

Taxonomy and phylogeny of polychaetes

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Dissertation abstract

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Polychaetes are a large group of segmented worms that display an enormous morphological diversity. Molecular data has shown in recent years that groups previously thought to be separate from polychaetes are actually part of the group. The relationships within polychaete groups have been difficult to discern, and molecular data only partly corroborate classifications done on morphological grounds. The main focus of this thesis is on Phyllodocidae, a family of polychaetes, and its phylogenetic relationships. Our results show that none of the phyllodocid subfamilies, as previously delineated by morphology, find support from molecular data. Instead groups previously not recognized receive high support. A number of polychaete families are holopelagic, and most of these have been regarded as closely related to phyllodocids. We have found that one of these holopelagic families, Alciopidae, is well nested within the phyllodocids, with its closest sister being *Eumida arctica*, making the genus *Eumida*, as delineated today, paraphyletic.

Part of this thesis also deals with cryptic species, which means that two or more species are virtually impossible to separate morphologically, but still represent separately evolving lineages, reproductively isolated from each other. We have found that Arctic and boreal populations of *Paranaitis wahlbergi* belong to two separate species, and the boreal populations are referred to a new species, *P. katoi* sp. n. We have also found that sympatric populations of *Notophyllum foliosum*, found in deep and shallow waters are two separate species, morphologically distinguished only by subtle details in their colouration, and the deep form is described as *N. crypticum* sp. n. A description is also provided for *Axiokebuita*, previously not found in European waters. Due to delineation problems with the two described species in the genus it was not possible to refer these new specimens to either of them or to a new species. A phylogenetic analysis of molecular data confirms the position of *Axiokebuita* among scalibregmatids.

Keywords: Polychaeta, Phyllodocidae, Alciopini, pelagic polychaetes, phylogeny, cryptic species

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