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Fecampiidae (Turbellaria, Neorhabdocoela) in Greenland waters

AAGE MØLLER CHRISTENSEN

Marine Biological Laboratory, DK-3000 Helsingør, Denmark



Vlaams Instituut voor de Zee
Flanders Marine Institute

Introduction

The only published description of a fecampiid turbellarian from Greenland is that of *Kronborgia caridicola* by KANNEWORFF and CHRISTENSEN (1966). It was described from worms found in the body cavity of preserved shrimps, *Lebbeus polaris* (Sabine), *Pasiphaea tarda* Krøyer and *Eualis machilenta* (Krøyer), collected mainly from a number of Greenland expeditions. Although most of the infested shrimps were *L. polaris*, a worm taken from the only infested specimen of *E. machilenta* was designated as the holotype.

The authors found it difficult to explain why the infested shrimps came mainly from shallow waters, whereas the cocoon assigned to *K. caridicola* came from depths of about 200 to more than 1000 m. It was noted, however, that a cocoon taken at Egedsminde (depth unknown) in 1892 differed so much from the others that it could only belong to a second undescribed species. It was irregularly coiled and showed signs of having been in contact with organisms such as bryozoans. It was later described as cocoon type C by CHRISTENSEN and KANNEWORFF (1967) who also noted that several other cocoon remains in the original material belonged to this type.

It was not anticipated, however, that the worm material treated in the 1966 paper also represented two species. That this was the case became clear when Dr. ARNE NØRREVANG, as a member of the Kap Farvel Expedition to South Greenland in 1970, observed a female *Kronborgia* leave its host, *L. polaris*, and construct a cocoon identical to the type C cocoon.

This discovery posed the question as to which shrimp species *K. caridicola* and the undescribed species really infest, respectively, and whether the cocoon described as that of *K. caridicola* really belongs to that species.

These aspects are dealt with in the present paper although it has not been possible to provide a key to differentiate between the two species on morphological and anatomical criteria.

Materials and methods

The material collected in the extreme South of Greenland by the Kap Farvel Expedition came from stations 21, 84, 95, 101, 112, and 142 (see station list by LEMCHE, JUST and NØRREVANG) at depths between 10 and 120 m.

The Greenland Fisheries and Environment Research Institute (G.F.E.R.I.) provided 23 infested *P. tarda* collected in southwest Greenland in the outer part of the Bredefjord at

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660 m and in the Sukkertoppen Deep at 440–540 m depth between 1968 and 1981, as well as some cocoons and cocoon fragments taken in the same or other localities in southern Greenland. At a much earlier date the Smithsonian Institution (U.S.N.M.) placed 16 cocoons at my disposal, all of which are identical with the regularly coiled cocoon originally assigned to *K. caridicola*.

None of the worms in the Greenland material had been removed from their hosts, and this makes them difficult to handle. The worm is fragile and lies extremely twisted in a tight, thick mass (KANNEWORFF and CHRISTENSEN, 1966, pl. 2). It cannot be removed and straightened out, and it is, in nearly all cases, difficult or impossible to locate the posterior end of the worm and remove it intact.

Nevertheless, serial sections were obtained from the posterior end of worms taken from both *P. tarda* and *L. polaris* and stained with Ehrlich's haematoxylin and eosin. No attempts were made to section whole worms, although sections from other parts of the worms were obtained.

Results and discussion

The serial sections revealed that both *K. caridicola* and the new species possess all the typical traits of the genus, including details described for *K. pugettensis* (SHINN and CHRISTENSEN, 1985) such as accessory reproductive glands and an ootype.

In both species the convoluted part of the ovovitelline duct may wind to the extent that the duct may appear seven times in a cross section of the worm. Although no morphological or anatomical differences were found, they must be present. It has, for example, not been possible to measure ovarian length relative to total length, or study details of the nervous system. However, apart from differences in the morphology of the cocoon and the mode of attaching it, the two species can be identified in field collections because they infest different host species. Proof of this comes from the following facts.

