

**A new species of *Newcombia* from the Pleistocene of Kaua'i,  
Hawaiian Islands, USA (Gastropoda, Pulmonata, Achatinellidae)**

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*Newcombia gagei* spec. nov. is described from the Pleistocene of the island of Kaua'i, Hawaiian Islands, USA. The new taxon is compared with the other taxa of the genus *Newcombia* Pfeiffer, 1854, found on the islands of Moloka'i and Maui. A colour plate illustrates individual characteristics for the *Newcombia* taxa discussed.

Key words: Gastropoda, Pulmonata, Achatinellidae, *Newcombia*, taxonomy, new species, Pleistocene, Kaua'i, Hawaiian Islands.

INTRODUCTION

The genus *Newcombia* L. Pfeiffer, 1854 (Achatinellidae) is restricted to the islands of the Hawaiian Archipelago. It consists of 8 species and 5 subspecies. Previously the genus *Newcombia* was thought to be restricted to Moloka'i (6 species with 5 subspecies) and Maui (1 species). A fossil form here described as *Newcombia gagei* spec. nov. was collected from Waiopili Dune, Pa'a, Koloa on the island of Kaua'i.

For collections the following abbreviations are used: ANSP, Academy of Natural Sciences, Philadelphia, USA; BPBM, Bernice Pauahi Bishop Museum, Honolulu, USA; FMNH, Field Museum of Natural History, Chicago, USA; MSC, M. Severns colln, Kihei, USA; RGC, R. Gage colln, Kalaheo, USA.

SYSTEMATIC PART

*Newcombia gagei* spec. nov. (fig. 1)

Type series (shells). – Waiopili Dunes, Pa'a, Koloa, Kaua'i, Hawaiian Islands (BPBM 271991/holotype; ANSP 419135/2; FMNH 312409/2; MSC 3818-3821/4, 4166-4168/3; RGC 950507/3. All specimens are from the type locality and stratum typicum (see below).

Shell. – Sinistral, with 6 whorls, turreted, acuminate, perforate, with a slight decussated pattern formed at the intersection of flattened, evenly spaced spiral striae and irregularly spaced axial striae. Suture smoothly concave in silhouette. Aperture narrow, oblong-ovate, sub-angular at the anterior end. The columella joins a thick parietal callus which is further thickened beneath the peristomal insertion.

Dimensions (n=10): height 16.7-24.9 mm (mean 18.11 mm), apertural height 7.51-9.42 mm (mean 7.59 mm), diameter 6.37-8.53 mm (mean 6.49 mm). Holotype: 20.9×9.18×6.87 mm.

Stratum typicum. – *Newcombia gagei* was discovered in May, 1995, in a small fossil-rich pocket of hardened rusty-red paleo-soil roughly a meter wide and two meters long on the Waiopili Dunes. The Waiopili Dunes are part of a calcareous coastal dune formation which stretches along the southeastern coast of Kaua'i. No dates are available for the Waiopili type location; however, fossil land snails found in the same calcareous dune structure less than a mile to the southwest at Makawehi show a maximum age of 6,740 +/-



Figs 1-11. *Newcombia* spec. 1, *N. gagei* spec. nov. (BPBM 271991/holotype), height 24.9 mm; 2, *N. cumingi*, Makawao, East Maui (ANSP 57846/syntype), 20.9 mm; 3, *N. p. pfeifferi*, Mapulehu, Moloka'i (MSC3575), 18.27 mm; 4, *N. p. ualapuensis*, Makalihua, Moloka'i (ANSP 94490/holotype), 19.7 mm; 5, *N. p. decorata*, Makalihua, Moloka'i (MSC 3565), 16.2 mm; 6, *N. p. honomuniensis*, Ahaino, Moloka'i (ANSP 110071/lectotype), 19.5 mm; 7, *N. lirata*, Kalae, Moloka'i (MSC 1967), 17.6 mm; 8, *N. sulcata*, Pukoo, Moloka'i (MSC 3567), 14.5 mm; 9, *N. canaliculata*, Kawaikapu, Moloka'i (ANSP 65713/lectotype), 13.8 mm; 10, *N. philippiana*, Moomomi Dunes, Moloka'i (MSC 4165), 20.1 mm; 11, *N. perkinsi*, Mauna Nui, Moloka'i (MSC3573), 19.6 mm.

80 years (Hearty et al., 2000) suggesting a similar maximum age for the type location at the Waiopili Dunes.

Ecology. – *Newcombia gagei* has only been collected as a fossil and from one location suggesting a localized distribution. This agrees with all other known species of the genus which are, or were, highly localized on trees in gulches and valleys. In addition, varices found on one specimen indicate a resting period during shell growth associated with a dry and wet climate cycle unlike any known *Newcombia*.

Among the fossil land snail genera that are represented in the deposit with *N. gagei* was a species of *Carelia* H. & A. Adams, 1855 (Amastridae) suggesting a leaf litter habitat, which living *Carelia* are known to prefer. This would be consistent with the known habitat of *Newcombia* species in which the arboreal populations are in relatively open forest with scattered small to medium trees, a fern understory and beneath that deep leaf litter.

