

NOTES ON SOME PROBLEMS IN THE DETERMINATION OF PHYLLODOCIDAE (POLYCHAETA)  
FROM THE NORTH SEA

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During the course of the workshop held by the Benthos Ecology Working Group of ICES on Helgoland 8-12 February 1988, several problems in the determination of the phyllococids have become apparent. Given the present status of the literature, several of these could be anticipated, while others were somewhat unexpected. Here, an attempt will be made to give some simple guidelines on what, in my opinion, are the solutions to these problems.

Eteone:

In most of the relevant literature, the species E. lactea and E. spetsbergensis are reported from North Sea waters. E. lactea seems to be a Mediterranean species that does not occur at our latitudes. Likewise, E. spetsbergensis is an Arctic species, that also does not appear to be present in the North Sea area. What we in fact have is, in my opinion, following the suggestion made by Eliason (1962), E. foliosa, originally described from the Atlantic coast of France. This conclusion is based primarily on details of the proboscis. E. foliosa differs from all other species of Eteone present in the North Sea in the relative length of the tentacular cirri (ventral cirri clearly longest) and in the usual absence of setae on segment 2 (one or two setae may be present on small animals, while other species of Eteone from this area have at least four per parapodium on this segment).

Eteone flava and E. longa are easily confused, as current keys primarily use the relative length of the dorsal cirri and of the prostomium for distinction. In my experience, the prostomium is quite contractile, and the latter character seems to be without importance. Regarding the dorsal cirri, one may encounter specimens in which the length of these organs is equal to the width. I have found that the most reliable character is the size of the dorsal cirrus relative to that of the neuropodium. In E. flava it is much larger than the neuropodium (about four times), while it is only somewhat larger in E. longa (up to about twice as large).

Eulalia:

The existence of the newly described species E. mustela Pleijel, 1987 is not generally known. It has, however, on several occasions turned up in the North Sea material. This species belong to the E. bilineata-group (reduced median antenna and oval dorsal cirri), but is primarily characteristic in the extremely reduced median antenna, while resembles only a slightly elongated papilla and may easily be overlooked. If this antenna is not perceived, the specimen will probably key out as Pseudeulalia or Protomystides, both of which appear to be extremely rare in the northeast Atlantic area.

Eumida:

Distinguishing E. sanguinea from E. bahusiensis may be very difficult using the literature presently at our disposal. However, E. bahusiensis appears to be a rather seldom species, which is quite distinct from E. sanguinea (at least when living adults are studied). The key character seems to be the same as that indicated in the Eteone flava/longa controversy. In E. sanguinea the dorsal cirri may, in extreme cases, be slightly broader than long, but they are never more than about twice as large as the neuropodium (while they are at least four times larger in adults of E. bahusiensis).

The largest contemporary problem in this genus (in our area) seems to be the report of Eumida (Pirakia) punctifera from the German Bight (Hartmann-Schröder & Stripp, 1968; Hartmann-Schröder, 1971; Gillandt, 1979). The specimens upon which these reports have been based differ greatly from E. punctifera from, for example, the southern coast of England. As has earlier been pointed out (Eibye-Jacobsen, 1987), the animals from the North Sea lack the characteristic pigmentation of E. punctifera and, most importantly, do not have the distinctively shaped presetal lobes on the neuropodia of this species. The reports from North Sea waters seem to be based on young animals, which, in my opinion, most likely belong to E. sanguinea. To my knowledge, genuine E. punctifera has yet to be found in the North Sea.