The specimen of *E. machilenta*, in which the holotype of *K. caridicola* occurred, was caught in the inner part of the Tungliarfik Fjord in the Julianehåb district in south-west Greenland at a depth of 290 m (KANNEWORFF and CHRISTENSEN, 1966). This is a locality and depth where *P. tarda* and *L. polaris* also may occur, although the former is a bathypelagic deep-water (250–2400 m) species (SIVERTSEN and HOLTHUIS, 1956) associated with muddy bottoms, and the latter predominantly is a shallow-water species usually associated with gravelly or stony bottoms. It may occur deeper down on mud bottoms (STEPHENSEN, 1935), but in most cases, perhaps all, only where stones or gravel may be found (HOFSTEN, 1916).

For *L. polaris* it is clear from Nørrevang's direct observations that the *Kronborgia* infesting it produces the type C cocoon (fig. 1). The question is whether this is the species that also infests *E. machilenta*, i.e. *K. caridicola*, or whether it is a new species. In the former case, KANNEWORFF and CHRISTENSEN (1966) obviously ascribed the wrong cocoon to *K. caridicola*.

E. machilenta is a Pacific-American (West Greenland) species (STEPHENSEN, 1935) which does not occur on the east coast of Greenland, nor at the localities south of Iceland and the Faroe Islands where the cocoon ascribed to *K. caridicola* was taken (KANNEWORFF and CHRISTENSEN, 1966).

L. polaris occurs in the North Atlantic, but there it has never been found deeper down than about 700 m (GREVE, 1963) although there is a single find from West Greenland at 930 m. Hence it is not conceivable that it should occur at a depth of about 1300 m in the North Atlantic localities mentioned above. Instead these localities and depths are typical

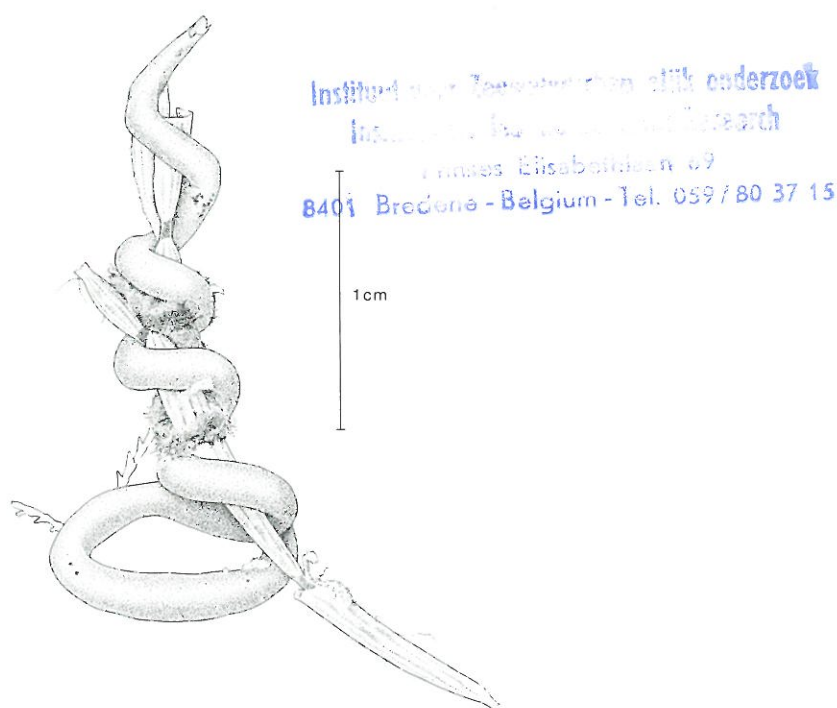


Fig. 1: Cocoon of *Kronborgia caridicola* coiled around a bryozoan. Kap Farvel Exp. st. 84, 10–20 m, 8. Aug. 1970.

for *P. tarda* (SIVERTSEN and HOLTHUIS, 1956). It is in fact the only possible host species which occurs at all localities (published and unpublished data) where the regularly coiled cocoon has been found. They have, furthermore, been collected in one and the same trawl haul in the Sukkertoppen Deep at G.F.E.R.I. st. 5956 on 1. April 1981 (unpubl. data).

In short, it is the *Kronborgia* infesting *P. tarda* that remains to be described and named.

