Clavadoce (Annelida: Phyllodocidae) from Australia

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Abstract

The first records of the phyllodocid genus Clavadoce are provided from Australia, where the fifth species in the genus is now known: Clavadoce dorsolobata (Hartmann-Schröder, 1987) comb. nov. which is widely distributed in intertidal habitats in southeastern Australia. Clavadoce dorsolobata was described as Eumida (Sige) dorsolobata Hartmann-Schröder, 1987 and herein transferred to Clavadoce. Five species of Clavadoce are now known world wide, four of which are from different regions on the Pacific Ocean margin, while Clavadoce cristata is from the North Atlantic. The Australian species is the first record of Clavadoce for the southern hemisphere.

Key words: Phyllodocidae, Nereiphylla, Notophyllum, benthic, algal turfs

Introduction

The genus Clavadoce Hartman, 1936 comprises species of Phyllodocidae with fusiform or “teardrop”-shaped antennae, palps and tentacular cirri, widest at about half length and usually with distinctly narrowed tip section. Species of Nereiphylla are similar but lack the fifth (median) antenna. Members of both genera also share the oblique orientation (relative to the aciculum) of the ventral cirrus and typical yellow-brown pigmentation.

The currently accepted concept of Clavadoce is due to Banse (1973) who modified the definition of Hartman (1936) to include in Clavadoce only species with: uniramous parapodia, four pairs of club-shaped or flattened tentacular cirri; five antennae; tentacular segments free (but first dorsally reduced); proboscis with diffusely arranged papillae; ventral cirrus very large, markedly oblique or at right angles to acicula. That concept, and especially the obliquely-oriented ventral cirrus, was validated in the cladistic treatment of Pleijel (1991) whose generic description is adopted below.

The phyllodocid genera most likely to be confused with Clavadoce are Nereiphylla Blainville, 1828 and Notophyllum Örsted, 1843. Each is discussed in turn below.

The presence of a fifth median antenna separates Clavadoce from Nereiphylla but since Pleijel’s (1991) analysis showed the presence of a median antenna to be plesiomorphic, it is possible that Clavadoce is paraphyletic with respect to Nereiphylla. Nevertheless Pleijel (1991) and subsequent authors retained Clavadoce, which now includes 5 species (Table 1).

Clavadoce shares with Notophyllum Örsted, 1843 the presence of obliquely oriented ventral cirri and 3 fusiform antennae. Notophyllum, however, is distinguished by the presence of notoaciculari (which are difficult to observe), prominent nuchal lobes, lateral rows of enlarged papillae on the pharynx and very large dorsal cirri covering much of the dorsum (Kato and Pleijel 2002).

Methods

Sources of material. The first collections of Clavadoce specimens from Australia are misidentifications: they were originally reported as Eumida (Sige) dorsolobata Hartmann-Schröder, 1987 (Hartmann-Schröder 1987; 1989;
Material examined lists use the following abbreviations. HZM—Zoological Museum, University of Hamburg, Hamburg, Germany; MV—Museum Victoria, Melbourne, Australia. All specimens are entire.

Description of characters and procedures. *Clavadoce* are small fragile worms, with antennae, palps, tentacular cirri and dorsal cirri easily dislodged. Dissection of parapodia is impossible without causing damage to specimens (for example, in the paratype of *Clavadoce dorsolobata* HZM P18839 all antennae, palps and tentacular cirri were found to be missing when we re-examined the material). Most of our specimens are covered with mucus which we were unable to remove without causing damage to appendages. Morphology is best observed by photography of live specimens (here using Pentax digital SLR and Olympus macro lens and bellows; Figures 2A–C) and of fixed specimens (using a Nikon digital SLR and macro lens and Zerene® photomontaging software, Figure 2D. Specimens were critical-point dried before mounting on carbon tabs, sputter-coated with gold, and examined in a Philips XL30 FEG SEM.

Width is measured at chaetiger 10, excluding parapodia.

