DISJUNCT DISTRIBUTION IN THE PACIFIC OCEAN: *PUPOIDOPSIS HAIWAIENSIS* IN FRENCH POLYNESIA, KIRIBATI AND HAWAII, SOUTH PACIFIC ISLANDS

Pupoidopsis haiwaiensis (Pupillidae, Pupillinae) was first described in 1921 by Pilsbry & Cooke (in Pilsbry, 1920–1921: 107), who established a monotypic genus for this species. They classified it within the subfamily Pupillinae, noting that they were "unable to suggest any more likely place". It was described as an extinct species, recorded only in Holocene and perhaps Pleistocene deposits from the islands of Oahu, Molokai and Maui in the Hawaiian archipelago in the North Pacific, from near sea level to low elevation ("a few hundred feet above"). They attributed it to the lowland fauna "which has been almost wholly destroyed by deforestation since the discovery of the islands by Europeans".

Cooke & Neal (1928) subsequently made a significant contribution to the knowledge of this species. In addition to adding it from the Hawaiian island of Kauai, they reported the discovery of a living population from Christmas Island (= Kiritimati, Kiribati, Line Islands, near the Equator) in 1924 (see also Anonymous, 1926). They described the anatomy of the species (thereafter quoted by Baker, 1935: 200), confirming the classification of *Pupoidopsis* within the Pupillinae (= Pupoidinae Iredale 1940 in Schileyko, 1998: 112).

Pilsbry (1927–1935: 159) was the first to record *P. hawaiiensis* from the Tuamotu Islands in French Polynesia (South Pacific), without additional information (island, collector or date).