On the above background the following information can be given on the two species discussed.

Kronborgia caridicola

This species infests *Eualis machilenta* and *Lebbeus polaris*, with the latter being by far its main host. Most finds are from the bays and fjords in or near the Kap Farvel district, but it has been found in *L. polaris* as far north as Melville Bay on the west coast and Danmarkshavn on the east coast of Greenland (KANNEWORFF and CHRISTENSEN, 1966). It has been found at depths between 6 and 490 m, but the large majority have been taken at depths less than 50 m.

K. caridicola is much smaller than the deep-water species. This is clearly shown by the size of its cocoon, i.e. the type C cocoon. CHRISTENSEN and KANNEWORFF (1967) had only incomplete cocoons at their disposal, but surmised that one with a length of about 14 cm was almost complete. This is verified by the newer material consisting of 17 cocoons, all of which are less than 20 cm long.

Upon leaving the host, the female proceeds to construct its cocoon so that it coils irregularly around sessile organisms such as algae, hydroids and bryozoans in much the same manner as known for *K. pugettensis* (SHINN and CHRISTENSEN, 1985). The male remains unknown.

The deep-water species

This species infests *Pasiphaea tarda*. In Greenland, where this worm or its cocoon has been taken at depths between 330 and 1100 m, its distribution is restricted to that of its host, i.e. from about Holsteinsborg on the west coast and south around the Kap Farvel district to the Skjoldungen-Umivik district on the east coast. In the North Atlantic it occurs as far east as the Faroe Islands, and it has at least occurred as far west as the eastern coast of Canada and U.S.A. from Nova Scotia to Delaware Bay. The 16 cocoons from the Smithsonian Institution were collected at 15 stations in the latter area a depth between 275

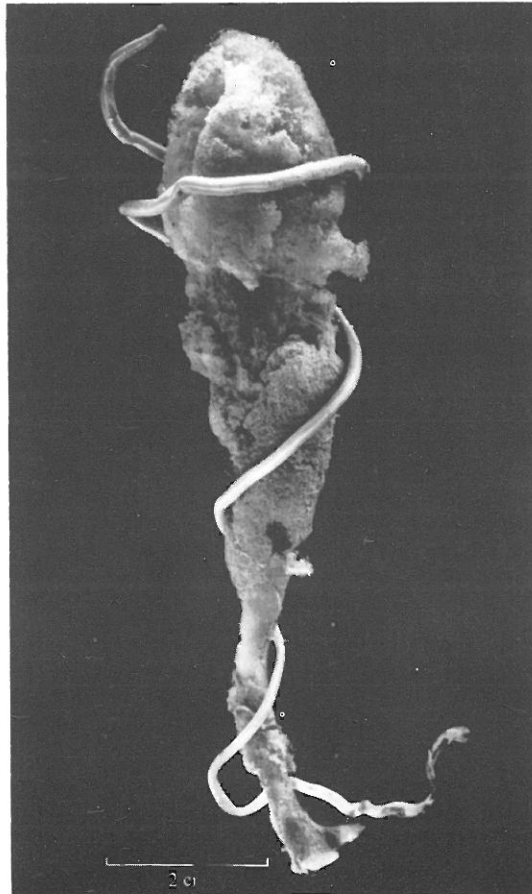


Fig. 2: Cocoon of deep-water *Kronborgia* coiled around unidentified sponge. Lindenowsfjord, 500 m, 31. Aug. 1932. P.M. Hansen coll.

and 3000 m during the years 1878–1885. It seems strange that none should have been taken off the American coast for more than a century, so it may no longer be present, even though *P. tarda* is present (SIVERTSEN and HOLTHUIS, 1956).

The cocoon may reach a considerable size. Thus, one collected in the Sukkertoppen Deep (550–580 m) on 24. June 1975 (G.F.E.R.I. st. 5112) measured 117 cm, indicating that the female worm may become about 50 cm long or longer.

A single case of coiling around an object is shown in fig. 2, but since the cocoon clearly had been anchored in the bottom in the normal fashion before coiling took place, it is almost certainly a fortuitous case.

The male of the deep-water species also remains unknown.

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