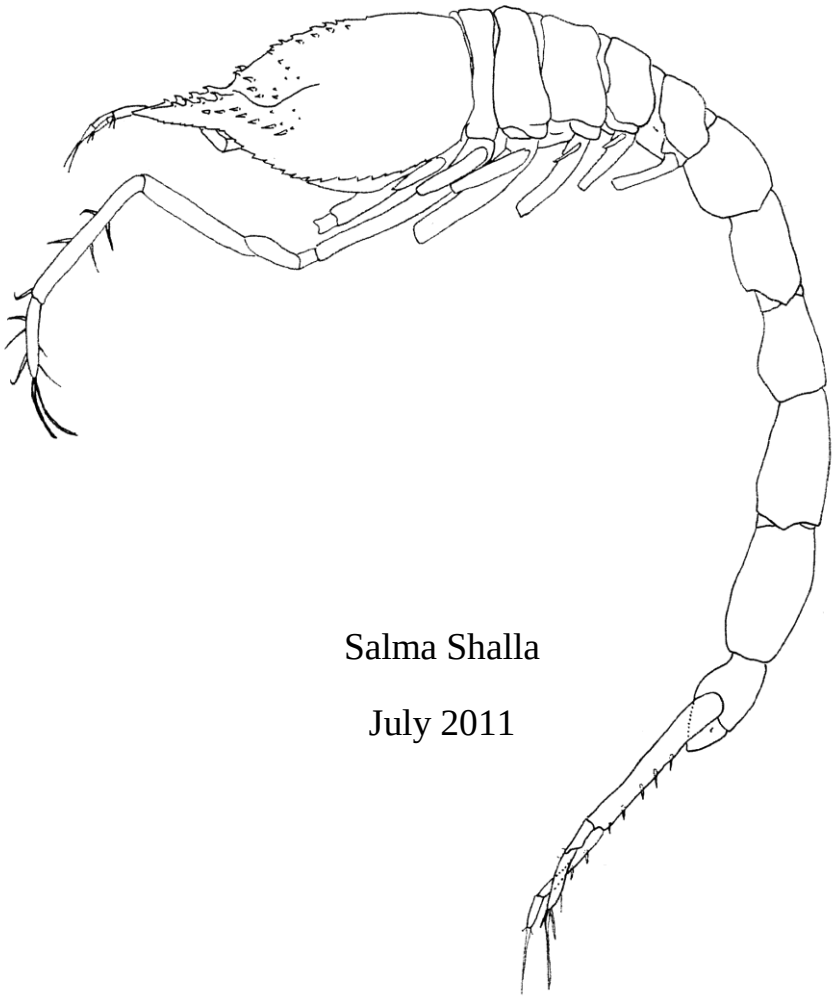
CUMACEA

Identification guide to British cumaceans



Atlantistylis borealis Shalla and Bishop 2005

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Introduction

Cumacea are a very distinctive order of the Class Malacostraca, in the Superorder Peracarida, distributed from the intertidal zone to the deep sea. *Oniscus scorpioides* (later re-named *Diastylis scorpioides*) was the first cumacean to be described, in 1780. At that time, many scientists thought that cumaceans were a larval stage of decapods. In 1846, they were recognized as a separate order by Krøyer. Twenty-five years later about fifty different species had been described. Since then, the number of known species has dramatically increased, and is still on the rise. In 1976 Jones listed 885 described species, in 1997 Watling and McCann listed over 1200 species and currently there are more than 1,593 described species (Anderson, 2010). Although that increase was largely due to the species described from the deep-sea and Antarctic expeditions, nevertheless many new species were also discovered in shallow waters, especially in tropical areas.

Cumaceans are small infaunal crustaceans, generally 1-10mm in length, although some species can reach up to 3.5cm. Typical cumaceans are easily recognizable by the combination of the following features (Figure 1): an inflated carapace, consisting of the head fused to at least the first three thoracic somites; anterior margin of the carapace usually extending in front of the head as a pseudorostrum; second antenna lacking an exopod; pereon composed of five free thoracic somites; pleon slender and composed of six somites ending in a forked tail. The telson may be present, reduced, or incorporated into the last abdominal somite.

All the British species are marine, scarcely penetrating into estuaries. Elsewhere, the group is mainly marine, with only a few adapted to brackish and fresh waters. Relatively few live between tidemarks while many species are to be found in shallow water offshore, especially in the tropics, but they are also common in the deep sea, with a few recorded from below 7000 m.

The British cumaceans included by Jones (1976) were those recorded from the continental shelf within 20 miles of the British coasts and down to 200m depth, and comprised 41 species. An additional 32 species which occur on the upper slopes down to 500m to the west of the British Isles are included here. The aim of this work is to update Jones (1976), so most of the keys are adapted from Jones. A few of the figures were also adapted from Sars (1900).

History of cumacean taxonomy in the Northeast Atlantic

Exploration in the deep North East Atlantic started with the "Lightning" cruise in the summer of 1868 and the "Porcupine" cruises in the summers of 1869 and 1870, led by Wyville Thomson, a Professor at Edinburgh. The cruises took place in the areas lying to the north and west of Britain and the Iberian Peninsula. The Rev. A. M. Norman (1879) described 30 species of cumaceans from the 'Lightning', 'Porcupine' and 'Valorous' expeditions, of which 9 were new species, and 2 new genera. On the basis of these cruises, and with the co-operation of the Royal Navy, the pioneering voyage of H.M.S. "Challenger" took place between 1872 and 1876 partly in the Atlantic but also in the Pacific and Southern Ocean. This was co-organised and led by Wyville Thomson. Fifteen new species of cumaceans were obtained during the Challenger voyage (Sars, 1887).

Calman (1905) published a description of the cumaceans of the West Coast of Ireland taken by the "Helga" down to 400 fathoms during the years 1899-1904. Deeper stations produced

richer yields (18 and 19 species). In total 48 species were identified, nine being regarded as new species, of which three represented new genera and one a new family.

The "Ingolf", "Thor" and other Danish expeditions around the end of the nineteenth century sampled the seabed in the north Atlantic around the Faeroes, Iceland and Greenland, recording 66 species, 24 of which were new to science (Hansen, 1920).

The Voyages of Prince Albert I of Monaco took place between 1886 and 1912 in the Bay of Biscay, off Portugal and near the Azores. Forty species of cumaceans were identified, of which seven were new (Fage, 1929). The end of this era was completed some decades later with the Danish round-the-world voyage of the "Galathea" expedition 1950-1952, when the Bay of Biscay was one of the stations. Thirty species of cumaceans were identified of which 26 species were new and one was referred to a new genus (Jones, 1969). From this time onwards it was widely accepted that the deep sea was much more diverse than previously thought.

More recently, to the south west of Ireland, the Institute of Oceanographic Sciences Deacon Laboratory (IOSDL) carried out an intensive survey of the benthic biology of the Porcupine Seabight between 1977 and 1986. However, the most extensive deep-sea time series collection was made by the Scottish Association of Marine Sciences (SAMS) starting 1973 in the Rockall Trough. Also a shorter time series was taken from the Anton Dohrn SeaMount since 1980. Primarily from SAMS's collection and others, Norman Jones described a large number of new species, mainly in the family Nannastacidae. A survey of the area around the Faroe Islands (BIOFAR programme) was carried out between 1987 and 1990 (see Norrevang et al 1994 for station data). The result of that produced 62 cumacean species, of which 42 are additional species to the listed 28 species by Hansen (1920) and Stephensen (1929). One of the 42 additional species is a new leuconid described by Watling and Gerken (1999). That increases the Faroe cumacean list to 70 species by Gerken and Watling (1999). The Benthic Invertebrates of Icelandic waters (BIOICE) Programme commenced in 1992 and sampling continued until 1997. Its main objective was to revise the systematics of the marine invertebrates of the area. More than 1000 samples were collected around Iceland from 20m down to 2400m depth. All the cumacean information relating to the BIOICE programme remains unpublished.

In 1996, 20,000 square kilometres of seabed lying to the west of the Shetland which was licensed for oil and gas exploration before or during 1996, was mapped and sampled by Atlantic Frontier Environmental Network (AFEN). In 1998, a further 10,000 square kilometres north and west of Scotland that covered the 17th U.K. oil licensing round was surveyed (see Bett 1997 and 1999 for the survey area and sampling details). From both surveys 102 cumacean species were identified, 27 of which are of taxonomic importance-either new species, or species which were poorly described and causing taxonomic problems (Shalla, 2001). Out of the 27 problematic species, four new species of the genus *Leucon* were described by Shalla and Bishop (2004); one new species of *Atlantistylis* was described, constituting the first record of the genus from the North Atlantic (Shalla and Bishop, 2005) and two new species of the genus *Hemilamprops* and *Mesolamprops* were described by Shalla and Bishop (2007).

At the end of year 2000, the UK Department of Trade and Industry (DTI) conducted a survey in the area northwest of Scotland in the Faeroe-Shetland channel (2000 "White Zone" survey). Fifty-two cumacean taxa were recorded from depths of 141-1697m, 11 of which were of taxonomic importance-either new species, or species which were poorly described

and causing taxonomic problems. In 2002, the DTI carried out another survey in the area north and west of Orkney and Shetland; no reports from this survey have been published.

In 2003, a survey of the north east of the Porcupine Bank, together with other Irish and North Sea material, lead to the erection of the new genus *Monopseudocuma* by Mccarthy et al (2006).

Morphology

The cumacean body is divided into three distinct parts, the inflated carapace, the pereon (thorax) and the pleon (abdomen) (Fig. 1).

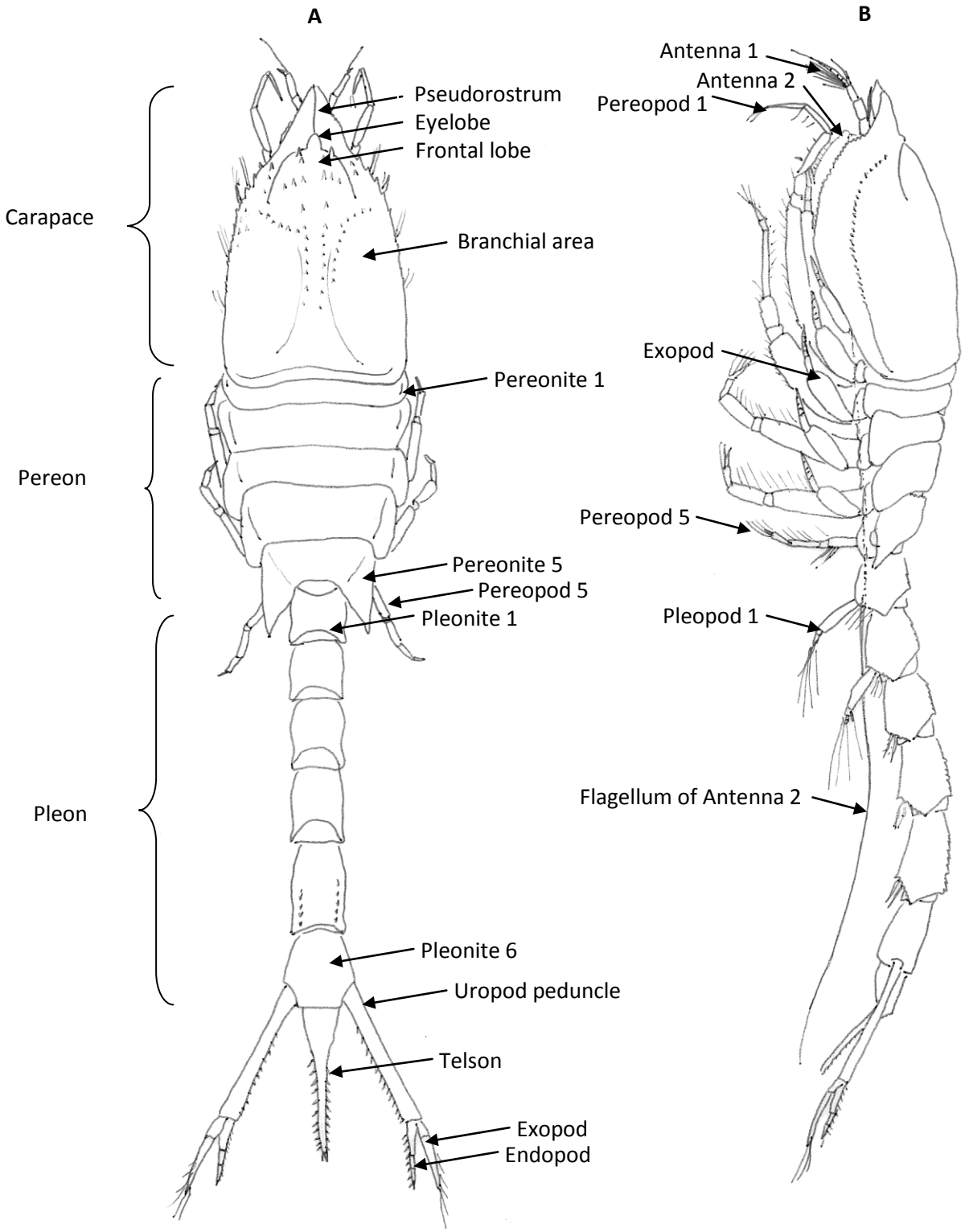
The carapace consists of the cephalon (head) fused to at least the first three thoracic somites. The carapace extends both laterally and ventrally to enclose the branchial cavity. Each side of the carapace is produced anteriorly to form the pseudorostral lobes. Both lobes project forward and meet (but are not fused) to form the pseudorostrum (Fig. 1). Projecting anteriorly through the pseudorostrum is the siphon, which is the anterior part of the branchial apparatus of the first maxilliped. The siphon is usually short but can be very characteristically long in some species. In the genus *Eudorella* and *Eudorellopsis*, the pseudorostral lobes are reflexed upward with no obvious pseudorostrum but still with a siphon (Fig. 2). Below the pseudorostrum the anterior border is excavated to form the antennal notch or sinus which is defined below by the anterolateral corner, although in many species both are lacking. Behind the pseudorostrum on the dorsum is the bell-shaped frontal lobe from which the small ocular lobe projects forward, usually carrying the unpaired eyes (Fig. 1). The shape of the frontal lobe can vary from triangular to rounded, and the ocular lobe can vary in shape from small or absent to very long (Fig.2). The eye lobe normally persists (even in eyeless species), except when the eyes remain separated into two groups as in *Nannastacus* (Fig. 2). Behind and to the sides of the frontal lobes are the branchial regions (Fig. 1).

The thorax (pereon) consists of five free thoracic somites (Fig. 1). Individually each is called a pereonite. Sometimes the first and exceptionally the second and third may be fused with the carapace, while the third and fourth may be fused together dorsally.

The abdomen (pleon**)** consists of six cylindrical somites "pleonites" (Fig. 1). The fifth is the longest, while the sixth is prolonged by a freely articulated telson in five of the families. In the remaining three, the telson is fused with the sixth pleonite and is not distinct. The freely articulated telson varies in length and shape. The anus, protected by a pair of valves, opens on the lower face of the telson or at the end of the sixth pleonite.