Taxonomic account

Family Phyllodocidae Williams, 1852

Genus *Clavadoce* Hartman, 1936

*Clavadoce* Hartman, 1936: 123

*Type species*: *Clavadoce splendida* Hartman, 1936 (by original designation)

Diagnosis. Phyllodocidae with two frontal and one median antennae and one ventral pair of palps, segment 1 dorsally reduced, 4 pairs of tentacular cirri (1+2+1), neurochaetae present from segment 2, proboscis with diffusely distributed papillae, parapodia uniramous, longitudinal axis of ventral cirrus oriented obliquely to aciculum.

Remarks. The diagnosis above follows Pleijel (1991) with the following additions. One pair of large eyes (as also noted by Blake 1997). Anal cirri may be tapering (in *Clavadoce cristata*) or digitiform (in *C. dorsolobata*); unknown in other described species.

The four frontal appendages of phyllodocids, although typically similar in form, comprise a dorsal pair of antennae and a ventral pair of palps and are homologous with the structures of the same name in Nereididae and other Phyllodociformia. However, much of the earlier literature on Phyllodocidae refers collectively to these appendages as antennae.

*Clavadoce dorsolobata* (Hartmann-Schröder, 1987) comb. nov.  
Figures 1A–D, 2 A–D


Material examined. Type material: Australia: Victoria: Warrnambool, Breakwater Rock erosion terrace, at Aquarium, 22 Dec 1975, 38° 24.23′S 142° 28.53′E, 0–1m, G. Hartmann-Schröder, ZMH P18837, holotype.  
Victoria: as for holotype, ZMH P18838, 1 paratype; Victoria: Point Lonsdale rock platform at lighthouse, 38° 17.48′S, 144° 36.92′E, 0–1 m, 24 Dec 1975, G. Hartmann-Schröder, ZMH P18839, 1 paratype.
<table>
<thead>
<tr>
<th>Species</th>
<th>Original combination</th>
<th>Prostomium form</th>
<th>Median antenna insertion</th>
<th>Dorsal cirri form</th>
<th>Distribution; depth range; comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>C. annenkovae</em></td>
<td><em>Eulalia (Clavadoce) annenkovae</em> Uschakov, (1950)</td>
<td>rounded oblong, widest posterior to midpoint</td>
<td>at posterior margin of eyes</td>
<td>asymmetrical ventral margin expanded, evenly convex; widest at basal third; length 1.5x width; distinct but rounded tip</td>
<td>Sea of Okhotsk, northwest Pacific Ocean; 34–127 m; synonymised with <em>C. nigrimaculata</em> by Uschakov (1955) but treated as distinct by Read &amp; Fauchald (2015) and here.</td>
</tr>
<tr>
<td><em>C. cristata</em></td>
<td><em>Cirrodoce cristata</em> Hartman &amp; Fauchald, 1971</td>
<td>rounded, anterior margin indented</td>
<td>level with eyes</td>
<td>symmetrical, ovoid, evenly convex; widest near base; length 2x width</td>
<td>Georges Bank, western North Atlantic Ocean; 102–196 m; transferred to <em>Clavadoce</em> by Blake (1988).</td>
</tr>
<tr>
<td><em>C. dorsolobata</em></td>
<td><em>Eulalia (Sige) dorsolobata</em> Hartmann-Schröder, 1987</td>
<td>rounded oblong, widest anterior to midpoint</td>
<td>at anterior margin of eyes</td>
<td>symmetrical circular (thus widest at midpoint; length = width; no tip)</td>
<td>Southeastern Australia, southwest Pacific Ocean; intertidal; transferred to <em>Clavadoce</em> in this paper.</td>
</tr>
<tr>
<td><em>C. nigrimaculata</em></td>
<td><em>Eulalia nigrimaculata</em> Moore, 1909</td>
<td>rounded, widest at midpoint</td>
<td>at posterior margin of eyes</td>
<td>asymmetrical ventral margin expanded, with straight portion; widest at basal third; length 1.5x width; acute tip</td>
<td>Western Canada to California, northeast Pacific Ocean; subtidal to 130 m; synonymised with <em>C. splendida</em> by Pleijel (1991) but treated as distinct by Blake (1997).</td>
</tr>
<tr>
<td><em>C. splendida</em></td>
<td><em>Clavadoce splendida</em> Hartman, 1936</td>
<td>rounded oblong, widest posterior to midpoint</td>
<td>anterior to anterior margin of eyes</td>
<td>symmetrical dorsal and ventral margins with straight portion; widest at basal quarter; length 1.8x width; rounded tip</td>
<td>Central California, northeast Pacific Ocean; intertidal to 63 m.</td>
</tr>
</tbody>
</table>
### Distribution and habitat
Southeastern Australia from western Victoria to northern New South Wales. Intertidal to 3.5 m, from algal turfs (Figure 1A).