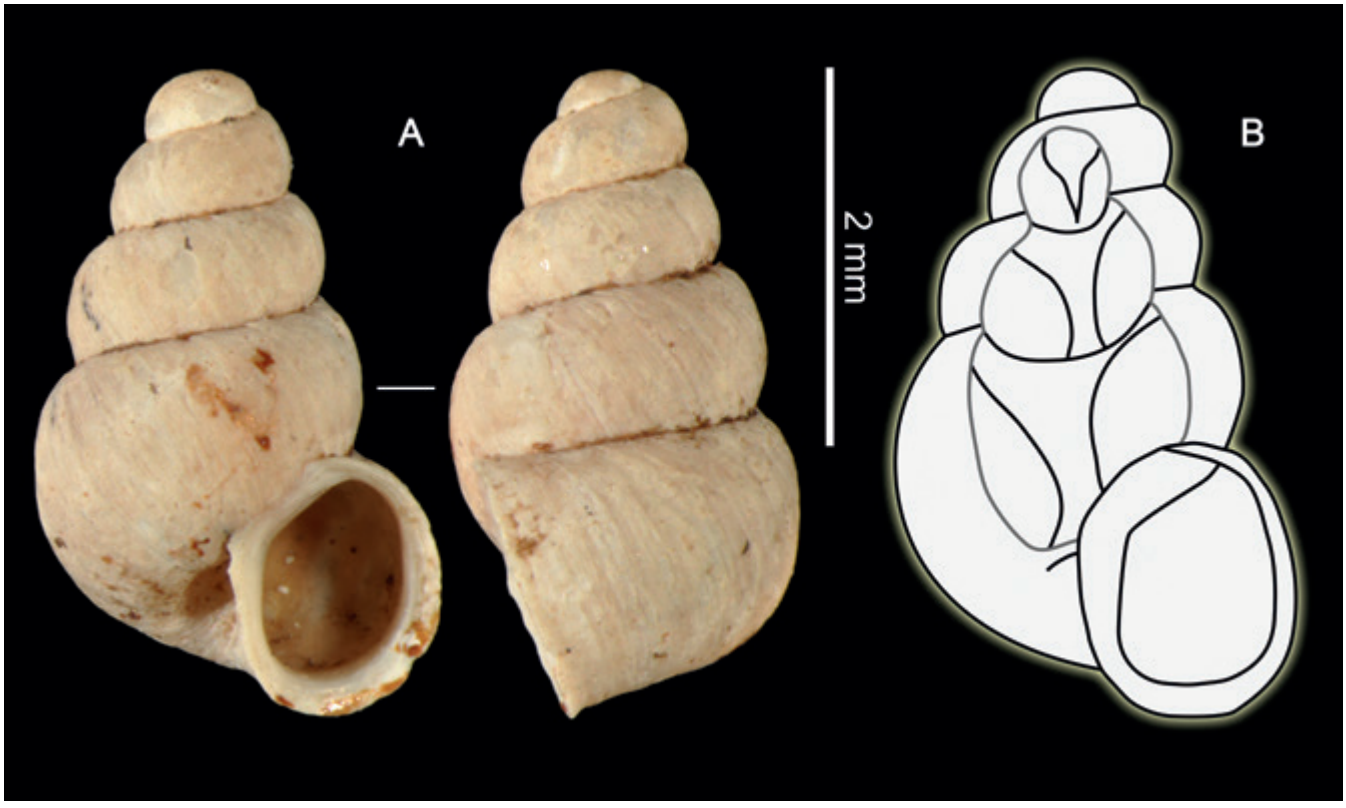

Figure 1 *Pupoidopsis hawaiensis*. A specimen from Niau. B drawing after Pilsbry (1920–1921: pl. 17 fig. 2) (as the scale of plate 17 does not match with dimensions in the description, the figure has been scaled with the same size of specimen A which is in the range of size variation given in the description). Another illustration of the shell is given by Schileyko (1998: fig. 133)

Later, Christensen & Kirch (1986) reported two collections in the Bishop Museum, Honolulu, from Hao, an atoll in the southeastern Tuamotu Islands, found "on tree trunks and twigs" (BPBM 136562–3) and "under *Tournefortia*" (BPBM 136597–8), probably the common native coastal tree *Heliotropium foertherianum* (syn. *Tournefortia argentea*, Boraginaceae).

Here we report the finding of subfossil shells on the atoll of Niau, Tuamotu Islands (16.16332°S, 146.32304°W, 06 March 2007, J.Y. Meyer coll.), ca. 250 km northwest of Hao. Shells were collected on calcareous (sandy) substrate near an archaeological site ("marae" made of erected coral blocks) being restored by the local community and located on the southeast point of the island, about 20 m from the lagoon. The surrounding vegetation is composed of an abandoned coconut plantation and strand/coastal native vegetation dominated by the shrubs *Scaevola taccada* (syn. *S. sericea*) with the small trees *Pipturus argenteus* var. *tuamotuensis* (Urticaceae) and *Premna serratifolia* (Verbenaceae) and the creeping vine *Ipomea* sp. (Convolvulaceae). The species was found, together with shells of two species (*Cyclomorpha flava*, *Mautodontha daedalea*) endemic to the Tuamotu Islands (Makatea, Anaa and Niau) and four introduced or cryptogenic species (*Lamellidea pusilla*, *Gastrocopta pediculus*, *Allopeas* cf. *oparanum*, *Allopeas gracile*). Living specimens of *Pupoidopsis haiwaiensis* are not known from Niau.

Pupoidopsis haiwaiensis is probably restricted to grasses and strand vegetation in the islands' lowlands. On Kiritimati it inhabits clumps of bunchgrass (*Lepturus* sp., Poaceae) (Cooke & Neal, 1928). It occurs in strand vegetation on Hao (Christensen & Kirch, 1986). The species is extinct in the Hawaiian Islands, only known as subfossils on Niau, and the current status of the living populations on Kiritimati and Hao should be investigated as observations are more than 50 years old. Coastal communities and lowland habitats in much of the inhabited islands in the Pacific had been severely disturbed by human occupation by the early 18th century, and *Pupoidopsis haiwaiensis*, already extirpated from some islands, might be globally in danger of extinction.

Because of its peculiar disjunct distribution in the Pacific (Hawaii, Kiribati and Tuamotu), *Pupoidopsis haiwaiensis* constitutes an interesting model for the study of species colonization, speciation, extinction and human impacts. Whether this pattern of distribution has resulted from local extinctions of formerly wide ranging species, hazardous colonisations, introductions by early Polynesians, or insufficient survey work, is not known. Multidisciplinary collaboration between taxonomists, ecologists and archaeologists is needed to better understand the natural history of such small land snail species, which represent a high proportion of the endemic biota on the Pacific Islands.

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