Phyllodoce:

The greatest problem in this genus is the distinction between P. maculata and P. mucosa. Following Gillandt (1979) there has in recent years, especially among German workers, been a tendency to regard these species as synonymous (under the name of P. maculata). Material from the North Sea

clearly confirms my experience with specimens from inner Danish waters: the two species are clearly separate. There are important differences in pigmentation: 1) the prostomium is anteriorly dark brown in P. mucosa, only slightly pigmented in P. maculata; 2) segments 3 and 4 bear obvious, dark brown, transverse dorsal bands in P. maculata, while in P. mucosa they are marked only by the mediodorsal and two laterodorsal spots on each segment typical of the dorsum of both species; and 3) the ventral, anterior border of segment 1 is darkly pigmented in P. mucosa, while it is more or less unpigmented in P. maculata. These differences in pigmentation correlate with the only consistent morphological difference between the two species, which is the shape of the ventral cirri. The ventral cirrus is more or less pointed in P. mucosa, while it is rounded in P. maculata. It is, however, necessary to point out that the ventral cirri are usually longer than the neuropodium in both species. There are other, more subtle differences between the two species in the relative length of the tentacular cirri and the number of papillae in the lateral, longitudinal rows on the proximal part of the proboscis, but in these cases the ranges overlap.

The distinction between P. maculata and P. mucosa made by Hartmann-Schröder (1971), regarding the presence or absence of a ciliated ridge on the dorsal cirrus, seems to be based on preserved material. On live animals it is easily apparent that all species of Phyllodoce possess these ridges, this thus being a diagnostic character for the genus as a whole.

This workshop has brought to light several specimens of Phyllodoce longipes, a species which should be easily recognizable by the prolonged, digitiform supracircular lip of the presetal lobe on the neuropodium. The pigmentation of the anterior end has a superficial resemblance to that of P. maculata, in that two segments have dark, dorsal, transverse bands. However, in P. longipes these bands are on segments 4 and 5, not 3 and 4 as in P. maculata. Phyllodoce longipes is synonymous with P. jeffreysii (McIntosh, 1908) (see Parker, 1987), but is not mentioned in Hartmann-Schröder, 1971 under either name.

Several specimens of Phyllodoce rosea were also seen at this workshop. They were, however, usually labeled as P. subulifera, which has been shown to be synonymous with P. rosea (see O'Connor, 1987).

#### Sige:

Sige fusigera is treated in Hartmann-Schröder, 1971 under the name of Eumida (Sige) fusigera. Her description is confused, and obviously largely

follows that of Bergström, 1914 (under the name of Sige macroceros). As was indicated by Uschakov (1972) and later confirmed by Eibye-Jacobsen (1987), the following characters are, among others, to be found in S. fusigera: proboscis smooth (i.e. provided only with micropapillae), all tentacular cirri cylindrical or somewhat flattened (as is often seen in Eulalia viridis and Eumida sanguinea), segment 1 partially reduced dorsally, and the supraacicular lip of the presetal lobe on the neuropodium prolonged and digitiform.

Some additional points:

In closely related species (for example, Eteone longa/flava, Eumida bahusiensis/sanguinea and Phyllodoce maculata/mucosa), it may be expected that specific differences will not appear until at a later stage in the ontogeny of the animals. It is therefore in most cases meaningless to determine the specific identity of very small juveniles (as a rule smaller than 5 mm in length, and certainly less than 3 mm). This is not to be interpreted as ignorance on our part, but simply a reflection of developmental reality. We must in such cases be satisfied only to indicate the generic name unless exceptional information is available.

It is important, when comparing the parapodia of different species, that they be taken from approximately the same region of the body. As a rule, median parapodia should be used. Animals without a prostomium should not, of course, be determined.

Among the phyllodocids, as in many other polychaetes, pigmentation patterns may greatly facilitate specific determination. In my experience, the following procedure best preserves these patterns: narcotization in  $MgCl_2$  (usually impracticable in ecological work), fixation in 2% neutralized formaldehyde in seawater for 2-3 days, and preservation in 70% alcohol, which should be changed after about a week.

Finally, a list and a key will be given for those species of Phyllodocidae which are known to occur in Danish and Swedish waters, and which should also be present in the North Sea. Besides these, there are a number of species, known from in or near the English Channel or from along the east coast of Great Britain, which may be expected to appear in material from the ICES sampling stations, especially in the southern and western regions of the North Sea: Eteone picta, Eulalia aurea, E. expusilla, E. ornata, E. tripunctata, Eumida punctifera, Hesionura elongata, Nereiphylla paretii, N. rubiginosa, Phyllodoce laminosa, P. lineata and Pterocirrus macroceros.