The body is covered with a chitinous epidermis, sometimes strongly calcified. Its surface is often sculptured with grooves, ridges, spines, tubercles or teeth, or has a fine reticulated, pitted or scaled appearance. It is sometimes covered with sand grains.

The first antenna (antennule) is short (Fig. 3A). It has a peduncle of three articles and two flagella. The main outer flagellum is usually longer than the accessory inner flagellum, with two to six articles. The accessory flagellum often has only one article. One or two modified sensory setae ,"aesthetascs", may be present at the end of the main flagellum. In males of some species (e.g. *Leptostylis*) a brush of sensory filaments is present on the basal articles of the main flagellum (Fig 3B). Between the bases of the first antenna on the underside of the front end of the carapace are two small chitinous plates (the epistome), to which the first antennae are attached (Fig. 3A).



Figur 1: *Diastylis rathkei:* A, female dorsal view; B, adult male lateral view (from Sars, 1900).

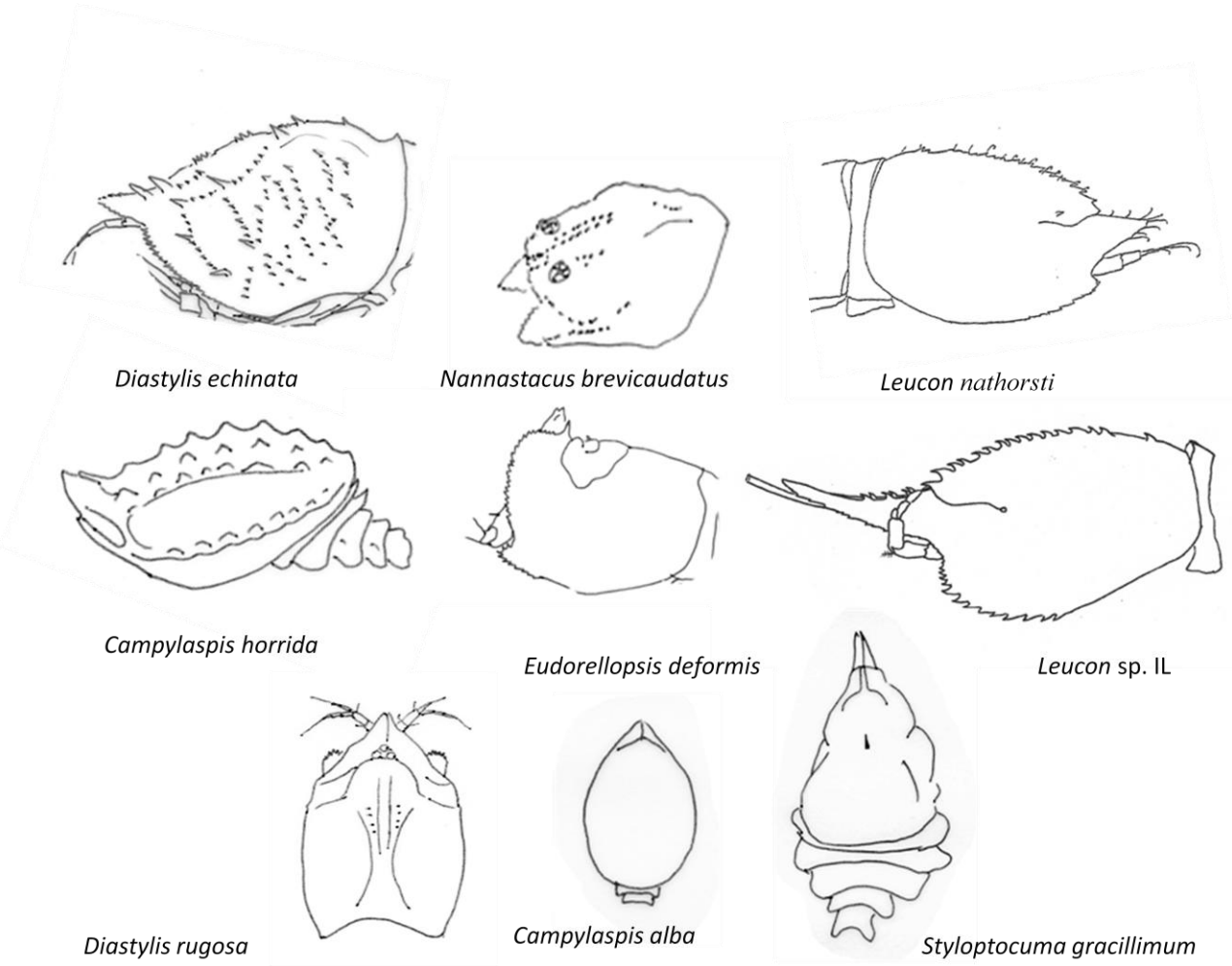


Figure 2: Examples of carapace shape and ornamentation.

The second antenna (antenna) is generally rudimentary in females, with from one to five articles (Fig. 3A). In males, the shape and length changes at different developmental stages. In mature males (Fig. 3C), it is well developed with a peduncle of five articles and a many-segmented flagellum. The outer sides of the fourth and fifth articles of the peduncle are normally thickly covered with setae. The second antenna is bent backwards between the third and fourth articles of the peduncle, and the flagellum is closely applied to the sides of the body. It usually reaches to the end of the body but is sometimes shorter. In some species, the second antenna is used as an organ for clasping the female. The second antenna is attached to the upper lip (labrum) (Fig. 3A).

The mouth parts consists the upper lip (labrum), paired mandibles, paired first and second maxillae and lower lip (labium) (Fig. 3A,D-H). The upper and lower lips are of no taxonomic significance.

The mandibles (Fig. 3D&E) are simple and always without a palp. Each is normally boat-shaped, pointed at either end, with a strong molar process and toothed incisor process and in between them a row of setae and a distal lacinia mobilis (Fig.3D). In some families the mandibule is reduced to a truncate shape (Fig.3E). In Nannastacidae the mandible is modified to aid the predatory feeding habit, with a styliform molar process.

The first maxillae (maxillulae) (Fig. 3F*)* lie ventral to the labium (Fig. 3H) and the second maxillae (Fig. 3G) ventral to the first pair. Both consist of a flattened protopodite bearing endites and the first pair have a backwardly directed palp, usually with one or two filaments, which vibrate in the respiratory chamber and cause a current of water to pass the gills.

In cumaceans, the first three thoracic somites are covered by the carapace but only the first one is thought to be fused to the head. The first three pairs of thoracic appendages are maxillipeds and the last five are pereopods. Each has a short coxa fused with the sternite, followed by the basis, usually the longest article, which may carry an exopodite on its proximal part, normally with a peduncle and setiferous flagellum but sometimes a rudiment. Exopods are never present on the first and second maxilliped nor on the fifth pereopods, and the number on the other appendages varies with the species. In the female oostegites are borne on the coxae of the third maxilliped and the first three pairs of pereopods, lamellar in form and interlocking to form the brood chamber. The remaining articles are the ischium, merus, carpus, propodus and dactyl.

The first maxillipeds are short, robust and highly developed (Fig.3I). The coxa carries a large epipod (the branchial apparatus). The anterior part of the epipod extends forward and, together with its counterpart, forms the siphon. Its posterior part forms finger-like branchial lobules (gills), often more numerous in the male than in the female. Water leaves the branchial chamber through the siphon.

The second maxillipeds (Fig. 3J) usually have a long basis. The propodus and dactyl are bent in towards one another and may be modified, with large flattened spines. In the female there is a flattened plate attached to the hind end of the coxa, the rudimentary oostegite, which has a fringe of long slender setae directed backwards into the brood chamber.

The third maxillipeds (Fig. 3K) are large, and partly cover the first and second pairs and the mouthparts. They are sometimes similar in structure to the first pereopods but usually differ considerably. Long feathered setae are present on the basis, acting as a screen to filter the

water entering the branchial chamber.

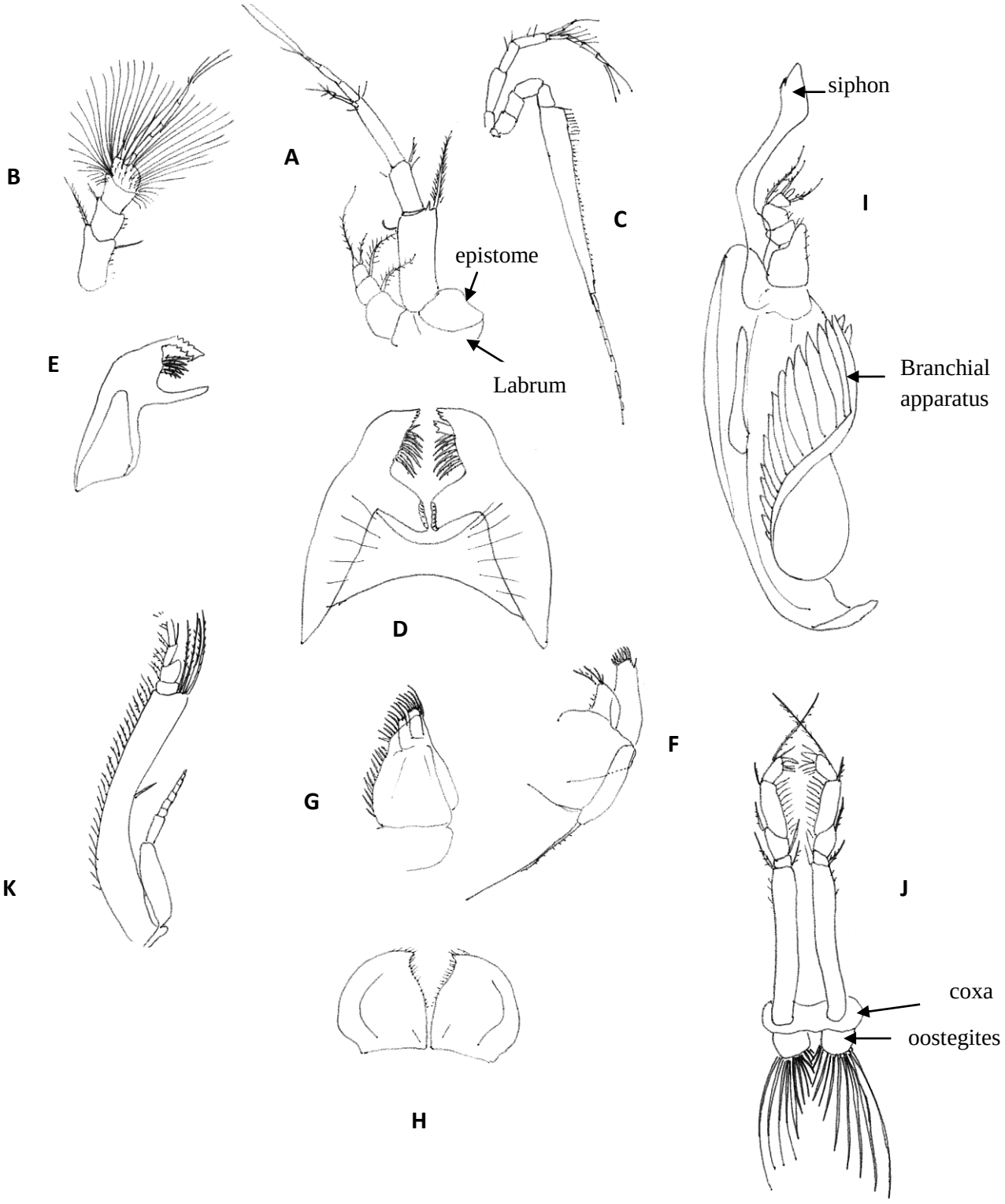


Figure 3: Detailed view of the head appendages, anterior thoracic appendages and pleopods. A, Antenna 1 and 2 of female diastylid; B, antenna 2 of male *Leptostylis*; C, antenna 2 of male diastylid; D, mandible of diastylid; E, mandible of *Campylaspis*; F-G, maxilla 1 and 2 of Diastylid; H, Labium of diastylid; I-K; maxillipeds 1-3 of diastylid (all from Sars, 1900).

The first two pairs of pereopods (Fig. 4) are directed forwards, the first normally reaching beyond the tip of the pseudorostrum. The second are usually shorter than the first and their ischia are often fused with the bases. The last three pairs of pereopods are directed backwards (Fig.4) and are used for burrowing.

Pleopods (Fig. 4) have been reported in the female of only a single species. In the male there may be one, two, three or five pairs, placed at the hind ends of the pleon sternites, or they may be absent. The peduncle consists of a short coxa and a long basis, with two short rami, the outer usually with two articles and the inner with one article, normally carrying long plumose setae in the adult. The inner ramus is rudimentary in some species.

The uropods are the last pair of abdominal appendages. Each consists of a uniarticulate peduncle and two rami, the outer ramus (exopod) with two articles and the inner ramus (endopod) with one to three articles (Fig. 4). Spines and setae are usually present on the edges of the peduncle and rami. The uropods are used as cleaning organs.

