
Morphology, taxonomic status and relationships of Melongenidae (Gastropoda: Neogastropoda)

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ABSTRACT. External morphology, mantle complex and digestive system of four species of Melongeninae (*Melongena corona*, *Pugilina pugilina*, *Hemifusus ternatanus*, *Volema pyrum*), three species of Busyconinae (*Busycon carica*, *B. sinistrum*, *Busycotypus spiratum*) and one of Buccinidae (*Pisania tinctoria*) are described. Both subfamilies of Melongenidae differ significantly in morphology: head shape and size; morphology and anatomy of proboscis, including anatomy of its walls; mechanism of proboscis inversion and arrangement of proboscis retractors; the presence of valve and gland of Leiblein (absent in Melongeninae); stomach anatomy. Digestive system of Busyconinae is closer to that of Buccinidae than to Melongeninae. A cladistic analysis of 15 species of Buccinoidea and two outgroups suggested that Busyconinae should be excluded from Melongenidae and transferred to Buccinidae as a subfamily. Melongenidae s.s. are supported by several autapomorphies and significantly differ from the rest of Buccinoidea, undoubtedly deserving a familial status. Busyconinae as a clade are supported by several apomorphies, presence of a proboscis septum with separate holes for salivary ducts being the most important.

Introduction

The Buccinoidea is one of the generally accepted monophyletic groups within neogastropods [Harasewych et al., 1997]. It is abundant and diverse group of carnivorous marine gastropods, which encompasses about 1000 species [Taylor et al., 1980].

The Buccinoidea are one of the most geographically widespread and ecologically diverse clade within the Neogastropoda, surpassed only by Conoidea. Having first appeared during the Early Cretaceous (Valanginian) [Tracey et al., 1993], buccinoideans have radiated to occupy most benthic marine habitats ranging from the tropics to the poles and from the intertidal zone to hadal depths. Several members of the family Nassariidae have even invaded fresh water [Brandt, Temcharoen, 1971; Kantor, Kilburn, 2001].

Up to seven families are usually included in this superfamily: Buccinidae, Fascioliariidae, Nassariidae, Melongenidae, Buccinulidae, Collumbellidae and Colubrariidae. Buccinidae is the most diverse family and its taxonomy on subfamilial level is far

from being generally accepted. To encompass the variability of Buccinidae in the northern Pacific, Habe and Sato [1973] recognised 6 subfamilies.

A contrary viewpoint on Buccinoidean taxonomy was expressed by Ponder and Warén [1988], who reduced Nassariidae, Melongenidae and Fascioliariidae to subfamilies of Buccinidae, retained Collumbellidae as a separate family and considered Buccinulidae, Colubrariidae and all subfamilial names as mere synonyms of Buccinidae.

Kantor [2003] concluded that one of the reasons for the different views on taxonomy of the group is that their foregut (including radula) is rather uniform and rather poor in taxonomic characters. At the same time, characters of the foregut have been generally used for familial discrimination of neogastropods. He demonstrated that stomach anatomy provides an important set of additional characters, very useful for taxonomic discriminations at generic and familial levels.

The family Melongenidae is a small family of Buccinoidea, encompassing slightly more than 20 species, and divided into two subfamilies, the Melongeninae, which have a global, primarily tropical distribution, and the Busyconinae, which have always been restricted to the temperate waters of the Northwestern Atlantic [Harasewych, 1998]. The subfamily Melongeninae Gill, 1871 includes the following Recent genera: *Melongena* Schumacher, 1817 (New World tropics); *Hemifusus* Swainson, 1840; *Volema* Röding, 1788 (both from Indo-West Pacific); *Pugilina* Schumacher, 1817 (one amphiatlantic species, one Indian Ocean species).

The genus *Taphon* H. & A. Adams, 1853, which has been assigned to the Melongenidae by Wenz [1943], is of uncertain affinities [Harasewych, 1998].

Taxonomy of subfamily Busyconinae Wade, 1917 is still under reconsideration. In a more conservative version [Edwards, Harasewych, 1988], two Recent genera with several subgenera are included: *Busycon* Röding, 1798 (with subgenera *Busycon* s.s., *Sinistrofulgur* Hollister, 1958 and *Busycoractum* Hollister, 1958) and *Busycotypus* Wenz, 1943 (with subgenera *Busycotypus* s.s. and *Fulguroopsis* Marks, 1950). Petuch [1994] described a separate subfamily Busycotypinae and considered busyconids as a separate family.

Traditional inclusion of Busyconinae into Me-