

FROM INDIVIDUALS TO DEEP METAZOAN BRANCHES: RELATIONSHIPS AND
DELINEATION OF RECENT AND FOSSIL CHRYSOPETALIDAE (ANNELIDA)

Thomas Dahlgren

Department of Zoology, Göteborg University, Box 463, 405 90 Göteborg, Sweden
Email: T.Dahlgren@tmbi.gu.se

Abstract: The chrysopetalid polychaetes are a small group of marine worms that have a global distribution but are most common on tropical coral reefs. Most of the ca. 50 described forms are distinguished by flattened notochaetae which are arranged as roofing tiles on the dorsum. Recent attention to the group has focused on a possible close relationship between chrysopetalids and the Cambrian fossil worms *Wiwaxia* and *Canadia*, known mainly from the Burgess Shale, British Columbia. Despite several descriptive studies on the group, one part of the Chrysopetalidae, the "dysponetid" taxa, has been largely neglected. In papers I, II and III, two new (*Dysponetus bipapillatus* and *D. macroculatus*) and two poorly known taxa (*D. caecus* and *D. paleophorus*) are described from newly collected specimens.

Apart from the aim to increase our knowledge on the organismal diversity among the dysponetids, this thesis is the first attempt to resolve problems concerning the phylogeny of chrysopetalids and its allies. Traditionally the group is treated as a family group taxon within the order Phyllodocida, but there is no agreement on the closer position of chrysopetalids within this large assemblage of errant worms. Papers IV and V explore, among other issues, the delineation and position of Chrysopetalidae. They include three different analyses, applying both morphological and DNA sequence data. While the resulting trees indicate a well-delineated Chrysopetalidae, the topologies are not conclusive on identifying the sister group to the chrysopetalids. It is suggested, however, that either Hesionidae or Nereididae may represent the most likely candidate.

The last paper of the thesis (VI) discusses and analyses some of the disparate views that have been presented on the position of the Cambrian fossil *Wiwaxia*. The hypothesis that *Wiwaxia* is an annelid, close to the Phyllodocida, is further examined and related to recent advances in polychaete phylogeny. One implication is that, if *Wiwaxia* and *Canadia* indeed hold a basal position in the annelid tree, then the Phyllodocida (including *Wiwaxia* and *Canadia*) constitutes a grade in which the sister to all other annelids should be found. Alternatively, if the Phyllodocida represent a clade within the polychaetes, then *Wiwaxia* and *Canadia* are derived annelids.

Keywords: Annelida, Polychaeta, Phyllodocida, Chrysopetalidae, *Dysponetus*, *Wiwaxia*, phylogeny, systematics, cladistics, Cambrian, Burgess Shale

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