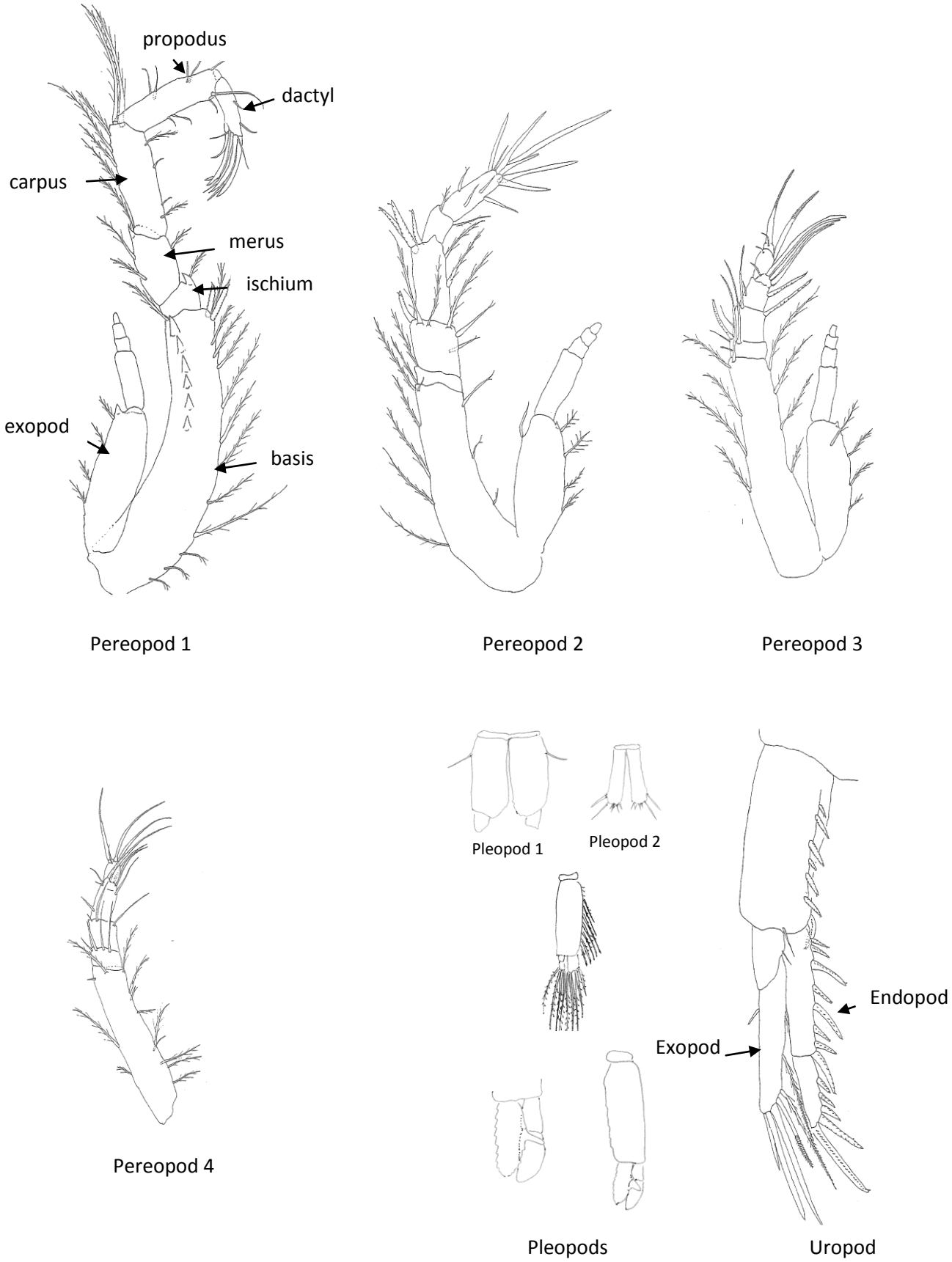


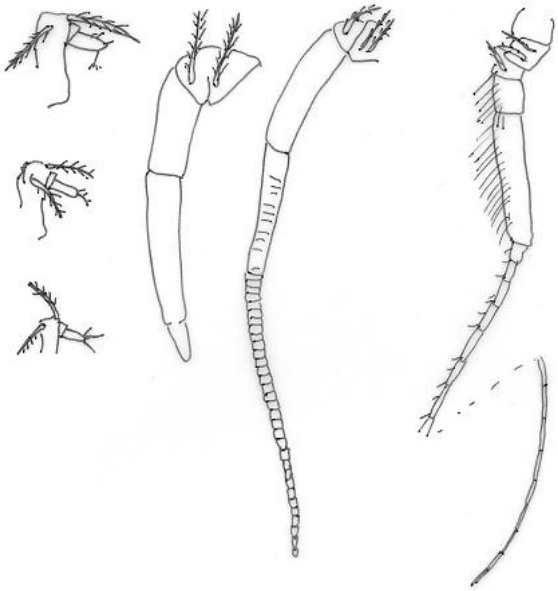
Figure 4: Thoracic and abdominal appendages: pleopods (top to bottom) of Pseudocumatidae, Diastylidae and Bodotriidae (from Sars, 1900); pereopods and uropods of Leuconidae (from Shalla and Bishop, 2003).

Sexual dimorphism

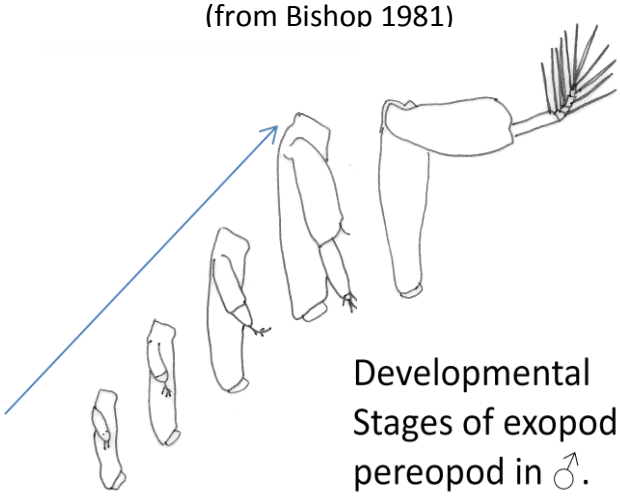
There is always some sexual dimorphism in adults, more pronounced in some families than in others, but almost always including: better development of the second antenna in the male; the presence of oostegites (brood pouch) in the female; the presence of pleopods (except in Nannastacidae) in the male; the presence of more or better-developed exopods on the thoracic appendages in the male, and sometimes differences in shape and ornamentation of the carapace, as well as differences in the development of some sense organs.

General distinction between sexes in adult cumaceans:

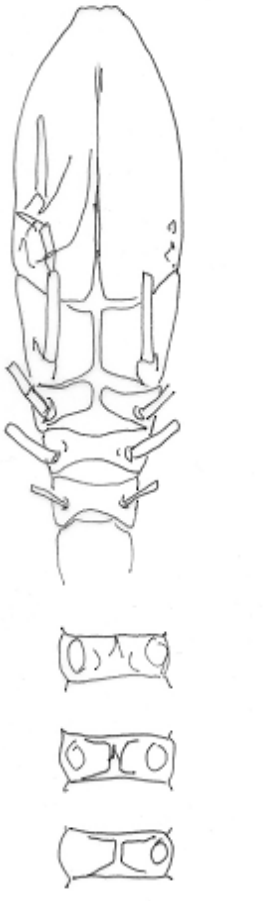
	Female	Male
Antenna 2	Rudimentary	Well developed, with long flagellum
Oostegites or brood pouch	Present	Absent
Pleopods	No	Yes (except in Nannastacidae)
Exopods on thoracic appendages	Less developed	More developed (except Bodotriidae)



A2 of ♂ *Leucon jonesi*
(from Bishop 1981)



Developmental Stages of exopod on pereopod in ♂.



Development of oostegites in ♀

Biology

Cumaceans brood their eggs after fertilization in the brood pouch in which the embryos are retained and moult into a stage closely resembling the adult (manca) but lacking the last pair of pereopods, the secondary sexual characters, and some of the spines and setae. Several moults follow the manca before the adult stage is reached. The number of moults, the life cycle and the life span of a cumacean varies with species and environmental conditions (for detailed studies, see Forsman (1938), Kruger (1940), Zimmer (1941), Corey (1969, 1976, 1983), Bishop (1982), Duncan (1984), Persson (1989), Roccatagliata (1991), Bishop and Shalla (1994) and Corbera et al. (2000).

The key adopts the terminology of Bishop (1982) who summarised the developmental stages from a newly hatched manca to an adult in both sexes in the deep-sea species *Leucon jonesi* as follows:

Manca: without pereopod 5 and without pleopods.
Juvenile: with five pairs of pereopods and without external sexual differentiation.

Immature males: pleopods not developed externally but visible through the cuticle, antenna 2 in development but unsegmented.
Preadult males: pleopods with peduncle and rami but no setae, antenna 2 in development and partially segmented with a differentiated peduncle
Adult males: pleopods fully developed and antenna 2 flagellum fully segmented and longer than body length

Immature females: without oostegites; without pleopods and antenna 2 rudimentary, as in the following stages.
Preadult females: oostegites in development but not yet forming a brooding pouch.
Brooding females: fully developed oostegites forming a marsupium containing individuals in different developmental stages.

The majority of species occur in soft deposits and a number in sand where they may show a preference for a certain range of grain size (Foxon, 1936; Pike and Le Sueur, 1958), possibly related to the mesh size of their branchial filtering apparatus or the size of grain which they can manipulate during feeding. They normally burrow into the deposit by means of the last four pairs of pereopods, remaining at rest usually with only the front part of the carapace emerging and sometimes also the uropods, but they make fairly frequent swimming excursions and the adult males of many coastal species may swim up into the plankton, especially at night, and may rise almost to the surface to form swarms. They may be joined by smaller numbers of females but it is likely that females do not rise as far from the bottom nor remain above it for as long a time. The function of this behaviour is presumably to enable mating to take place, or at least for the males to find the females (from Jones, 1976).

Cumaceans feed on micro-organisms and organic matter from the bottom deposit. Mud-living species filter small particles and those inhabiting sand clean their food off sand grains. In the latter case objects carrying food are picked up by the first pereopods and passed on to the third maxilliped. The food is then cleaned off by the first and second maxillipeds and passed on to the first and second maxillae and mandibles (Dixon, 1944). The food-manipulating appendages and mouthparts are suitably armed with spines and bristles. In the filter feeders

the first and second maxillae together form a pump by means of which water is drawn through their setules which filter off particles of food (Dennell, 1934). In *Campylaspis* and some related genera the mandibles and second maxilliped are modified as piercing organs and they probably feed on foraminiferans and perhaps small crustaceans (from Jones, 1976).

Classification

Family Bodotriidae
    Subfamily Vaunthompsoniinae
        Subfamily Bodotriinae
Family Leuconidae
Family Nannastacidae
Family Pseudocumatidae
Family Lampropidae
Family Diastylidae
Family Gynodiastylidae*
Family Ceratocumatidae†

Although Cumaceans are a very recognizable group, their family distinctions are not as obvious. Various taxonomists have divided the order into 4-26 families, of which eight are currently accepted. The family definitions overlap to such an extent that the most difficult task in identification of a species is placement into a family (Day, 1980). A large part of the problem is due to the significant sexual dimorphism in cumaceans. Thus it is helpful to identify the sex and the stage of maturity of the specimen before using the key (see section on biology); but this is not always obvious and can mainly be learnt by experience.

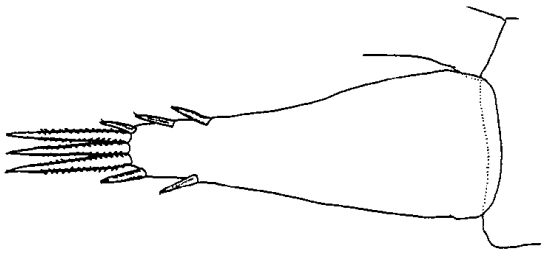
*Species are present predominantly in the southern hemisphere
†British records from mainly deep-water
Useful web links:
http://www.marinespecies.org/cumacea
http://peracarida.usm.edu/CumaceaTaxa.pdf

Key to the Families (Fig. 5)/subfamilies*

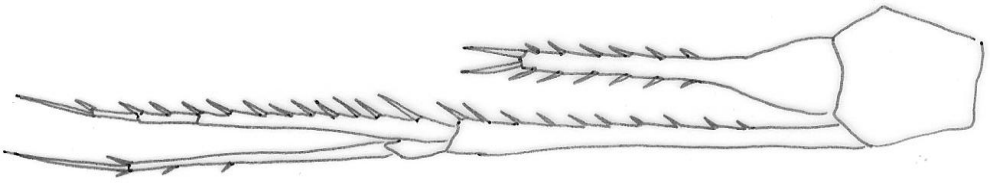
(*Applicable to the British species only)

1- With freely articulated telson 2
Without freely articulated telson 5

2- Telson small or large, with 0 or 2 terminal spines 3
Telson mostly well developed, always with 3 or more terminal spines Lampropidae



3-Telson small, without apical spines. Endopod of uropod with only one article 4
Telson larger, with 2 apical spines. Endopod of uropod with 2 or 3 articles
Diastylidae



4- ♂ with 3, 4 or 5 pairs of pleopods, pleopods with two rami
Ceratocumatidae†

♂ with 1 or 2 pairs of rudimentary pleopods, pleopods with one ramus (Figure 4)
Pseudocumatidae

5- In both sexes the last four pairs of pereopods either without exopods or with very small rudimentary exopods. ♂ with 5 pairs of pleopods
Bodotriidae- Bodotriinae

In the female at most the last three pairs of pereopods without exopods, in the male only the last pair. ♂ with 0, 2 or 5 pairs of pleopods 6

6- Uropodal endopod uniarticulate. In ♀ the last three pairs of pereopods without exopods, in ♂ only the last pair. ♂ without pleopods Nannastacidae

Uropodal endopod with two articles. In ♀ the last two pairs of pereopods without exopods, in ♂ the last pair. ♂ with 5 or 2 pairs of pleopods 7

7- Eyes distinct. ♂ with 5 pairs of pleopods. In ♀ exopods of pereopods 1 well developed, of pereopods 2-3 well developed or rudimentary. Mandible of normal shape
Bodotriidae-Vaunthompsoniae

Eyes wanting. ♂ with 2 pairs of pleopods. In ♀ exopods of pereopods 1-3 well developed. Mandibles truncate at base Leuconidae

*Key modified from Jones (1976) and Watling and McCann (1997)
†British records are mainly deep-water, not discussed in the following key.

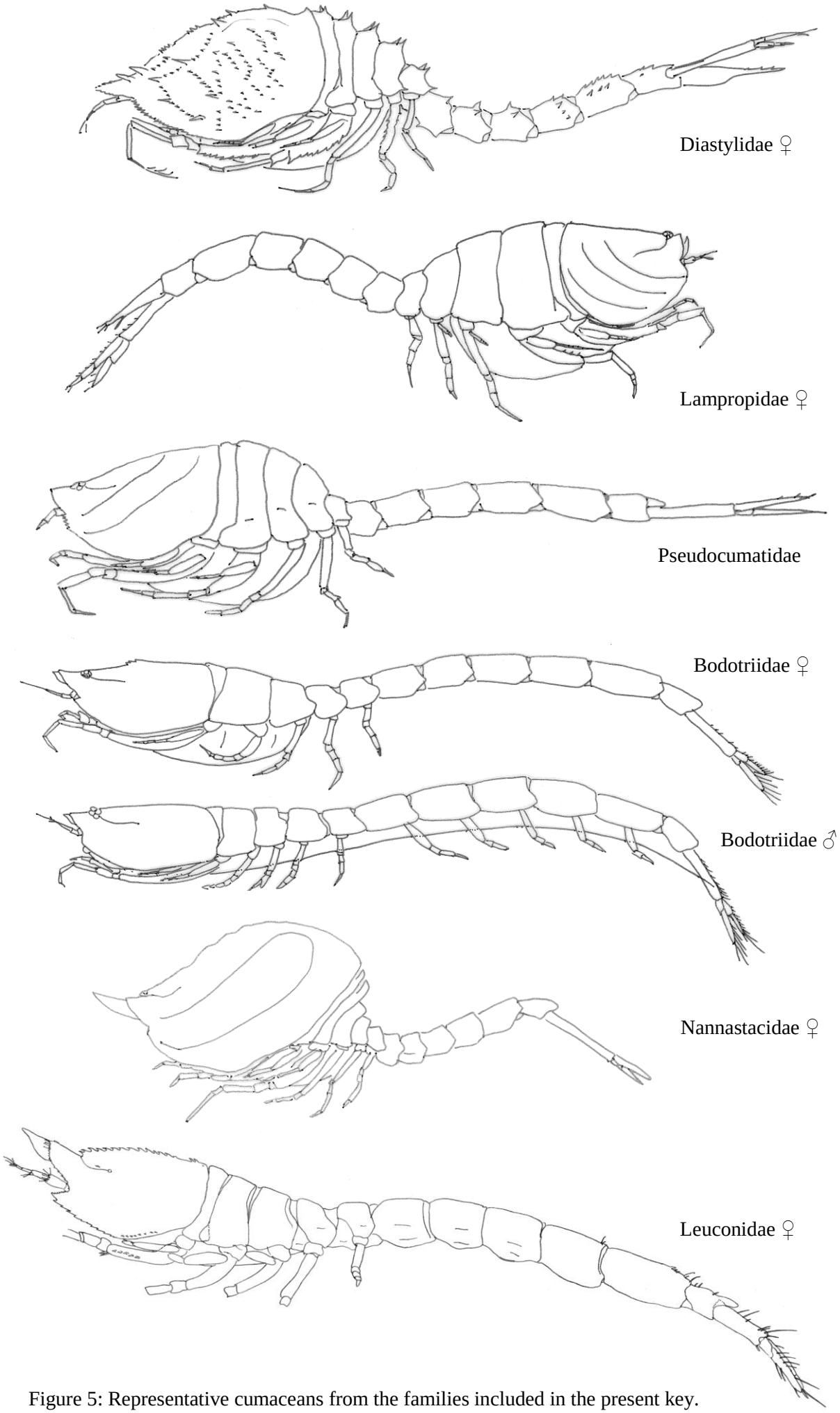


Figure 5: Representative cumaceans from the families included in the present key.

