



Anatomy and function of the penial twin papillae system of the Helicinae (Gastropoda: Helicoidea: Helicidae) and description of two new, small *Hemicycla* species from the laurel forest of the Canary Islands

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Abstract

Hemicycla laurijona **sp. nov.** and *H. fulgida* **sp. nov.** are described from the laurel forests of La Gomera and Tenerife islands, respectively (Canary Islands). Both species belong to the Helicinae group of genera sharing the “presence of a specialized twin papillae system” in the penis, the adaptive advantage of which has not hitherto been discussed. Both species present a proximal penial papilla homologous to the “penial papilla” of other Stylommatophora, and an apomorphic distal penial papilla. The arrangement of these organs is described in a specimen with the distal genital system everted, showing that the distal penial papilla is an accessory papilla whose main function may be to lengthen the male duct in the evaginated penis. The accessory papilla may also have another function; its base forms a protuberant ring in the everted penis, perhaps for anchorage during mating or to impede a too deep penetration.

The dart and an undigested part of the spermatophore of *H. fulgida* are also described, the species status of both *H. invernicata* (Mousson, 1872) and *H. consobrina* (A. Férussac, 1822) is confirmed and some aspects of *Hemicycla* relationships are discussed.

Key words: Gastropoda, Helicinae, *Hemicycla*, Canary Islands, taxonomy, mating, penial twin papillae, function

Introduction

As occurs on other isolated oceanic islands, land snails from the Canary Islands (Fig. 1) show high levels of endemism. This rich biodiversity is attributed in part to the diversity of habitats present within the archipelago. Lanzarote and Fuerteventura share an arid climate and they are considered to be the western outpost of the Saharan Zone (Ortiz *et al.* 2006). In contrast, the other five islands possess a considerable range of habitats generated by high mountains that intercept the moist trade winds from the North East.

In recent years, knowledge of the terrestrial gastropod fauna of the Canary Islands has increased significantly. The fauna comprises some 255 described species, 84.7% of which are endemic to the archipelago, 26 species having been described in the present century (Alonso *et al.* 2000, 2002, 2003, 2006a,c, Beck & Rähle 2006, Castillo *et al.* 2006, Ibáñez & Alonso in press, Ibáñez *et al.* 2001, 2002, 2003, 2006a,b, in press, and this paper). Excluding introduced species, more than 40 naturally occurring genera are to be found on the archipelago, and seven of these are endemic to the islands. *Napaeus* Albers, 1850 is the most species-rich genus, with 50 living species and one fossil species. *Napaeus* is followed by *Hemicycla* Swainson, 1840, with around 125 nominal taxa but only 31 living and 9 fossil species, while 8 subspecies were also described (Table 1, based in Bank *et al.* 2002). Both above mentioned genera are present in all the islands. *Hemicycla* species are typically of limited geographic distribution, with each species normally restricted to one area of a single island (Fig. 1). However, there are exceptions such as that of *H. sarcostoma* (Webb & Berthelot, 1833), which is widely dis-