List of the Danish Phyllodocidae

- Chaetoparia nilssoni* Malmgren, 1867  
*Eteone barbata* (Malmgren, 1865)  
*E. flava* (Fabricius, 1780)  
*E. foliosa* Quatrefages, 1866  
*E. longa* (Fabricius, 1780)  
*E. suecica* Bergström, 1914  
*Eulalia bilineata* (Johnston, 1840)  
*E. mustela* Pleijel, 1987  
*E. viridis* (Linné, 1767)  
*Eumida bahusiensis* Bergström, 1914  
*E. minuta* (Ditlevsen, 1917)  
*E. ockelmanni* Eibye-Jacobsen, 1987  
*E. sanguinea* (Oersted, 1843)  
*Hesionura augeneri* (Friedrich, 1937)  
*Mystides caeca* Langerhans, 1880  
*Nereiphylla lutea* (Malmgren, 1865)  
*Notophyllum foliosum* (M. Sars, 1835)  
*Paranaitis kosteriensis* (Malmgren, 1867)  
*P. wahlbergi* (Malmgren, 1865)  
*Phyllodoce citrina* Malmgren, 1865  
*P. groenlandica* Oersted, 1843  
*P. longipes* Kinberg, 1866  
*P. maculata* (Linné, 1767)  
*P. mucosa* Oersted, 1843  
*P. rosea* (McIntosh, 1877)  
*Pseudeulalia exigua* Eliason, 1962  
*Pseudomystides limbata* (Saint-Joseph, 1888)  
*P. sp.* (presently being worked on by Mary E. Petersen, Zool. Mus., Copenhagen)  
*Pige fusigera* Malmgren, 1865

Key to the Danish Phyllodocidae

- 1: Two or three pairs of tentacular cirri, arranged on one or two segments...2  
1: Four pairs of tentacular cirri, arranged on three segments

(ventral cirri og segment 2 may be short)...10

- 2: Two pairs of tentacular cirri, on one segment. Segment 2 without dorsal cirri. Four antennae. Nuchal papilla present...(Eteone)...3
- 2: Two or three pairs of tentacular cirri, arranged on two segments. Segment 3 without dorsal cirri. Four or five antennae. Nuchal papilla absent...7
- 3: One pair of tentacular cirri (the dorsal or the ventral) considerably longer than the other (about 1½ times). Number of setae on segment 2 variable...4
- 3: Dorsal and ventral pairs of tentacular cirri subequal. At least four setae per parapodium on segment 2...5
- 4: Dorsal pair of tentacular cirri longer than ventral pair. Segment 2 with well developed neuropodia, each with at least 4 setae. Dorsum with three dark, longitudinal bands of pigment...Eteone barbata
- 4: Ventral pair of tentacular cirri longer than dorsal pair. Segment 2 without setae, or with 1-2 setae at the most. Preserved animals without extensive dark markings on the dorsum...Eteone foliosa
- 5: Ventral cirri awl-shaped, acuminate, much longer than neuropodium. Animals stout. (Rare species)...Eteone suecica
- 5: Ventral cirri more or less oval, slightly longer than neuropodium at the most. Animals usually quite thin...6
- 6: Dorsal cirri somewhat longer than broad, only about twice as large as neuropodium. Living animals usually white, light grey or light brown, often with a green tinge...Eteone longa
- 6: Dorsal cirri broader than long, about four times as large as neuropodium. Living animals usually pink, sometimes red or yellowish brown...Eteone flava
- 7: Prostomium broadly rounded. Four filiform antennae present. Tentacular cirri fusiform (bottle-shaped) with long, thin tips. Eyes absent...Mystides caeca
- 7: Prostomium more or less cone-shaped. Tentacular cirri subulate or cirriform. Eyes normally present...8