Family DIASTYLIDAE

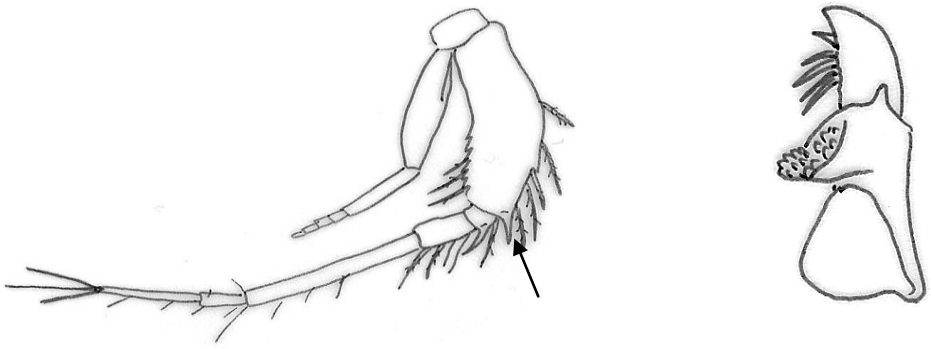
Diagnosis (as emended by Day, 1980 and Watling and McCann, 1997): Mandibles normally boat-shaped but widened at base in *Diastyloides*. First maxilliped branchial filament with numerous leaflets. Exopods present on maxilliped 3 (except in *Paradiastylis*) and in females on pereopods 1 and 2, absent or rudimentary on pereopods 3 and 4, in males present on pereopods 1-4. Telson variable, usually large, often with a long post-anal part, or short and poorly armed; bearing one pair of terminal spines or none. Uropods usually long and slender, endopod with 3 articles. Male antenna 2 with long flagellum reaching at least to the posterior end of thorax. Males with two pairs of pleopods (except in *Atlantistylis* which has no pleopods); no outer process on inner ramus.

Remarks: The Diastylidae is one of the oldest and biggest cumacean families, and is well represented in the temperate North Atlantic. The family contains around 285 species in 20 genera, with very clear sexual dimorphism. Identification of male specimens is very difficult especially if the specimen is not at the adult stage, the present key still need to improve on it. Jones (1976) listed 12 species in 4 genera from depths down to 200m, while the present key extends the depth range into the lower slopes down to 500m and contains 20 species in 5 genera.

Diastyloides biplicatus (G.O. Sars, 1865)
Diastyloides serratus (G.O. Sars, 1865)
Diastylis boecki Zimmer, 1930
Diastylis bradyi Norman, 1879
Diastylis cornuta (Boeck, 1864)
Diastylis echinata Bate, 1865
Diastylis glabra Zimmer, 1900
Diastylis goodsiri (Bell, 1855)
Diastylis laevis Norman, 1869
Diastylis lucifera (Krøyer, 1837)
Diastylis rathkei (Krøyer, 1841)
Diastylis rugosa Sars, 1865
Diastylis tumida (Liljeborg, 1855)
Brachydiastylis resima (Krøyer, 1846)
Leptostylis ampullacea (Liljeborg, 1855)
Leptostylis longimana (Sars, 1865)
Leptostylis macrura Sars, 1870
Leptostylis villosa Sars, 1869
Makrokylindrus (Adiastylis) josephinae (Sars, 1871)
Makrokylindrus (Adiastylis) longipes (Sars, 1871)

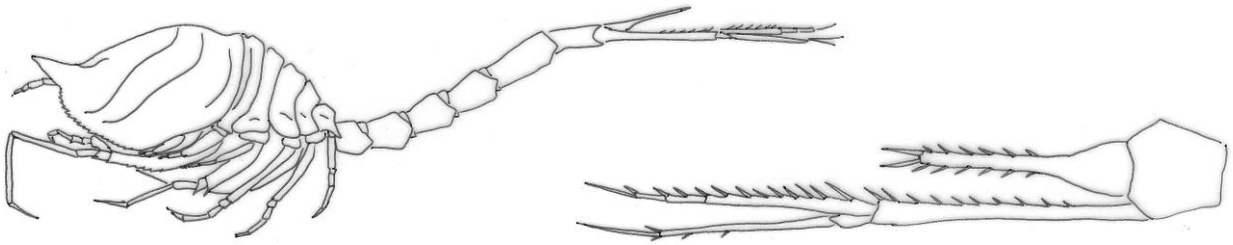
Key to the British Species of Diastylidae*

1- Mandibles broad at base, basis of pereopod 2 usually abruptly wider than ischium with one or two large strong teeth at lower distal corner (*Diastyloides*) 2

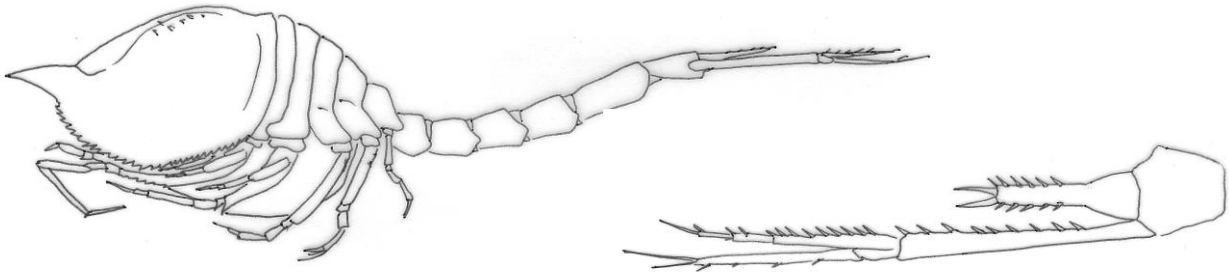


Mandibles narrow at base, basis of pereopod 2 narrow distally or abruptly wider than ischium but without one or two large strong teeth at lower distal corner 3

2- Carapace with diagonal folds, telson (excluding spines) more than half as long as the peduncle of the uropod *Diastyloides biplicata*

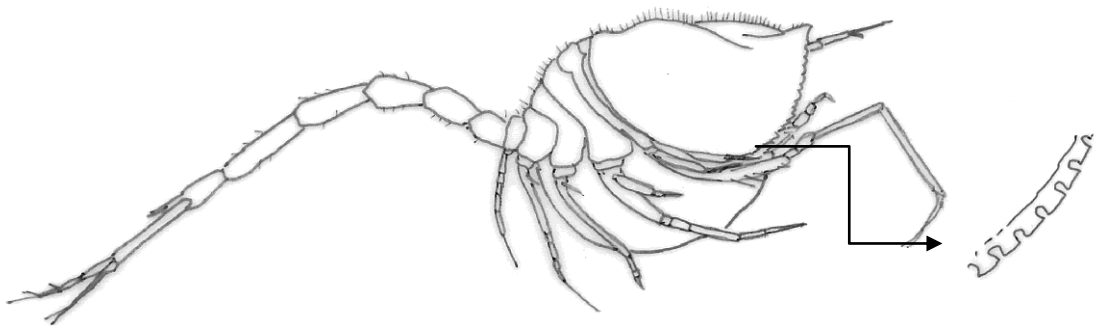


Carapace without diagonal folds, telson (excluding spines) about half as long as the peduncle of the uropod *Diastyloides serrata*



3-Telson short, shorter than the last abdominal somite (*Leptostylis*) 4
Telson long, longer than the last abdominal somite 7

4- Lower front edges of carapace with flat-topped teeth *Leptostylis villosa*



Lower front edges of carapace with triangular teeth 5

5- Pereopod 1 with the basis little longer than the carpus

Leptostylis longimana

Pereopod 1 with the basis much longer than the carpus 6

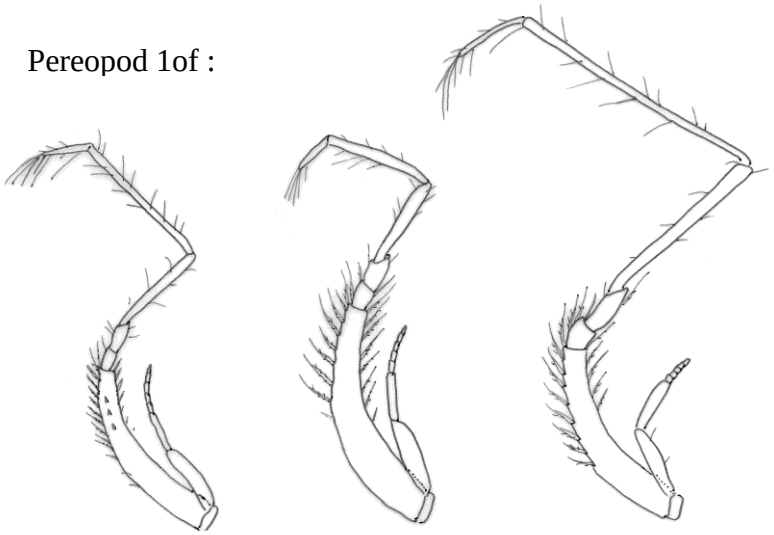
6- Pereopod 1with the basis as long as the carpus, propodus and dactylus combined, peduncle of the uropod not much longer than its endopod

Leptostylis ampullacea

Pereopod 1with the basis much shorter than the carpus, propodus and dactylus combined, peduncle of the uropod much longer than its endopod

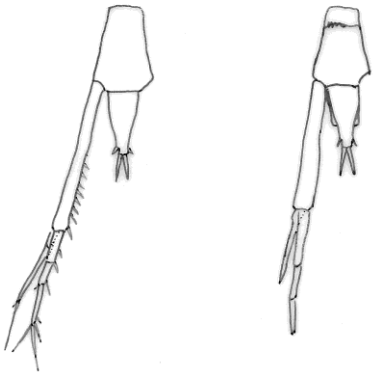
Leptostylis macrura

Pereopod 1of :



L. macrura *L. ampullace* *L. longimana*

Uropod of:



L. macrura *L. ampullacea*

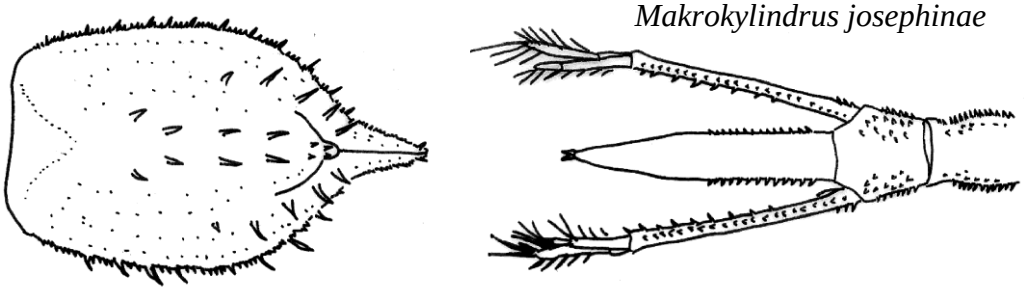
7- Post-anal part of telson shorter than pre-anal part

(*Makrokylindrus*) 8

Post-anal part of telson longer than or equal to pre-anal part 9

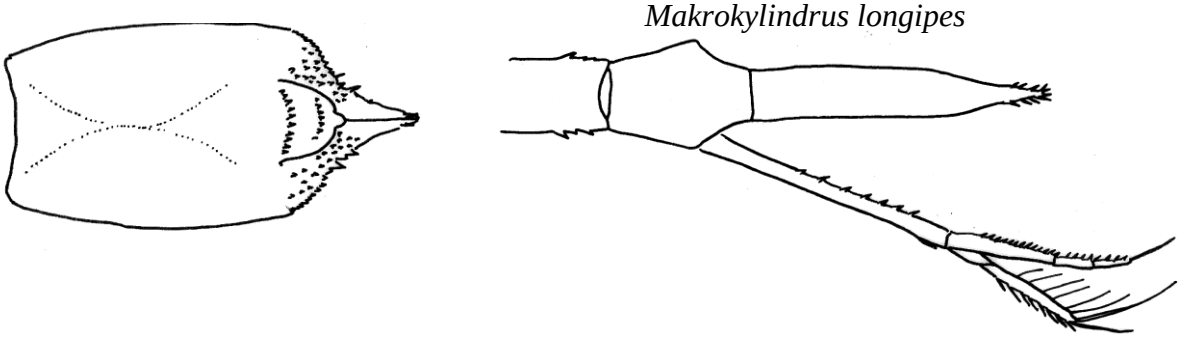
8- Post-anal part of the telson with at least three pairs of lateral spines

Makrokylindrus josephinae

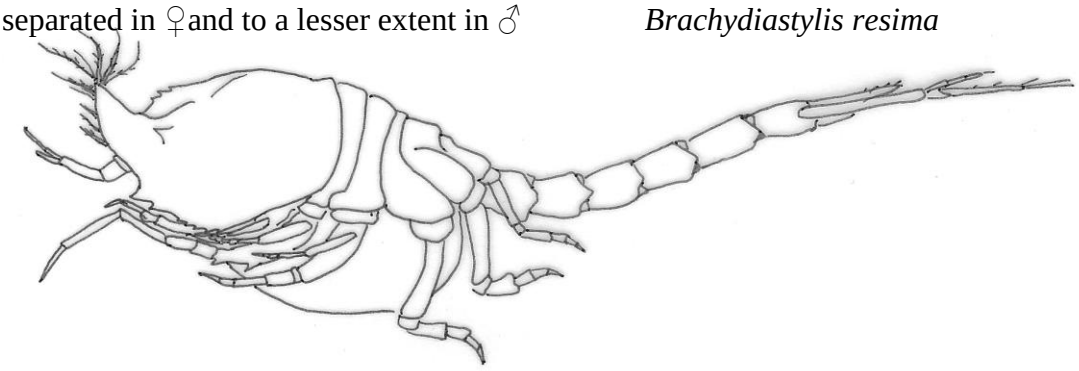


Post-anal part of the telson with at least three pairs of lateral spines

Makrokylindrus longipes



9- Pseudorostrum of ♀ strongly upturned, of ♂ slightly upturned, pereopods 2 and 3 widely separated in ♀and to a lesser extent in ♂ *Brachydiastylis resima*



