

## The phylogenetic position of the Pilargidae with a cladistic analysis of the taxon – facts and ideas

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### ABSTRACT

The taxon Pilargidae is considered to be a group of derived hesionid species. This view is supported by the fact that apparent pilargid-specific features also occur in a few hesionid taxa. The idea is also based on the hypothesis that the pilargid stem species evolved by early maturation ("progenetically") of a juvenile stage of a large-bodied hesionid species. Making use of all characters available and using a hesionid taxon as outgroup, a cladogram of all pilargid genera was constructed with the program HENNIG 86, vers. 1.5. It shows well developed prostomial appendages and separate biarticulated palps to be the plesiomorphic character states. The genera *Synelmis* and *Litocorsa* are newly defined. For phylogenetic systematic implications the pilargid taxa should be included in the Hesionidae.

### RÉSUMÉ

Position phylogénétique des Pilargidae avec analyse cladistique du taxon - faits et idées.

Le taxon des Pilargidae est considéré comme étant dérivé d'un groupe d'Hesionidae. Ce point de vue est conforté par le fait que des caractères typiques des Pilargidae se rencontrent également chez quelques Hesionidae. L'idée est basée sur l'hypothèse que l'espèce souche des Pilargidae a évolué à partir du stade juvénile d'un hésionide de grande taille qui aurait acquis une maturité sexuelle précoce (progenèse). En se fondant sur tous les caractères disponibles et en prenant un hésionide comme groupe extérieur, un cladogramme de tous les genres de Pilargidae a été construit à l'aide du programme HENNIG 86, version 1.5. Cela révèle que des appendices prostomiaux bien développés et les palpes biarticulés représentent l'état plésiomorphe. Les genres *Synelmis* et *Litocorsa* sont redéfinis. Dans une optique de systématique phylogénétique, les Pilargidae devraient être inclus dans les Hesionidae.

### INTRODUCTION

When he described *Pilargis verrucosa*, SAINT-JOSEPH (1899) erected the Pilargidae to contain it, starting a long-lasting discussion on the systematic validity of this polychaete taxon. The first descriptions of pilargid species were actually much earlier, but the authors considered the worms to be orbiniids (*Sigambra grubii* Müller,

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1858, as Amytidea; and *Parandalia tricuspis* Müller, 1858, as Ariciaea) or syllids (*Ancistrostylis groenlandica* McIntosh, 1879; *Cabira incerta* Webster, 1879; *Pilargis tardigrada* (Webster, 1879), as *Phronia*; *Synelmis albini* (Langerhans, 1881), as *Ancistrostylis*. EHLERS (1908) was the first to consider these species to be hesionids. For most polychaete taxonomists, however, these species appeared to be too different from "typical" hesionids to be included in this family. For instance, HESSLE (1925) argued that *Ancistrostylis* was neither a syllid nor a hesionid - an opinion which has persisted to the present.

One of us (W. WESTHEIDE) became extremely interested in pilargids when first seeing living *Sigambra* individuals at the northern coast of China in 1987. The form of these specimens, under a low power dissecting microscope, and their locomotion seemed so similar to those features of the interstitial hesionid species *Hesionides maxima* Westheide, 1967 and *Hesionides pettiboneae* Westheide, 1987 (WESTHEIDE, 1967, 1987a) that the later identification of the fixed specimens as a pilargid taxon was rather astonishing. We asked ourselves whether our many years of experience in recognizing live meiofauna-taxa just by their appearance and locomotory characters had failed in this case or whether this apparent mistake might be due to a very close systematic relationship between interstitial hesionids and pilargids.

This prompted an investigation of the phylogenetic systematics within the Pilargidae to see if there was any support for this hypothesized relationship. Our findings resulted in reinvestigations of several pilargid taxa and a review of the entire pilargid literature, especially JONES (1961), EMERSON & FAUCHALD (1971), BRITAEV & SAPHRONOVA (1981), FITZHUGH & WOLF (1990) and SALAZAR-VALLEJO & SOLÍS-WEISS (1992). A comprehensive analysis of the taxon suffers from the fact that no true anatomical or any ultrastructural details are available. FITZHUGH & WOLF (1990) in their cladogram especially used brain gross morphology as a taxonomic and systematic character. Although it is based only on the outlines of various brains taken from whole mounted specimens their cladistic analysis has been of considerable help. However, we do not agree with their phylogenetic interpretation in all points. Our phylogenetic analysis differs from their results because we make use of a different outgroup.

## CLADISTIC ANALYSIS

**DIAGNOSTIC FEATURES OF THE PILARGIDAE.** — The pilargid body is cylindrical or dorsoventrally flattened, and anterior segments can be inflated. The integument may be smooth or papillated. The prostomium bears antennae (three, two, or none at all) and biarticulated palps, consisting of large palpophores and palpostyles of different length and shape. Small pigmented eyes may be present. The pharynx is eversible and usually has a circlet of distal papillae; jaws may be present.

The achaetous peristomium is usually equipped with two pairs of tentacular cirri, which may be absent. The parapodia are usually well developed and biramous. In most of the species the notopodia possess a single stout spine or hook, and a notoacicula; additional capillary chaetae may occur. The neuropodia are equipped with an acicula and several simple chaetae, which may be capillary, slightly unidentate, serrated, smooth, spinous or furcate. Dorsal and ventral cirri are usually present, and they may be of different lengths. Gills exist in one genus. The pygidium has two or three anal cirri.

The following characters are considered to be autapomorphic, defining the monophyly of the Pilargidae: (1) possession of a simple specific stout emergent notochaeta, to be reduced in some genera, (2) possession of exclusively simple, neuropodial mainly capillary chaetae, and (3) possession of fleshy biarticulated palps.