- 8: Dorsal and ventral cirri cirriform (not flattened). Each neuropodium with four or five setae, their shafts distally bifid or trifid. Four antennae present. Interstitial species...Hesionura augeneri
- 8: Dorsal and ventral cirri flattened, lamelliform. More than five setae on each neuropodium, their shafts distally otherwise. Five antennae present (the median antenna very small, difficult to detect)...(Pseudomystides)...9
- 9: Ventral cirri of segment 2 elongate, tentacular (although flattened). Median dorsal cirri about twice as long as broad. Uniform in colouration...Pseudomystides limbata
- 9: Ventral cirri of segment 2 enlarged (up to three times as large as normal ventral cirri), but not tentacular. Median dorsal cirri only  $1\frac{1}{2}$  times as long as broad. Living animals with dark green spots spread over most of body...Pseudomystides sp.
- 10: Four antennae present (NB: Chaetoparia nilssoni included here). Nuchal papilla may or may not be present...11
- 10: Five antennae present (median antenna may be strongly reduced and very difficult to detect)...21
- 11: Dorsal cirrophores poorly developed. All tentacular segments separate and fully developed...Pseudeulalia exigua
- 11: Dorsal cirrophores well developed. Segment 1 fused to segment 2, at least dorsally...12
- 12: Ventral cirri very large, reniform, posteriorly attached to the neuropodium. Nuchal papilla absent...Nereiphylla lutea
- 12: Ventral cirri of normal size, more or less ventrally attached to the neuropodium. Nuchal papilla present...13
- 13: Dorsal cirri quite small, not imbricate. Prostomium dorsally fused to segment 1. Nuchal papilla antenna-like. Segments 2 to 4 with large, acicular setae...Chaetoparia nilssoni
- 13: Dorsal cirri imbricate. Prostomium separate from segment 1. Nuchal papilla normal. Segments 2 to 4 without acicular setae...14

- 14: Segment 1 dorsally developed as a collar, encompassing posterior portion of prostomium...(Paranaitis)...15
- 14: Segment 1 dorsally completely reduced...(Phyllodoce)...16
- 15: Nuchal papilla visible, on posterior ligula of prostomium ...Paranaitis kosteriensis
- 15: Nuchal papilla not visible. Ligula of prostomium very weakly developed or absent...Paranaitis wahlbergi
- 16: Supraacicular lip of presetal lobe on neuropodium prolonged, digitiform. Distal part of proboscis with large papillae...Phyllodoce longipes
- 16: Lips of presetal lobe on neuropodium subequal. Distal part of proboscis tuberculate or smooth...17
- 17: Ventral cirri awl-shaped, very long and thin, acuminate. Proximal part of proboscis with 12 longitudinal rows of papillae and 4 rows of large, drop-shaped papillae...Phyllodoce rosea
- 17: Ventral cirri oval or lanceolate, blunt or acuminate. Proximal part of proboscis with 8 or 12 longitudinal rows of papillae...18
- 18: Proboscis proximally with 8 rows of papillae. Prostomium usually broader than long. Dorsum iridescent with a mediodorsal, longitudinal band of pigment...Phyllodoce citrina
- 18: Proboscis proximally with 12 rows of papillae. Prostomium variable. Pigmentation on dorsum otherwise...19
- 19: Prostomium usually broader than long. Median dorsal cirri at least twice as high as broad. Acuminate tip of median ventral cirri points downwards. Dorsum without spots of pigment, but with transverse, green or brown bands...Phyllodoce groenlandica
- 19: Prostomium longer than broad. Median dorsal cirri  $1\frac{1}{2}$  times as high as broad. Median ventral cirri, if acuminate, then with tip pointing horizontally. Dorsum with 3 longitudinal rows of brown, red or green spots (lateral rows may coalesce as longitudinal bands)...20
- 20: Longest rows on proximal part of proboscis with 9 or less papillae. Median ventral cirri oval, rounded or bluntly pointed