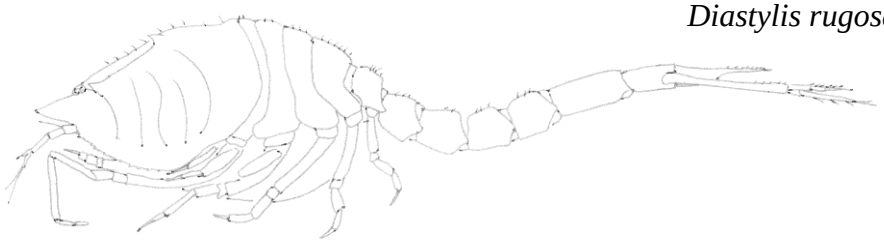
Pseudorostrum not strongly upturned, pereopods 2 and 3 not widely separated (*Diastylis*) 10

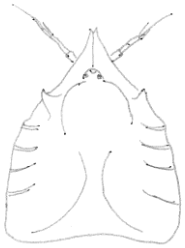
10- Pleopods absent or ,when present, without feathered setae (♀♀ and immature ♂♂) 11

Pleopods present and with long feathered setae (adult ♂♂) 20

11- Carapace with 3-5 vertical folds extends to the posterior half of the carapace and two pairs of strong dorsal spines

Diastylis rugosa





Carapace without distinct folds or with 1-2 indistinct folds in the anterior part of the carapace 12

12- Carapace with a number of large teeth 13

Only small teeth or none on the carapace 14

13- Read three alternatives

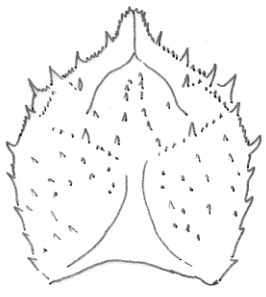
One very prominent pair of teeth and c14 smaller ones on the carapace *Diastylis cornuta*

One prominent pair of teeth and fewer c6 smaller ones on the carapace *Diastylis boecki*

Prominent pair of teeth absent. Carapace divided into polygonal areas by numerous teeth, spines and spinules *Diastylis echinata*

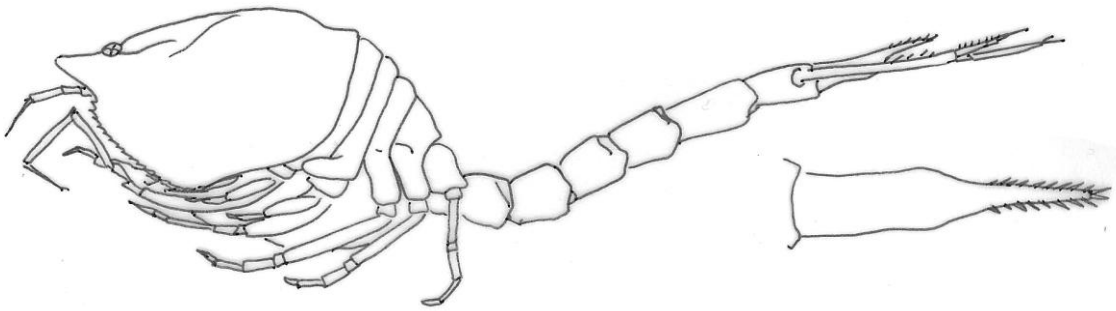
D. cornuta

D. boecki



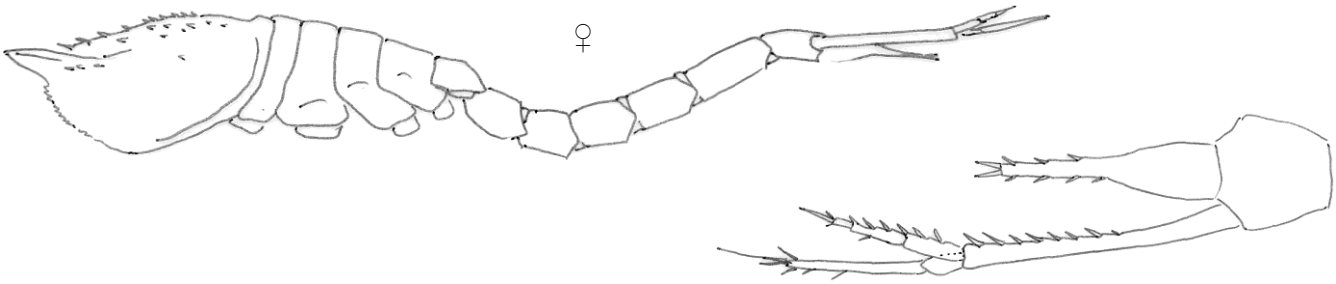
D. echinata

15. The pre-anal part of the telson about as long as the post-anal part *Diastylis tumida*



The pre-anal part of the telson distinctly shorter than the post-anal part 16

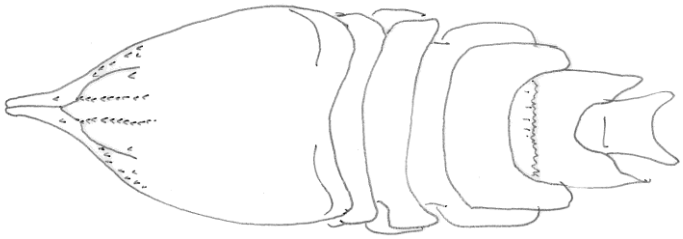
16- Telson with no more than 4 lateral spines on either side *Diastylis lucifera*



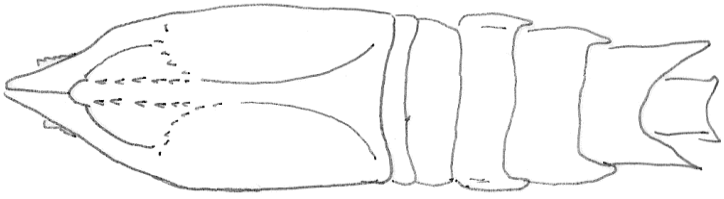
Telson with at least 6 lateral spines on either side 17

17- Two long rows of small teeth on the frontal lobe 18
Where there are teeth on the frontal lobe they are arranged transversely 19

18- Carapace less than one and half as long as broad *Diastylis glabra*
Carapace more than one and half times as long as broad *Diastylis rathkei*



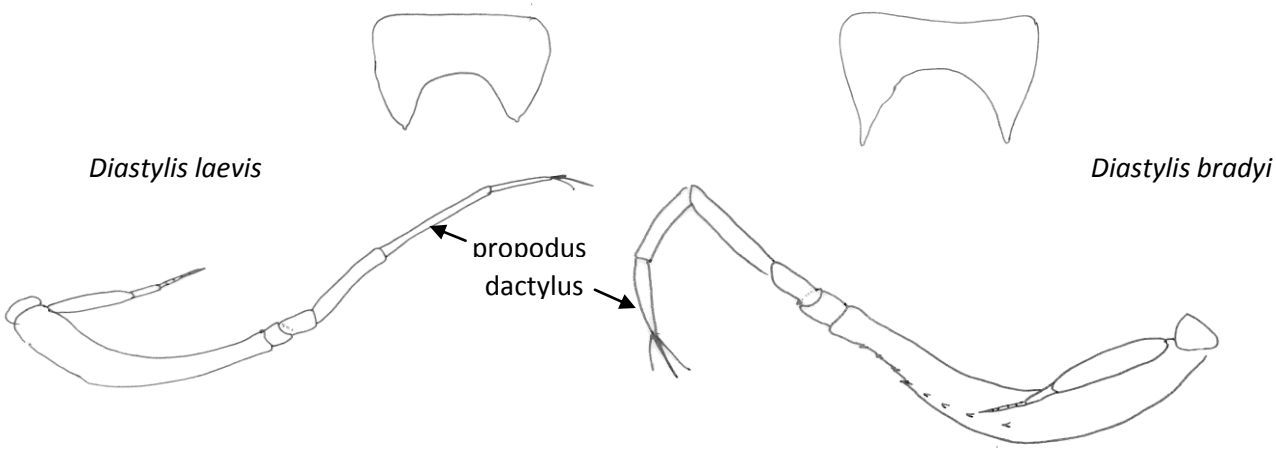
Diastylis glabra



Diastylis rathkei

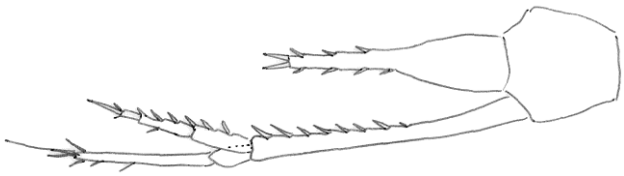
19- Prolongation of the hind end of pereonite 5 ending in a short blunt point. Propodus of pereopod1 about twice as long as dactylus *Diastylis laevis*

Prolongation of hind end of pereonite 5 ending in a long sharp point. Propodus of pereopod 1 much less than twice as long as dactylus *Diastylis bradyi*

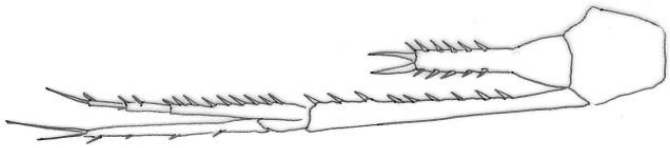


20- No lateral ridges on the carapace 21
Lateral ridges, which may be only faintly defined, present on carapace 22

21- First article of uropod endopod shorter than the other two articles together *Diastylis lucifera*



First article of uropod endopod longer than the other two articles together *Diastyloides serrata*



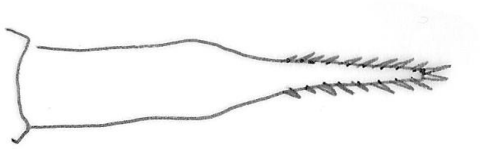
22- No vertical or diagonal ridges nor pseudorostral ridges on the carapace 23
Vertical or diagonal ridges present on carapace, or where absent at least pseudorostral lines present 28

23- Subrostral lines present or the lateral ridges extend to the subrostral margin of the carapace 24
Subrostral lines absent, the lateral ridges not reaching to the subrostral margin of the carapace 27

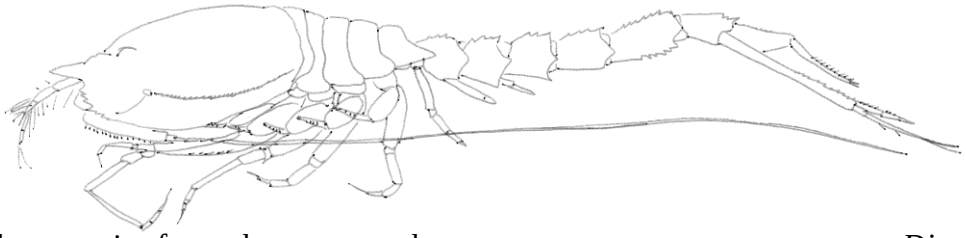
24- No protuberances on the carapace 25
Protuberances present on the carapace in the position where large teeth are present in the females 26

25- Telson with not more than 4 lateral spines, 3 teeth on the frontal lobe *Diastylis lucifera*

Telson with more than 4 lateral spines, no teeth on the frontal lobe
Diastylis tumida



26- 2 pairs of protuberances on the carapace *Diastylis cornuta*



Only one pair of protuberances on the carapace *Diastylis boecki*

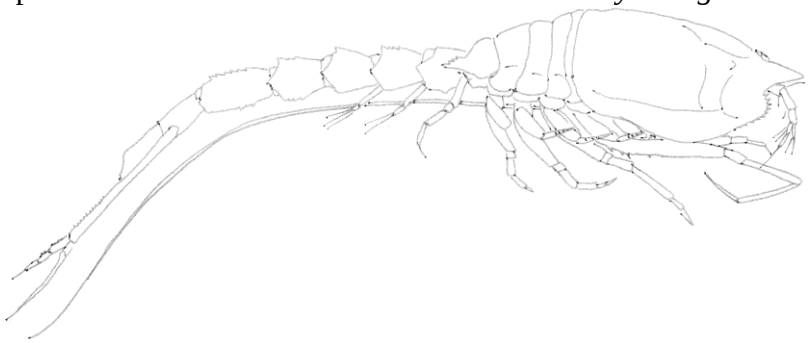
27- Carapace thickly covered with hairs, length over 25mm *Diastylis goodsiri*
Carapace not thickly covered with hairs, length about 8mm *Diastylis lucifera*

28- The pseudorostral lines form an angle broadly open towards the underside, propodus of pereopod 1 about twice as long as dactylus *Diastylis laevis*
The pseudorostral lines run otherwise or absent 29

29- Pereonites 2-4 without depressions in the mid-line 30
Pereonites 2-4 depressed in the mid-line so that two distinct but low keels are formed 32

30- No pseudorostral lines 31
Pseudorostral lines present *Diastylis bradyi*

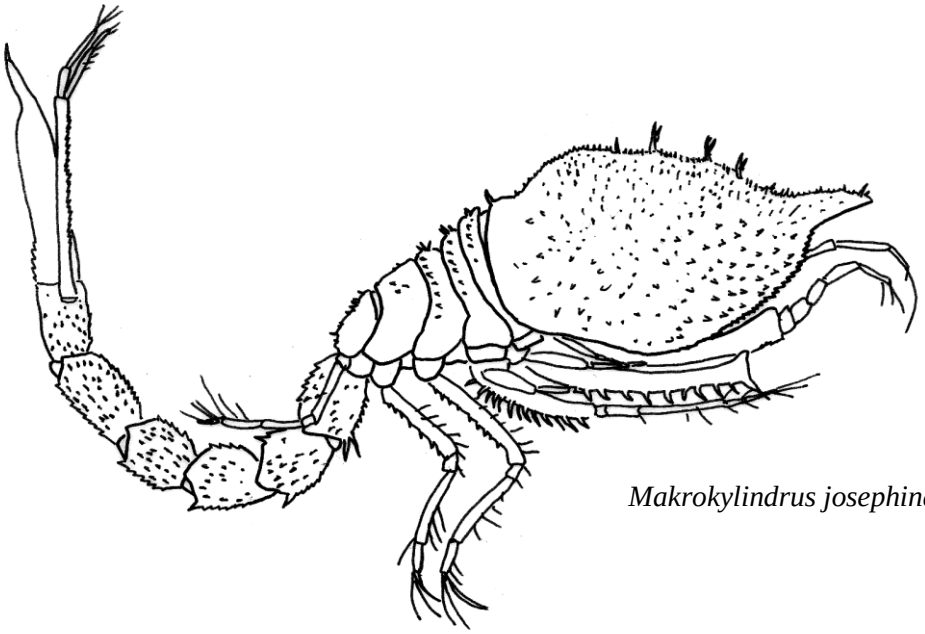
31- 2-3 vertical lines on the carapace *Diastylis rugosa*