### Remarks
There is no doubt that this species belongs to *Clavadoce* as first recognised by Banse (1973):
obliquely oriented ventral cirri, 3 fusiform antennae and uniramous parapodia are sufficient to confirm the generic placement. *Clavadoce* and *Notophyllum* are similar in having obliquely oriented ventral cirri, 3 fusiform antennae. *Clavadoce* is distinguished by having uniramous parapodia but the absence of a notopodial aciculum (and the presence of the structure in *Notophyllum*) is difficult to observe, especially without damage to the specimens which have fragile parapodial appendages. *Notophyllum*, however, is also distinguished by the nuchal lobes, lateral rows of enlarged papillae on the pharynx and much larger dorsal cirri covering much of the dorsum (Kato and Pleijel 2002).

Our material agrees closely with the figures and description of Hartmann-Schröder (1987) and with the type material. The availability of colour photographs and two specimens with everted pharynx has allowed us to provide a more complete description of the species. The dorsal raised areas on dorsum near the base of the dorsal cirri were observed by Hartmann-Schröder (“... treten oberhalb der Parapodien längliche Lappen auf”) Hartmann-Schröder (1987, p.31) and is visible in most of our specimens (Figure 2B, arrows). This structure is easiest to see in photographs of living material where brown pigment helps to distinguish the raised patch.

The neurochaetae of our material (Figure 2D) are as figured by Hartmann-Schröder (1987, p.64, figure 6). However the neurochaetae are also similar to other described species of *Clavadoce*, for example Blake (1997, Figure 4.13C, *C. splendida*; Figure 4.14C, *C. nigrimaculata*). Chaetal morphology apparently does not provide characters for distinguishing species of *Clavadoce*.

We have not re-examined the specimens reported by Hartmann-Schröder (1989; 1990) from northern NSW, but it is not plausible that Hartmann-Schröder would have misidentified this distinctive species so we do not doubt this northern extent of the range. *Clavadoce dorsolobata* is now known to be widespread in shallow water algal

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**FIGURE 1.** *Clavadoce dorsolobata* (Hartmann-Schöder, 1987): A, locations where *Clavadoce dorsolobata* specimens are known; B, SEM anterior end, MV F166895; C: SEM parapodia, chaetigers 26–28, MV F166897; D, neurochaetae, chaetiger 17, MV F166897.
turfs of southeastern Australia and is probably more common than the current limited records indicate. Even though *Clavadoce dorsolobata* is a small species and is easily overlooked, it is apparently absent from large MV collections of Phyllodocidae from southeastern Australia from shallow (5 m plus) and shelf depths, so it seems this species is confined to intertidal and shallow subtidal depths as indicated by the known specimens (Figure 1A).

**FIGURE 2.** *Clavadoce dorsolobata* (Hartmann-Schöder, 1987): A, dorsal view, live specimen, MV F166896; B, dorsal view, anterior end, live specimen, MV F166896; C, dorsal view, pygidium and anal cirri, live specimen, MV F166894; D, lateral view, everted pharynx, fixed specimen, F166898; A, B, C: photographs Leon Altoff; D: photograph David Paul.

**Discussion**

Species of *Clavadoce* are easily recognised by the fusiform antennae and palps, widest at about mid-length and usually with distinctly narrowed tip section. Members of both genera also share the oblique orientation (relative to the aciculum) of the ventral cirrus and typical yellow-brown pigmentation, which is most conspicuous in live specimens but often remains even in preserved material. Species of *Nereiphylla* are similar but lack the median antenna. Species of *Notophyllum* are also similar and possess a median antenna but also have prominent nuchal lobes and other distinguishing features as discussed above.

Five species of *Clavadoce* are currently known and can be separated using the summary information in Table 1. Of the known species, none overlap in geographic range except *C. nigrimaculata* and *C. splendida* which occur in northern California but not at the same depths (Blake, 1988).

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References


