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**Systematics of *Marionina* (Annelida: Clitellata:
Enchytraeidae)**

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Dissertation abstract

This thesis is about species of segmented worms that previously were placed in the genus *Marionina* Michaelsen, 1890, within the family Enchytraeidae, class Clitellata and phylum Annelida. These species are closely related to earthworms, but are much smaller and many of them are found between the sand grains in marine beaches. Species within *Marionina* have long been suspected to be a non-monophyletic assemblage of only distantly related species, since they lack unique and consistent morphological characters that unify them as a group and distinguish them from other enchytraeids.

The main aim of this thesis has been to revise the systematics of *Marionina*, to obtain a classification that is congruent with the phylogenetic relationships of this assemblage.

To clarify the complex taxonomical history of *Marionina*, a nomenclatural review is conducted, and the type species *Pachydriulus georgianus* Michaelsen, 1888 is re-described. Based on morphological characters it is concluded that a majority of the species bearing the generic name *Marionina* are only distantly related to this type species.

Within my thesis, DNA sequences from three mitochondrial (12S, 16S, COI) and tree nuclear genes (16S, 18S, ITS) were studied, from different specimens. Molecular analyses confirmed that *Marionina* is a non-monophyletic taxon, and revealed, e.g., a monophyletic sub-group of almost 50 species that have a pharyngeal bifurcation of the dorsal blood vessel. This feature is shared with the type species of *Michaelsena* Ude, 1896 and is likely to be an autapomorphy (a derived, unique character) for this group. *Michaelsena*, which was earlier synonymised with *Marionina*, was thereby restored as a genus, and proposed to include these nearly 50 species.

Seven other former *Marionina* species form a monophyletic group together with the type species of another genus, *Enchytronia parva* Nielsen & Christensen, 1959, and they are thus relocated into *Enchytronia* Nielsen & Christensen, 1959, which is the sister group to *Michaelsena*. The majority of species within *Michaelsena* are marine, while *Enchytronia* species are exclusively terrestrial.

Two additional nominal species of *Marionina* appear to be closely related to, respectively, *Bryodrilus* and *Oconnorella*, which are only distantly related to *Michaelsena* and *Enchytronia*. The remaining species of *Marionina* not dealt with in this thesis, may form a non-monophyletic group and their correct phylogenetic position and taxonomy are not yet solved.

In several cases within *Michaelsena*, the molecular variation is large within groups of taxa that are difficult or impossible to separate morphologically. One example is studied in detail: the *Marionina achaeta* complex, which comprises at least nine separate species that all lack chaetae. Some of these species are impossible to distinguish morphologically and are therefore referred to as cryptic species.

A new species, *Michaelsena triplex* (Matamoros et al., 2007) from the Black Sea has been formally described within this thesis.

Keywords: *Marionina*, *Michaelsena*, *Enchytronia*, Enchytraeidae, cryptic species, molecular phylogeny, taxonomy, systematics, genetic diversity