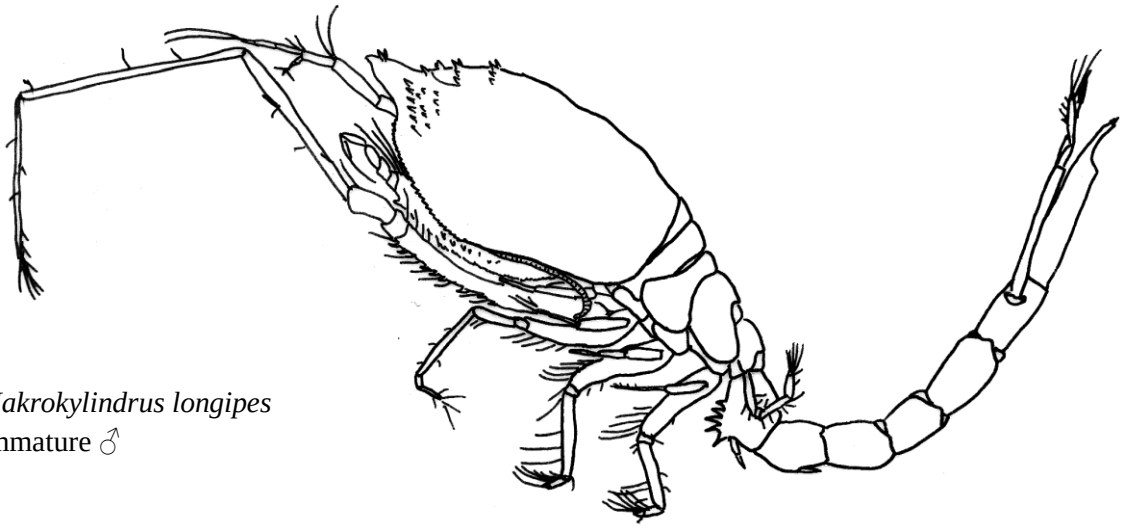
Only 1 oblique line on the carapace *Diastylis boecki*

32- Pseudorostrum short *Diastylis rathkei*
Pseudorostrum long *Diastylis glabra*

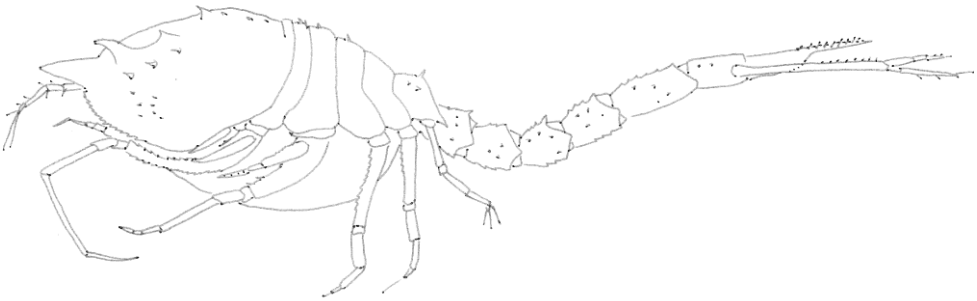
*Key modified from Jones 1957 and 1976



Makrokylindrus josephinae ♀

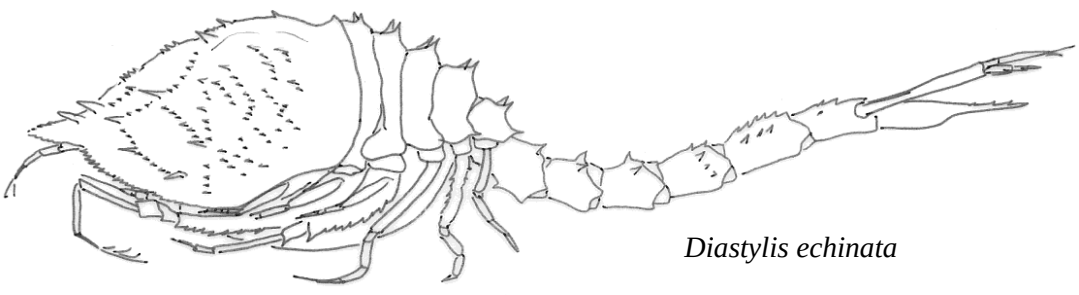


Makrokylindrus longipes
Immature ♂



Diastylis cornuta

Brooding ♀



Diastylis echinata

Brooding ♀

Family: LAMPROPIDAE

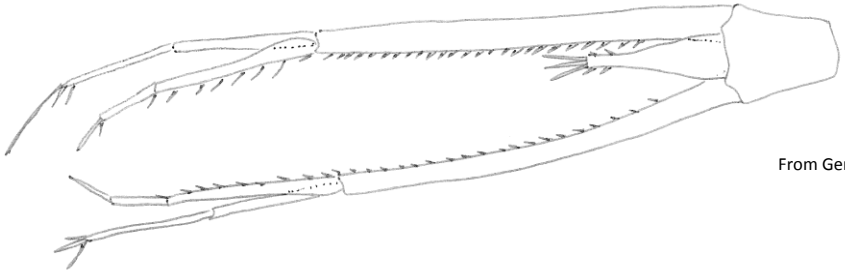
Diagnosis (Day, 1978, Watling and McCann, 1997): Antenna 1 with well developed flagellum. Mandibles boat-shaped. Maxilla 1 palp absent or bearing 1 or 2 setae. Exopods present on maxillipeds 3 and pereopod 1 in both sexes; in female present or rudimentary on pereopods 2-4 or absent from all three; in male exopods present on pereopods 2-4. Pleopods absent or 1-3 pairs in male, with outer process on inner ramus. Telson moderate to large, well developed post-anally, with 3-8 terminal and subterminal spines.

Remarks: The family Lampropidae is clearly distinguished by the presence of at least 3 terminal spines on the telson. The family contains around 100 species in 14 genera and is well represented in the North Atlantic. Of these, *Chalarostylis* Norman, 1879, *Lamprops* Sars, 1863, *Hemilamprops* Sars, 1883, *Mesolamprops* Given, 1964, *Paralamprops* Sars, 1887, and *Platysympus* Stebbing, 1912 are discussed here. The genus *Chalarostylis* is defined by a short telson, a robust first pereopod with a group of long setae on the dactylus, and 3 pairs of pleopods in males. The genera *Lamprops, Hemilamprops* and *Mesolamprops* are very similar; males are readily separated by the absence of pleopods in *Lamprops* versus the presence of three and two pairs of pleopods in *Hemilamprops* and *Mesolamprops* respectively. Ascribing females to genus without reference to the corresponding males is more problematic but, as noted by Haye & Gerken (2005), *Hemilamprops* and *Mesolamprops* both have the basis of the first pereopod much shorter than the rest of the appendage, whereas in *Lamprops* it is equal in length to the rest of the appendage. The genus *Platysympus* is well defined by the strongly flattened carapace with a pronounced marginal carina, the absence of exopods on pereopods 2 to 4 in females and the presence of 3 pairs of pleopods in males. The genus *Paralamprops* is defined by a broad depressed carapace, with a marginal carina, exopods on pereopods 3 to 4 rudimentary or absent in females and the presence of 3 pairs of pleopods in males. Jones (1976) listed 2 species in 2 genera from depths down to 200m, while the present key extends the depth range to the lower slopes down to 500m and contains 13 species in 6 genera.

Chalarostylis elegans Norman, 1879
Hemilamprops assimilis Sars, 1883
Hemilamprops cristatus (G.O. Sars, 1870)
Hemilamprops normani Bonnier, 1896
Hemilamprops pellucidus Zimmer, 1908
Hemilamprops pterini Shalla and Bishop, 2007 Atlantic
Hemilamprops roseus (Norman, 1863)
Hemilamprops uniplicatus (G.O. Sars, 1872)
Mesolamprops denticulatus, Ledoyer, 1983
Mesolamprops hartleyi Shalla and Bishop, 2007
Paralamprops orbicularis (Calman, 1905)
Platysympus typicus (Sars, 1870)
Lamprops fasciata Sars, 1863

Key to the British Species of Lampropidae

1- Telson small, sub equal in length to pleonite 6 and less than half the length of the peduncle of the uropod *Chalarostylis elegans*



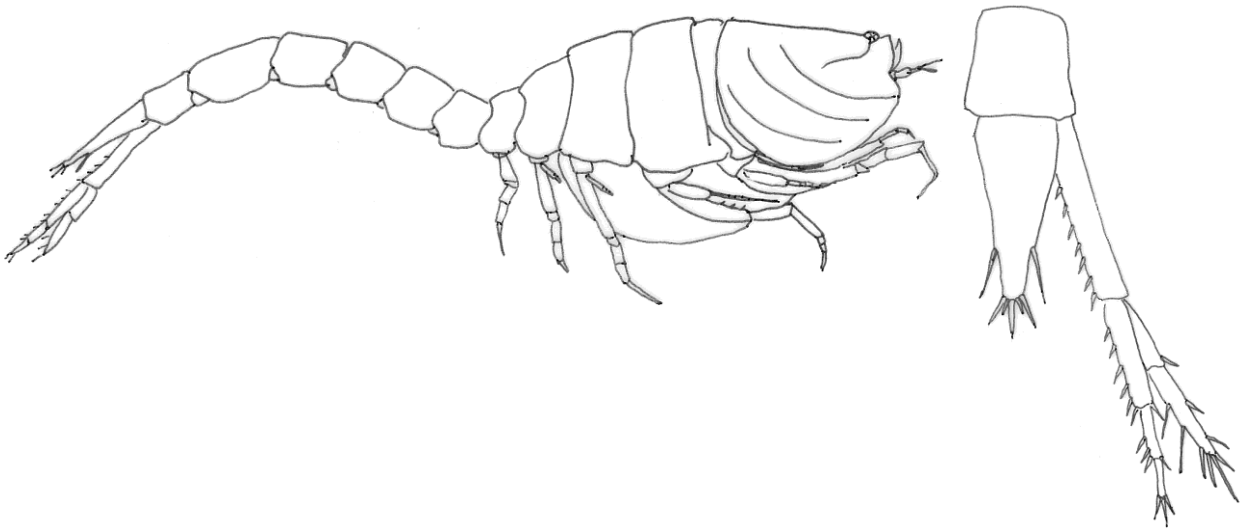
From Gerken and McCarthy (2007)

Telson long, longer than pleonite 6 and more than half the length of the peduncle of the uropod 2

2- Basis of pereopod 4 longer than entire length of pereopod 5. Males with 3 pairs of pleopods *Paralamprops orbicularis*
Basis of pereopod 4 subequal to, or shorter than, entire length of pereopod 5. Males with 0, 2 or 3 pairs of pleopods 3

3- Carapace strongly flattened with a pronounced marginal carina . Males with 3 pairs of pleopods *Platysympus typicus*
Carapace not as above. Males with 0, 2 or 3 pairs of pleopods 4

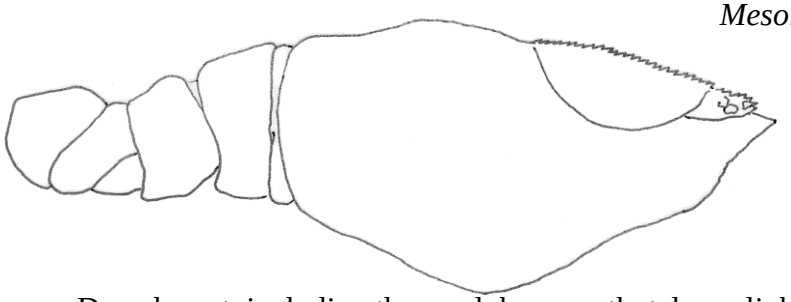
4- Read three alternatives
Male without pleopods, antennal notch small but distinct, eyes present. Basis of pereopod 1 approximately equal in length to the rest of the appendage. Telson with 5 apical spines, the median being the longest. Carapace with 3 oblique folds *Lamprops fasciata*

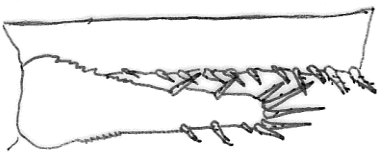


Male with 2 pairs of pleopods, antennal notch present or absent, eyes present or absent. Basis of pereopod 1 shorter than the rest of the appendage, carapace without oblique folds (*Mesolamprops*) 5
Male with 3 pairs of pleopods, antennal notch usually absent, eyes present or absent. Basis of pereopod 1 distinctly shorter than the rest of the appendage, carapace with or without oblique folds (*Hemilamprops*) 6

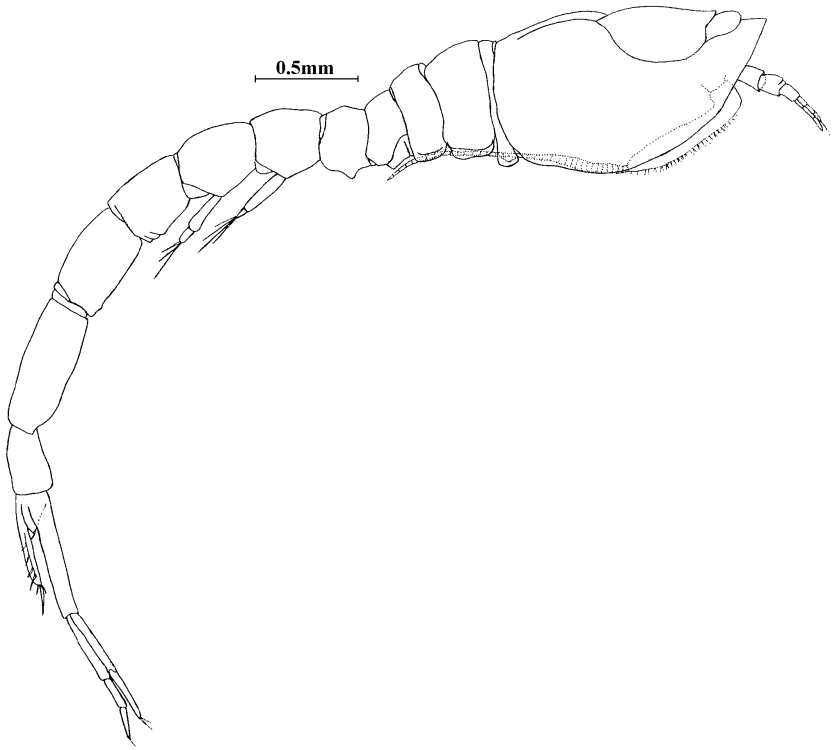
5- Dorsal crest denticulate in the anterior half of carapace including eye lobe. Telson slightly over half but less than three-quarters the length of uropodal peduncle

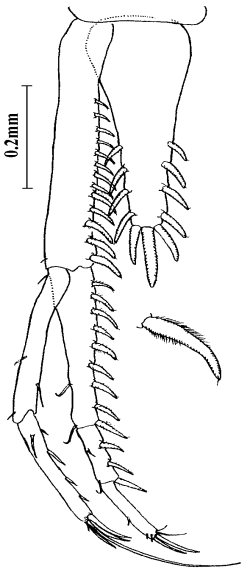
Mesolamprops denticulatus



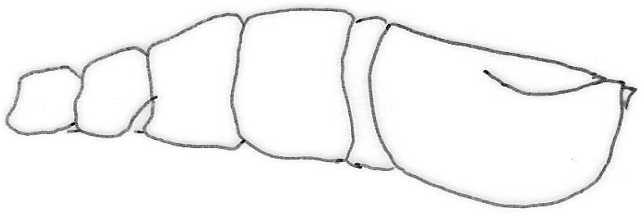


Dorsal crest, including the eye lobe smooth, telson slightly over three-quarters the length of uropodal peduncle *Mesolamprops hartleyi*