(NB: longer than neuropodium). Segments 3 and 4 dorsally darkly pigmented. Longest tentacular cirri extend no further than to segment 9...Phyllodoce maculata

20: Longest rows on proximal part of proboscis with 9 or more papillae. Median ventral cirri oval, acuminate, with a horizontally pointing tip, longer than the neuropodium. Anterodorsal portion of prostomium and ventral surface of segment 1 very darkly pigmented. Longest tentacular cirri extend at least as far as segment 9...Phyllodoce mucosa

21: Proboscis covered with diffusely arranged papillae. Segment 1 dorsally well developed...(Eulalia)...22

21: Proboscis variable. Segment 1 at least partially reduced dorsally...24

22: Median antenna not conspicuously smaller than frontal antennae. Dorsal cirri lanceolate, much longer than broad. Anal papilla absent...Eulalia viridis

22: Median antenna markedly smaller than frontal antennae. Dorsal cirri oval, less than twice as long as broad. Anal papilla present...23

23: Median antenna about half as long as frontal ones. Papillae on proboscis become gradually larger distally. Anal cirri oval, distally rounded. Dorsum with two dark, longitudinal bands of pigment...Eulalia bilineata

23: Median antenna very short, only about twice as long as its own width.

Proboscis covered with papillae of uniform size. Anal cirri with thin, draw-out tips. More or less uniformly green...Eulalia mustela

24: Prostomium more or less rounded, greatest width at middle. Large, paired nuchal epaulettes present. Proboscis diffusely covered with papillae except for lateral, longitudinal rows of papillae. Dorsal cirri large, imbricate. Parapodia biacicular. Ventral cirri large, reniform, attached to posterior surface of neuropodium...Notophyl- lum foliosum

24: Prostomium more or less cordiform, greatest width at posterior half (exception: prostomium oval in Eumida minuta). Nuchal

epaulettes absent. Proboscis more or less smooth (with micropapillae), at least in adults. Dorsal cirri of normal size, only slightly imbricate. Parapodia uniacicular. Ventral cirri normal, more or less ventrally attached to neuropodium...25

- 25: Neuropodium with a prolonged, digitiform supraacicular lip. Segment 1 partially reduced dorsally...Sige fusigera
- 25: Neuropodium with the supra- and subacicular lips more or less equal. Segment 1 completely reduced dorsally...(Eumida)...26
- 26: Prostomium rounded, more or less oval, not cordiform. Antennae distally very thin. Tentacular cirri more or less fusiform (bottle-shaped). Dorsal cirri thick, oval, blunt. Living animals with three longitudinal rows of dark green pigment spots on dorsum...Eumida minuta
- 26: Prostomium more or less cordiform or triangular. Antennae subulate. Tentacular cirri cirriform (cirri of segment 1 and ventral cirri of segment 2 may be slightly fusiform or somewhat flattened). Dorsal cirri cordiform or almost lanceolate. Pigmentation otherwise...27
- 27: Small species (up to about 8 mm at maturity). Dorsal cirriophores weakly developed. Dorsal cirri almost lanceolate. Anal papilla present. More or less uniformly green coloured...Eumida ockelmanni
- 27: Larger at maturity (at least 20 mm long). Dorsal cirriophores well developed. Median dorsal cirri cordiform, no more than about 1½ times as long as broad. Anal papilla absent. Usually with a dark, transverse band across dorsum of each segment...28
- 28: Median dorsal cirri about as long as broad or longer, more or less symmetrical, evenly narrowed distally, only up to about twice as large as neuropodium. Median ventral cirri longer than broad, distally bluntly pointed...Eumida sanguinea
- 28: Median dorsal cirri conspicuously broader than long, somewhat asymmetrical, with a somewhat drawn-out, blunt point, about four times as large as neuropodium. Median ventral cirri broad, asymmetrical, with a somewhat drawn-out, acuminate point...Eumida bahusiensis

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