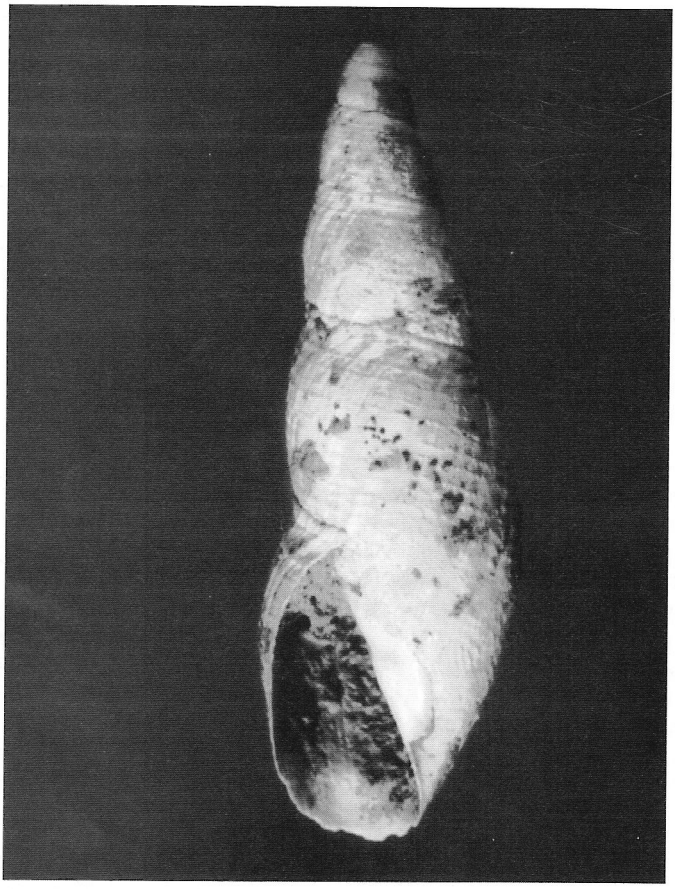

Fig. 1. *Newcombia* sp. from Waiopili, Kauai (BPBM 250717). The shell is 20.05 mm tall. (Photo T.A. Burch)

Lawai-Kukuiula, and Waikamoo Valley. Cooke & Kondo (1952) described a new fossil land snail species from near Waikamoo Valley, and a new fossil geographic race from Moloaa. Today, Kukuiula is being developed for homes, and Lawai Valley is the site of the National Tropical Botanical Garden. Both areas were impacted by Hurricane Iniki in 1992, and at Lawai the surge eroded the shoreline, uncovering fossil *Carelia*.

Having discovered the *Carelia* at Lawai, it seemed likely that fossil land snails might have been uncovered at additional locations. A diligent search of the the Koloa district was therefore undertaken. In May 1995, an eroding pocket of ancient soil (less than 2 m x 0.5 m and 0.5 m deep) was located on the seaward edge (within 4 m of the shore) of the lithified sand dune at Waiopili (Fig. 2). This soil was studded with fragmented and whole shells of the land snail genera *Orobophana* (Helicinidae), *Amastra*, *Carelia* (both Amastridae), *Cookeconcha* and *Endodonta* (both Endodontidae). In addition, shells belonging to a species of *Newcombia* (Achatinellidae: Achatinellinae) were found.

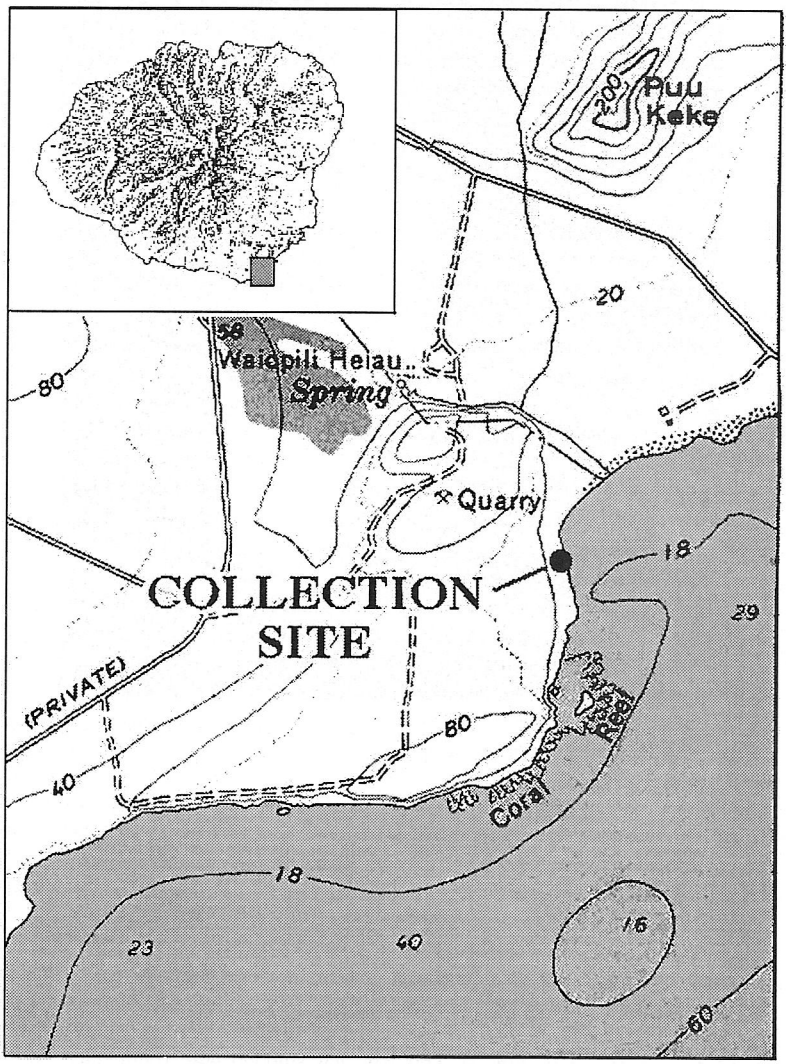

Fig. 2. Location of collecting site on Kauai.