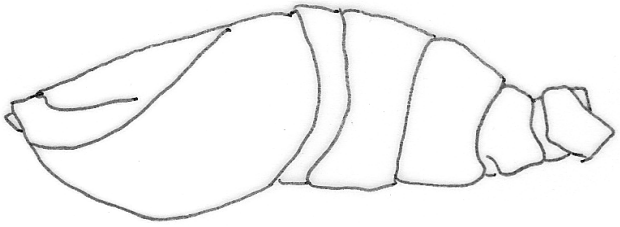




6- Carapace with no lateral folds, telson with three or more apical stout setae 7

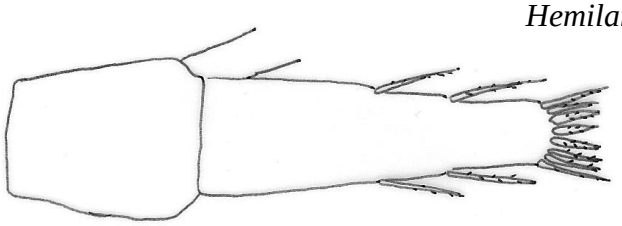


Carapace with lateral folds, telson with three apical stout setae 10

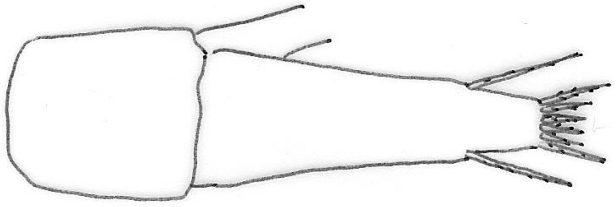


7- Dorsal crest smooth 8
Dorsal crest serrated 9

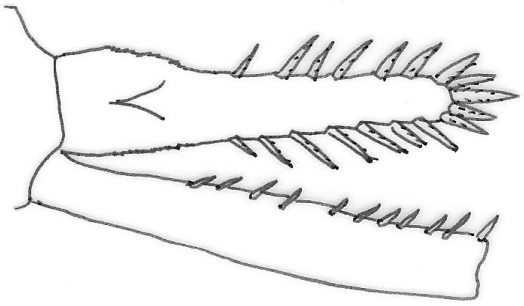
8- Telson with eight apical and two pairs of lateral stout setae
Hemilamprops roseus



Telson with six apical and one pair of lateral stout setae
Hemilamprops assimilis

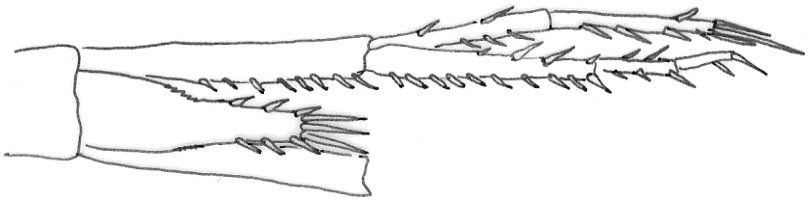


9- Telson with five apical and six pairs of lateral stout setae
Hemilamprops normani

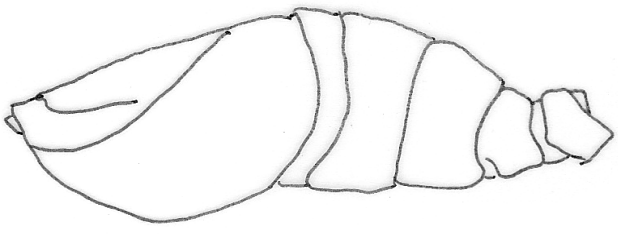


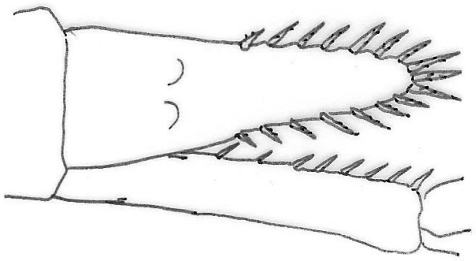
Telson with three apical and seven pairs of lateral stout setae
Hemilamprops pellucidus

Telson with three apical and two to three pairs of lateral stout setae
Hemilamprops cristatus



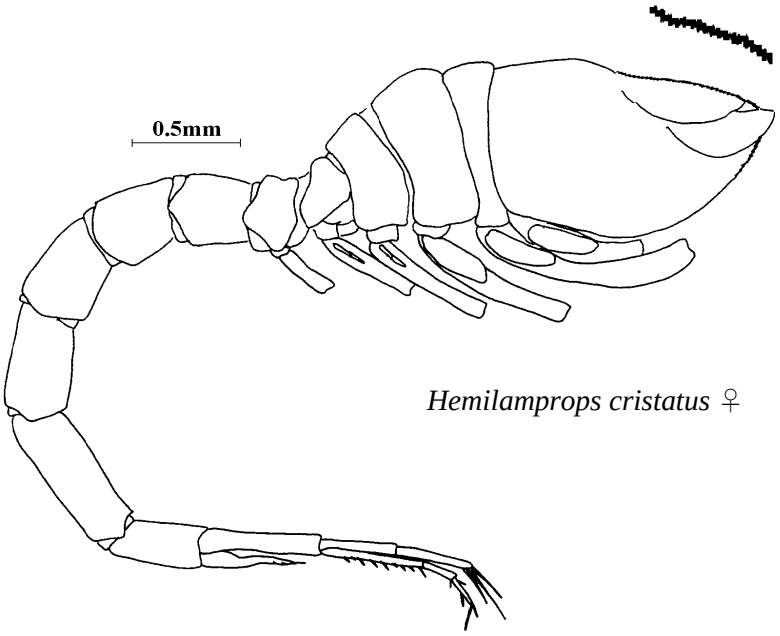
10- Carapace with prominent lateral fold on each side; branchial region not inflated. Telson subequal in length to the peduncle of the uropod, with three apical and five to seven pairs of lateral stout setae *Hemilamprops uniplicatus*





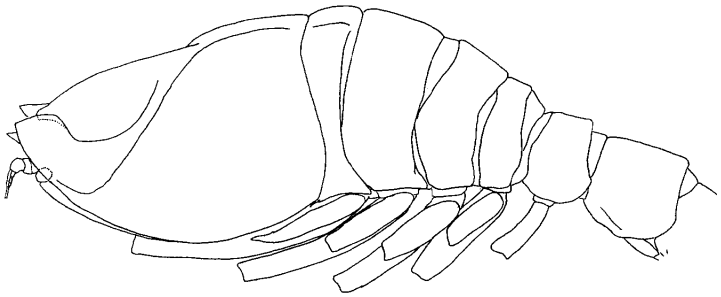
Carapace with relatively inconspicuous lateral folds; branchial region inflated on each side. Telson about three quarters the length of the peduncle of the uropod, with three apical and two to three pairs lateral stout setae 11

11- Dorsal crest including eye lobe, antero-lateral corner of carapace and basal part of telson serrated *Hemilamprops cristatus*



Hemilamprops cristatus ♀

Dorsal crest including eye lobe, antero-lateral corner of carapace and basal part of telson smooth *Hemilamprops pterini*



Family PSEUDOCUMATIDAE

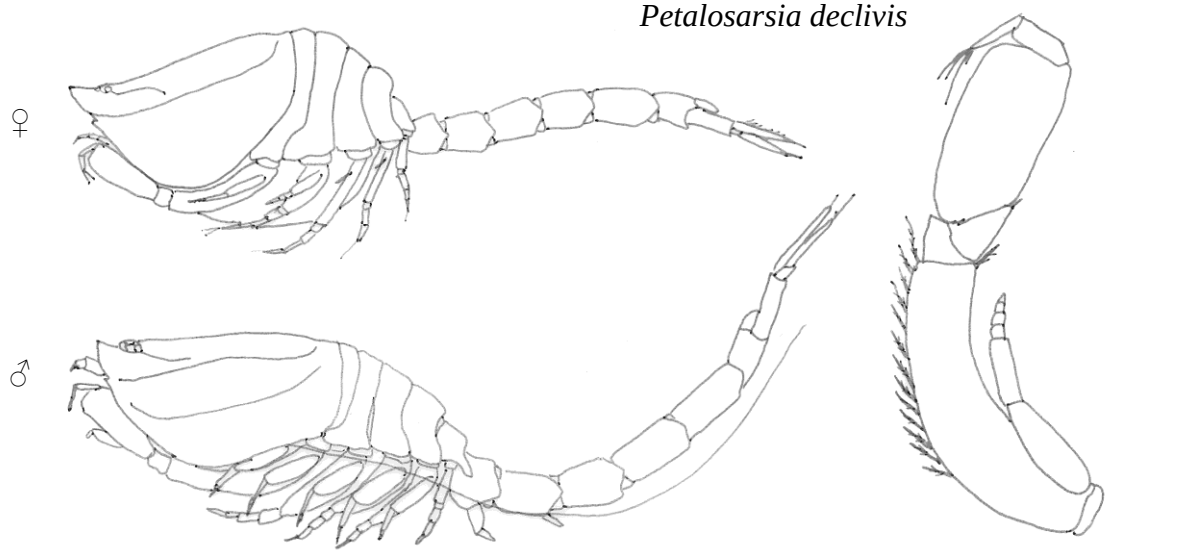
Diagnosis (as emended from Jones, 1976 and McCarthy et al, 2006): Telson present but small. Males with one pair of pleopods or two, the second pair somewhat rudimentary. Pleopods monoramous. Males with exopods well developed on maxilliped 3 and pereopods 1-4. Females with exopods well developed on maxilliped 3 and pereopods 1-2, and rudimentary on pereopods 3-4. The uropodal endopod with a single article.

Remarks: Pseudocumatidae is a small family with only three genera present in British shallow waters. The new genus *Monopseudocuma* was initiated by McCarthy et al (2006) to accommodate *Pseudocuma gilsoni* which differed from the rest of the species in the genus *Pseudocuma* by the following combination: 1 pair of pleopods in the male; pereopod 1 normal, fully developed exopods on pereopods 1-4 in males and 1-2 in females, rudimentary exopods on pereopods 3-4 in females. Antenna 2 in female uni-articulate. Uropods long and slender. Jones (1976) listed 4 species in 2 genera from depths down to 200m, while the present key extends the depth range to the lower slopes down to 500m but has no additions to Jones' Pseudocumatid list.

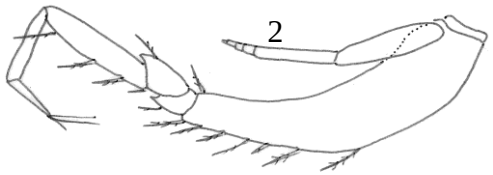
Petalosarsia declivis (Sars, 1865)
Monopseudocuma gilsoni (Gilson, 1906)
Pseudocuma longicornis (Bate, 1858)
Pseudocuma similis Sars, 1900

Key to the British Species of Pseudocumatidae

1- The first pereopod shortened and peculiarly formed with expanded flattened carpus
Petalosarsia declivis



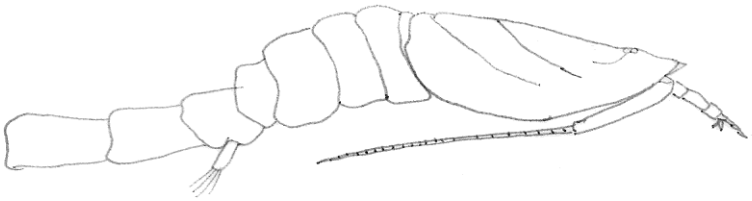
The first pereopod not shortened, of normal shape 2



2- With 1 or 2 pairs of pleopods, exopods well developed on maxilliped 3 and pereopods 1-4 (males) 3

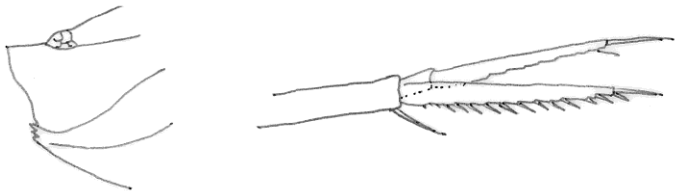
Without pleopods, exopods well developed on maxilliped 3 and pereopods 1 and 2 but rudimentary on pereopods 3 and 4 (females) 5

3- With 1 pair of pleopods. Antenna 2 flagellum extends to the end of pereon, or just beyond. Uropod peduncle with only one inner spine: endopod with 5-7 stout setulose setae and very fine setae in between *Monopseudocuma gilsoni* ♂



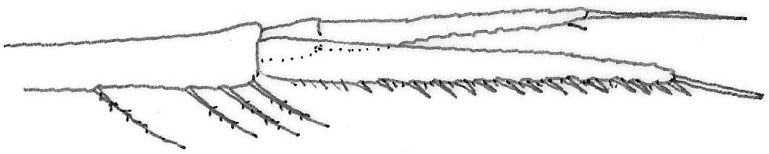
With 2 pairs of pleopods. Antenna 2 flagellum long, extends to at least pleonite 5 4

4- Anterolateral angle of the carapace armed with 3 teeth. Uropod peduncle with 1 simple seta *Pseudocuma similis* ♂



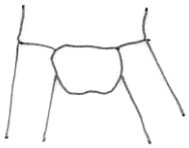
Anterolateral angle without teeth. Uropod peduncle with 4 plumose setae

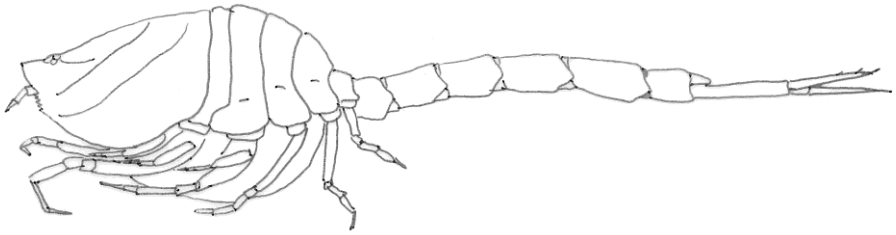
Pseudocuma longicornis ♂



5- Anterolateral angle of the carapace armed with 3 teeth. Telson broader than long, truncate

Pseudocuma similis♀

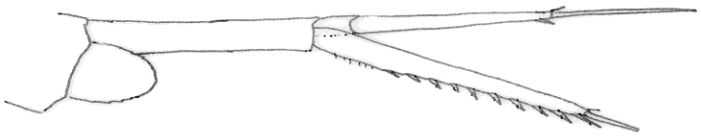




Anterolateral angle without teeth. Telson nearly semi- circular 6

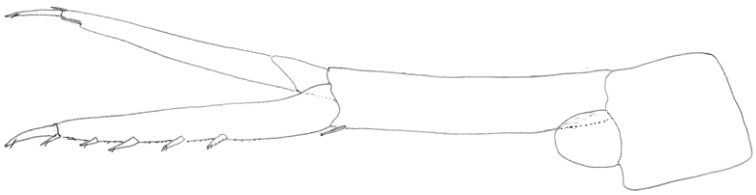
6- Uropod peduncle shorter than endopod. Endopod with 5-10 stout setulose setae

Pseudocuma longicornis♀



Uropod peduncle equal to endopod. Endopod with 3-4 stout setulose setae

Monopseudocuma gilsoni♀



Family BODOTRIIDAE

Diagnosis (emended from Jones, 1976, Watling 1977 and Day, 1978): No articulate telson. Pleopods (males only) with a prolonged process on the outer edge of the inner ramus (Fig. 4), usually 5 pairs, occasionally 2 or 3 pairs. Exopods present on the third maxilliped and at least pereopod 1, but may occur on pereopods in the following combinations: in the male, 4 or 1, occasionally 2 or 3 fully developed pairs, 1 and 2 rudimentary, 2 and 2 rudimentary, or 3 and 1 rudimentary; in the female, 3 or 1, occasionally 2 fully developed pairs, 3 and 1 rudimentary, 2 and 2 rudimentary, 2 and 1 rudimentary, or 1 and 2 rudimentary. The mandibles are not broadened at the base. The number of free thoracic somites is often reduced.