**LIST OF PILARGID GENERA.** — The assumed autapomorphies of the pilargid taxa are briefly mentioned; the material examined during this study is listed in brackets.

*Sigambra* Müller, 1858: this first described genus and most species-rich taxon of the family was recognized as a pilargid not earlier than in the middle of this century (HARTMAN, 1959; PETTIBONE, 1966). Since the notopodial hooks are considered by the authors to be plesiomorphic within the Pilargidae the taxon possesses primitive features only, but see FITZHUGH & WOLF (1990) (*Sigambra bassi* USNM 86966; *S. grubii* USNM 103016; *S. tentaculata*, USNM 86975; *S. wassi*, USNM 30987; specimens from Thailand and China).

*Ancistrostylis* McIntosh, 1879: the monophyly of the taxon may be based on its five-lobed brain (FITZHUGH & WOLF, 1990). *Ancistargis* Jones, 1961, is tentatively included (PETTIBONE, 1966; GARDINER, 1976; WOLF, 1984), although the species of this genus are clearly separated from *Ancistrostylis* in possessing two antennae only. If *Ancistargis* were accepted as a separate taxon, no synapomorphic character for *Ancistrostylis*-species with three antennae would be available (*Ancistrostylis breviceps* LACMNH AHF POLY 0143, LACMNH Velero st. 7498-

61; *A. carolinensis* USNM 86909; *A. hartmanae* USNM 30989; *A. papillosa* USNM 86923, and specimens from other sources).

*Cabira* Webster, 1879: the monophyly of this taxon is clearly shown by the possession of jaws (BRITAEV & SAPHRONOVA, 1981) (*Cabira incerta* USNM 30985).

*Pilargis* Saint-Joseph, 1899: since the papillated integument is considered to be a synapomorphy, this taxon should be closely related to *Ancistrosyllis-Ancistargis*, *Cabira* and *Paracabira*. A notopodial spine or hook is absent. As notopodia in all pilargid taxa - except *Otopsis* - are equipped with spines or hooks the absence of a chaetae of this kind in *Pilargis* is considered to be a derived character (*Pilargis berkeleyae* USNM 86959).

*Otopsis* Ditlevsen, 1917: the genus resembles *Synelmis*, but lacks notopodial spines or hooks, which is interpreted as a loss (see also *Pilargis*).

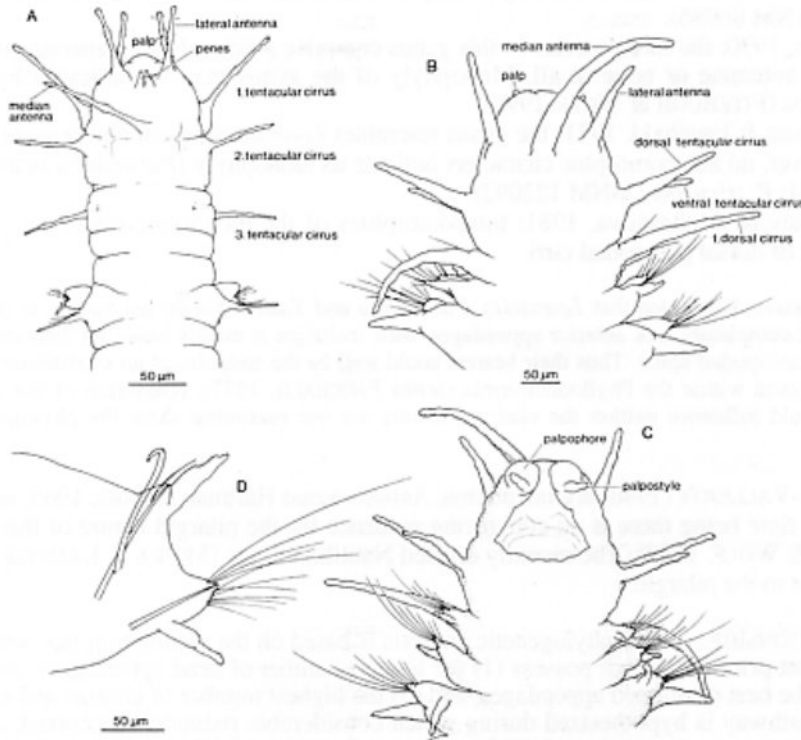


FIG. 1. — *Hesionides gohari* Hartmann-Schröder, 1960 and *Sigambra* sp. from Yellow Sea, near Qingdao: a, *Hesionides gohari*, anterior end, dorsal view. — b, *Sigambra* sp., anterior end, dorsal view. — c, anterior end, ventral view. — d, parapodium, mid-body region.

*Synelmis* Chamberlin, 1919: we adopt the view of FITZHUGH & WOLF (1990) and partition *Synelmis* species between "complex A" (species with furcate neuropodial spines) and "complex B" (species with non-furcate neuropodial spines). The non-furcate, less complex chaetal type is considered to be the apomorphic character state. For the monophyly of the two *Synelmis* complexes see "Discussion" (*Synelmis albinii*, collection of the senior author; *S. simplex*, USNM 19480).

*Talehsapia* Fauvel, 1932: this monotypic, poorly known taxon is included in the analysis although its assignment to the Pilargidae has been repeatedly questioned (e.g., PETTIBONE, 1966, EMERSON & FAUCHALD, 1971), mainly because of the possession of jaw-like structures. The shape of the body, especially of the anterior region, the absence of prostomial and tentacular appendages, the presence of an emergent notopodial spine, the absence of notoaciaculae and dorsal cirri, and the possession of only simple chaetae suggest a close relationship

