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A review of paragnath morphology in Nereididae (Polychaeta)

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Abstract

The form and arrangement of hardened paragnaths on the pharynx of polychaetes in the family Nereididae has for 150 years been used as a principal system of characters to distinguish species and other taxonomic ranks. Recent studies have shown that phylogenetic relationships based solely on paragnaths give different topologies and clade support than relationships inferred from other character systems. Furthermore, recent revisions and species descriptions continue to increase the range of known paragnath forms. We provide the first comprehensive overview of these important morphological characters, with the aim of encouraging more consistent observation and use of a standardized terminology in future studies. Illustrated descriptions and definitions of all known paragnath types are presented and compared. New terminology is introduced to improve description of paragnath types. Hypotheses are proposed for the chemical composition of paragnaths (scleroprotein), homology between different paragnaths types, and earlier studies implicitly proposing the homology of scleroprotein paragnaths with the more plesiomorphic pharyngeal soft papillae are addressed.

Key words: homology, character evolution, paragnaths, pharyngeal armature

Introduction

Paragnaths are hard denticles that occur in regular patterns on the muscular eversible pharynx of many taxa in the polychaete family Nereididae. The term paragnath was coined by Malmgren (1867) when he used "paragnathi," including an etymological explanation in Greek, as a part of the diagnosis of *Nereis* L., 1758. However, it was Kinberg (1865) who first instituted a systematic description of the structures now known as paragnaths in Nereididae. Since then, paragnaths and soft papillae (which may occur in place of paragnaths in some taxa) have provided important and readily quantifiable characters for description, classification, and identification of Nereididae. Despite the wide use of paragnaths in systematic studies of the Nereididae, detailed descriptions or definitions of the different paragnath types have never been presented. New forms of paragnaths have usually been described as a part of descriptions of the species in which they were first encountered. Publications synthesizing taxonomic information of Nereididae or a geographical region have sometimes included a short comparative description or a figure of relevant paragnath types (e.g., Day 1967), but there is no complete overview. Phylogenetic analyses (Bakken & Wilson 2005; Fitzhugh 1987; Santos et al. 2005) have given increasing attention to the diversity of forms of paragnaths as a contribution towards an understanding of evolution in the Nereididae. The aim of this paper, then, is to survey the diversity of paragnath forms in the Nereididae and to present definitions of different

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