Achatinellidae: **Achatinellinae**

***Newcombia* sp.** **New island record**

The subfamily Achatinellinae is endemic to the Hawaiian Islands and includes 4 genera: *Achatinella*, *Partulina*, *Perdicella* and *Newcombia*. There are over 200 species (Cowie *et al*. 1995). Until now, the subfamily had not been recorded from Kauai.

The genus *Newcombia* is highly distinctive, but the specific identity of the present specimens (Fig. 1) must await further study. The present record is, however, sufficiently significant to warrant rapid publication.

Material examined. KAUAI: Mahaulepu, Waiopili, in lithified sand dune, fossil, 8.v.1995, R. Genre, P. Sutter, R.P. Gage, II (BPBM Malacology 250717); 11.xi.1995, R. Genre, P. Sutter, R.P. Gage, II (BPBM 250718); 22.xi.1995, R. Genre, P. Sutter, R.P. Gage, II (BPBM 250719); 10.xii.1995, R. Genre, R.P. Gage, II (BPBM 250720).

Discussion

The family Achatinellidae is one of 4 land snail families endemic to Pacific Islands; the other 3 are Endodontidae, Partulidae (not Hawaiian) and Amastridae (endemic to the Hawaiian Islands). The subfamily Achatinellinae is one of the most distinctive elements of Hawaii's natural history. The relatively large size of the shells, and their often striking colors and patterns have made them the objects of intensive study since they were first discovered by Western naturalists (Dixon 1789).

The genus *Newcombia* consists of 7 species and 5 infraspecific taxa (Cowie *et al*. 1995). Prior to the present finding, a single species was known from Maui, the remaining taxa all being found on Molokai. The present record may represent a new species.

There are several lithified dunes on the southwest shore of Kauai. These appear to have been formed and lithified during glacial periods when sea level was lower, so that they now extend below the current sea level (Gavenda 1992). However, the age of the fossil deposit containing the *Newcombia* is unknown, although Olsen & James (1991) provided a radiocarbon date of 6740 ± 80 yr BP for fossil land snails at the nearby Makawehi dune. Certainly the present deposit predates human colonization of the Hawaiian Islands and the presence of *Newcombia* on Kauai cannot be attributed to human activities.

In general, Achatinellinae are snails of forest habitats, with many of the extant species appearing to favor *'ohi'a* (*Metrosideros polymorpha*) forest. The presence of *Newcombia* in a low coastal locality therefore suggests that the forest extended down to this elevation and, perhaps, that the climate was wetter than it is now. Median annual rainfall at Waiopili is now about 840 mm [33 inches], characteristic of the dry leeward coastlines of all the main Hawaiian Islands.

The absence of Achatinellinae from Kauai has often been considered something of a paradox (Cowie 1996). The family Achatinellidae is ancient, predating by far the present main Hawaiian Islands, but the subfamily Achatinellinae may have evolved more recently, perhaps on the Maui Nui complex (Zimmerman 1948). This seems particularly likely for *Newcombia*, given that its greatest diversity occurs on Molokai and Maui. Its presence on Kauai may be a simple historical accident resulting from the vagaries of dispersal.

Acknowledgements

I thank Robert Cowie and Carl Christensen for initial confirmation of the identity of the shells. Cowie assisted me in comparing the specimens with the collections in the

Bishop Museum, reviewed the manuscript, and greatly facilitated the submission of this note.

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New Records of Introduced Land and Freshwater Snails in the Hawaiian Islands

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Ampullariidae

Pomacea canaliculata (Lamarck) **New island record**

This freshwater species, here reported from Lanai, is 1 of 4 species of Ampullariidae ("apple snails") recorded from the Hawaiian islands (Cowie 1995). It has previously only been reported from the islands of Kauai, Oahu, Maui and Hawaii. It is of South American origin, but was deliberately introduced to South-East Asia in the late 1970s or early 1980s as a potential food source, and has since become an extremely serious pest of rice and other crops (Mochida 1991). It was probably brought deliberately to Hawaii from Asia in about 1989 and has rapidly become a serious pest of taro.

Material examined. LANAI: Koele golf course, water hazard at hole no. 15, 1760 ft. [536 m.], 27.iv.1995, D.J. Preston (BPBM Malacology 250486).

Cerionidae

Cerion viaregis Bartsch **New state record**

Cerionidae are land snails native to the Caribbean islands and Florida Keys. Studies of their genetics and morphological variation have made major contributions to evolutionary biology (e.g., Gould & Woodruff 1990). This species is from the island of Andros (Bahamas).

Live specimens were sent by Paul Bartsch of the U.S. National Museum (Smith-