Other genera that are represented are (with the number of species). – *Helicina* Lamarck, 1799, Helicinidae (3); *Tornatellaria* Pilsbry, 1910 (1) Tornatellinidae; *Lamellina* Pease, 1860 (2), Achatellinidae; *Cyclamastra* Pilsbry & Vanatta, 1905 (2) and *Leptachatina* Gould, 1847 (2), Amastridae; *Nesopupa* Pilsbry, 1900 (1), Vertiginidae; *Cookeconcha* Solem, 1976 (1) and *Endodonta* Albers, 1850 (2), Endodontidae; *Philonesia* Sykes, 1900 (1), Euconulidae.

Etymology. – *Newcombia gagei* is named for Mr. Reginald Gage of Kalaheo, Kaua'i who has enthusiastically studied the Hawaiian endemic fossil land snail species of Kaua'i for decades.

## DISCUSSION AND DIFFERENTIATION

All previously known species of *Newcombia* were described from the island of Moloka'i with the exception of one species found on the island of Maui approximately 20 km to the east of Moloka'i. The discovery of *N. gagei* in the Waiopili Dune fossil deposit on Kaua'i is therefore remarkable. A gap of 240 km separates the nearest fossil deposit of *Newcombia* at Mo'omomi on Moloka'i from the Waiopili Dunes of Kaua'i, yet no example of a *Newcombia* has been discovered on Oahu, 46 km west of Moloka'i, which has ample habitat and which lies directly between the previously known Maui – Moloka'i range of the genus and distant Kaua'i.

In their analysis of *Newcombia*, Pilsbry & Cooke (1912) divided the genus into three series: the series of *Newcombia plicata* Pfeiffer, 1848 (currently *Newcombia lirata* Pfeiffer, 1853; Cowie et al., 1996), the series of *Newcombia philippiana* Pfeiffer, 1857, and the series of *Newcombia cumingi* Newcomb, 1853. *Newcombia gagei* belongs clearly to the series of *N. cumingi* (containing *N. cumingi* and *N. pfeifferi*) because of similarities in shell shape, sculpture, aperture and columella. For comparative shell measurements, see table 1.

*Newcombia gagei* is most similar to the series of *N. cumingi* in sharing an elongate, acuminate, turreted shell sculptured with thin spiral striae crossed by widely spaced, longitudinal growth striae; an oblong-ovate aperture; a thin, simple, elliptical peristome; a modestly concave and a thinly callused columella which continues smoothly into the parietal callus. This series includes two previously known species, *N. cumingi* (Newcomb, 1853) of Maui and *N. pfeifferi* (Newcomb, 1853) of Moloka'i, which was further divided into three infraspecific taxa all here considered subspecies; *N. pfeifferi honomuniensis* Pilsbry & Cooke, 1912, *N. pfeifferi decorata* Pilsbry & Cooke, 1912, and *N. pfeifferi ualapuen-sis* Pilsbry & Cooke, 1912.

*Newcombia cumingi* (Newcomb, 1853) differs from *N. gagei* by its longer, narrower and imperforate shell, in having more numerous and finer spiral striae intersected by numerous fine incremental longitudinal striae, and more convex whorls. The aperture is wider

	H	AH	D
<i>N. gagei</i> (n=10)	16.70-18.11-24.90	7.51-7.59-9.42	6.37-6.49-8.53
<i>N. cumingi</i> (n=4)	15.95-18.08-19.11	7.22-7.25-7.26	5.82-6.29-6.57
<i>N. p. pfeifferi</i> (n=2)	14.23-14.74-15.25	5.52-5.69-5.86	5.33-5.46-5.59
<i>N. p. ualapuensis</i> (n=2)	17.01-17.49-17.98	6.19-6.75-7.31	5.14-5.41-5.67
<i>N. p. decorata</i> (n=2)	13.23-14.71-16.19	5.56-6.09-6.62	4.85-5.19-5.54
<i>N. p. honomuensis</i> (n=2)	17.95-18.03-18.10	7.11-7.15-7.19	5.74-5.89-6.04

Table 1. Measurements (in mm), extremes with mean values: H, height; AH, apertural height; D, diameter. N, number of specimens that have been measured.

and more ovate, with the parietal callus confined to the center of the parietal region (not extending to the peristomal insertion), and it has a simple columella.

*Newcombia pfeifferi pfeifferi* (Newcomb, 1853) differs dramatically from *N. gagei* by having a rough shell surface in which there are well developed spiral striae with large, evenly spaced, axial ridges. The shell is turreted, not acuminate, and the contour of the spire is slightly convex. The columella is rounded, smooth, and expanded posteriorly. A parietal callus is absent.

*Newcombia pfeifferi ualapuensis* Pilsbry & Cooke, 1912, differs from *N. gagei* in having more numerous and well-defined spiral striae and in lacking the well defined longitudinal striae. The parietal callus is thin and transparent.

*Newcombia pfeifferi honomuniensis* Pilsbry & Cooke, 1912, differs from *N. gagei* by having tightly spaced, low spiral striae which are more defined on the early post embryonic whorls but almost absent on the penultimate and body whorl. Regularly spaced flattened longitudinal striae intersect the spiral striae at the same height giving the shell a smooth appearance. The columella is simple and the parietal callus weak or absent.

*Newcombia pfeifferi decorata* Pilsbry & Cooke, 1912, does not differ remarkably in shell shape from *N. gagei*, but the fine spiral striae combined with the low longitudinal striae give the shell a smooth appearance. The simple columella and the slightly callused parietal region distinguish it from *N. gagei*.

*Newcombia gagei* is the tallest species of the *N. cumingi* series, reaching 24.9 mm, i.e. 4 mm taller than any other specimen of that series of which I am aware.

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