Remarks: The family Bodotriidae is the second most diverse after the family Nannastacidae, reaching its highest diversity in the South West Pacific. The family was divided into two subfamilies, Bodotriinae and Vaunthompsoniinae by Hall (1944) according to the number of exopods on the pereopods. A third subfamily, Mancocumatinae, was established by Watling (1977) on the same bases. The family now contains around 360 species in 33 genera. Jones (1976) listed 11 species in 5 genera from depths down to 200m; the present key extends the depth range to the lower slopes down to 500m and contains 13 species in 7 genera. The two additional species are *Bathycuma brevirostre* (Norman, 1879) recorded from the middle and lower slopes in the AFEN survey but at 205m west of Ireland by Calman (1905) and *Cyclaspis longicaudata* Sars, 1865 recorded from the shelf to lower slopes on both sides of the Atlantic.

Subfamily: Vaunthompsoniinae
Cumopsis goodsiri (v. Beneden, 1861)
Cumopsis longipes (Dohrn, 1869)
Cumopsis fagei Bacescu, 1965
Vaunthompsonia cristata Bate, 1858
Bathycuma brevirostre (Norman, 1879)

Subfamily: Bodotriinae
Bodotria arenosa Goodsir, 1843
Bodotria pulchella (Sars, 1878)
Bodotria scorpioides (Montagu, 1804)
Bodotria armoricana Le Loeuff & Intes, 1977*
Eocuma dollfusi Calman, 1907
Iphinoe tenella Sars, 1878
Iphinoe trispinosa (Goodsir, 1943)
Iphinoe serrata Norman, 1967
Cyclaspis longicaudata Sars, 1865

* Species not in the key but to be considered.

Key to the British Species of Bodotriidae

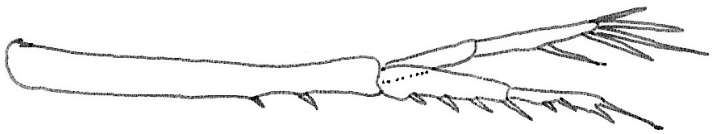
1- Well developed or rudimentary exopods on pereopods 1-3 or 1-4 in the male and 1-3 in the female Vaunthompsoniinae 2
Well developed exopods on pereopod 1 only, in both sexes
Bodotriinae 6

2-Telsonic somite not produced posteriorly, exopods on pereopods 2 and 3 rudimentary 3
Telsonic somite produced posteriorly between the uropods, exopods on pereopods 2 and 3 well developed 5

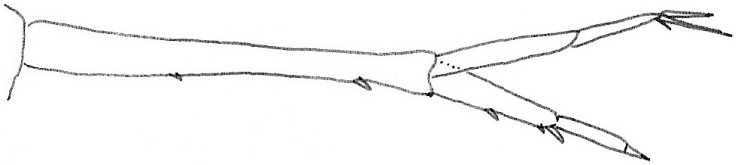
3- Carapace with two pairs of lateral ridges *Cumopsis goodsiri*

Carapace without lateral ridges. 4

4- Distal article of uropodal endopod with one thin apical spine and several lateral spines; first article of uropodal exopod shorter than the second *Cumopsis longipes*

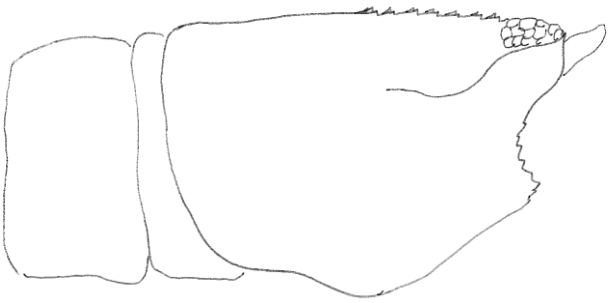


Distal article of uropodal endopod with only one stout spine at the end; first article of uropodal exopod longer than the second *Cumopsis fagei*

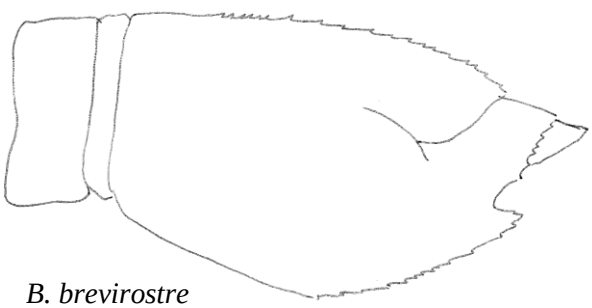


5- Maxilliped 3 with distal end of basis little or not at all produced and with ischium much wider than long. Pseudorostral lobes not reaching beyond ocular lobe, eyes present
Vaunthompsonia cristata

Maxilliped 3 with distal end of basis strongly produced and with ischium as long as wide. Pseudorostral lobes short but reaching beyond ocular lobe, eyes absent
Bathycuma brevirostre



V. cristata



B. brevirostre

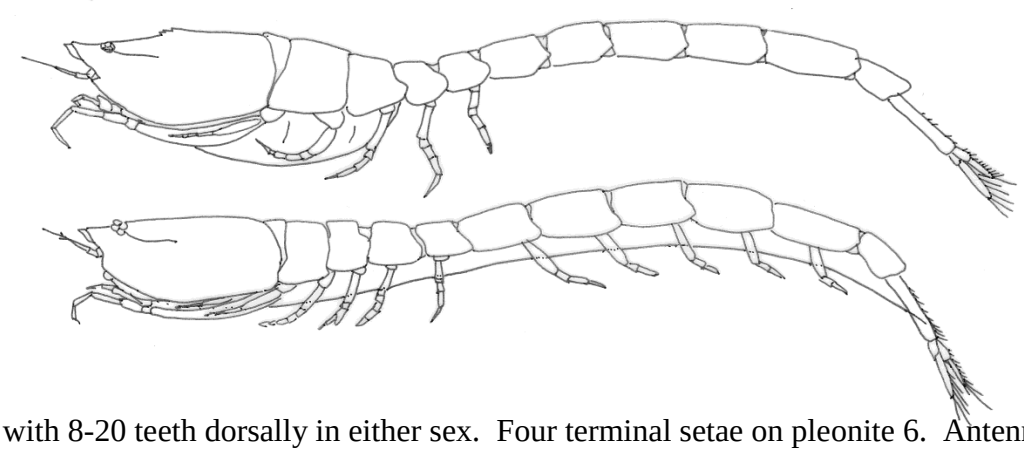
6- Pereon with 5 free somites, pereonite 1 visible from above (*Iphinoe*) 7

Pereon with at most 4 free somites, pereonite 1 hidden from above 9

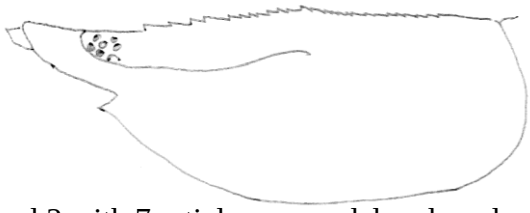
7- Pleonite 6 with 2 or 4 terminal setae. Adult males with a sternal process on pereonite 2 8

Pleonite 6 with 6 terminal setae. Adult males without sternal process *Iphinoe tenella*

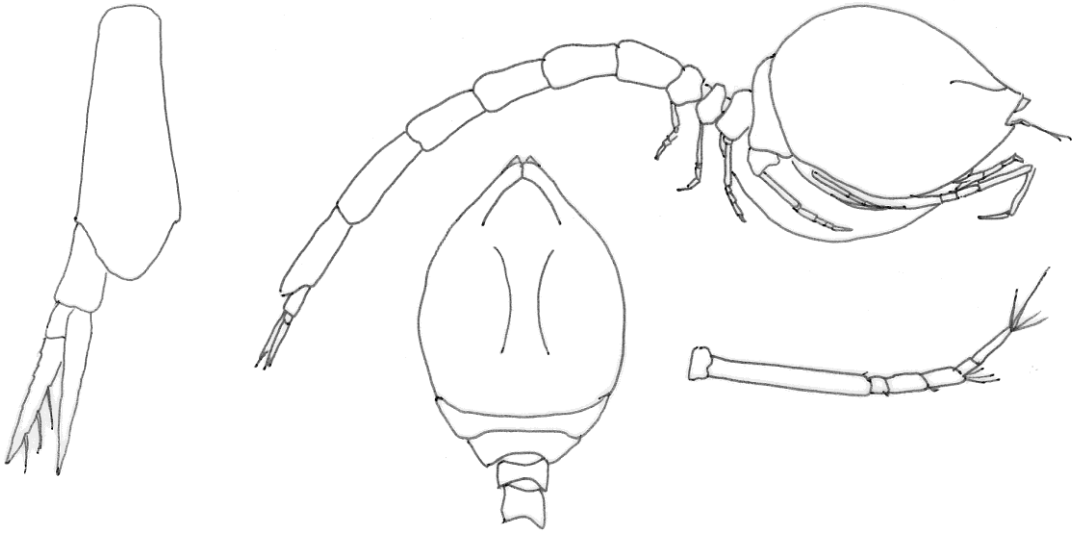
8- Carapace with 2-6 teeth dorsally in the female, unarmed in the male. Two terminal setae on pleonite 6. Antenna 1 with a single aesthetasc *Iphinoe trispinosa*



Carapace with 8-20 teeth dorsally in either sex. Four terminal setae on pleonite 6. Antenna 1 with two aesthetascs *Iphinoe serrata*



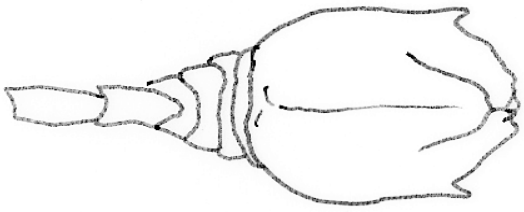
9- Pereopod 2 with 7 articles, uropodal endopod uniarticulate with the terminal spine fused to the article *Cyclaspis longicaudata*



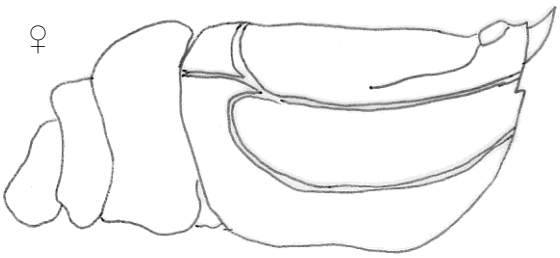
Pereopod 2 with 6 articles (basis and ischium fused), uropodal endopod with 1 or 2 articles and the terminal spine fused or not fused to the article 10

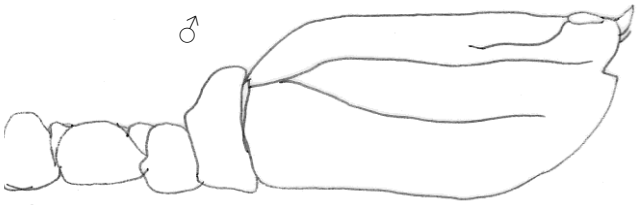
10- Carapace without lateral horns. Peduncle of the uropods much longer than the rami, uropodal endopod with 1 or 2 articles and the terminal spine not fused to the article (*Bodotria*) 11

Carapace with lateral horns. Peduncle of uropods much shorter than the rami, uropodal endopod uniarticulate with the terminal spine fused to the article *Eocuma dollfusi*

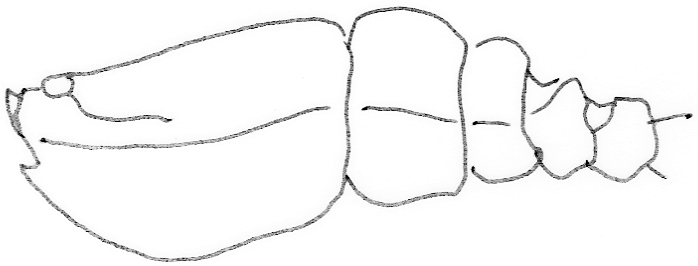


11- Carapace with two carinae on either side *Bodotria pulchella*

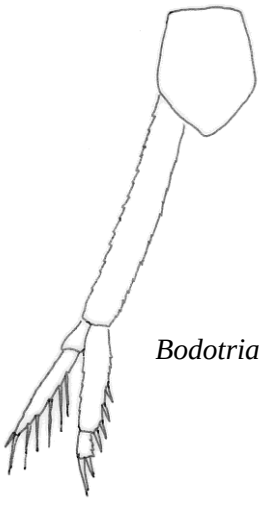




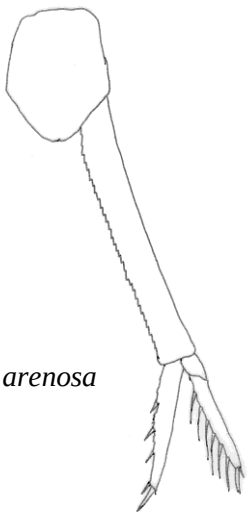
Carapace with a single carina on either side 12



12- Uropodal endopod with two articles *Bodotria scorpioides*
Uropodal endopod with one article *Bodotria arenosa*



Bodotria scorpioides



Bodotria arenosa

Family NANNASTACIDAE

Diagnosis (emended from Jones, 1963 and Watling and McCann, 1997): No articulated telson. No pleopods. Exopods in male usually present on maxilliped 3 and pereopods 1-4, rarely on pereopods 1-2 or 1-3; exopods in female usually present on maxilliped 3 and pereopods 1-2, occasionally absent from maxilliped 3 while present on pereopods1and 2, rarely absent from all appendages. Mandible normal in shape or with the base widened and the molar process styliform. Uropod endopod uniarticulate.

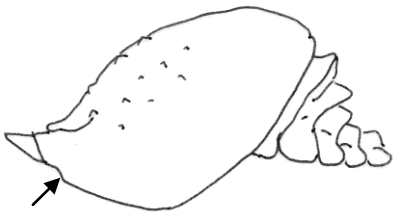
Remarks: The family Nannastacidae contains around 352 species in 19 genera and is well presented in the deep North Atlantic. Jones (1984) described one new genus and 41 new species and listed overall 99 species from depths exceeding 200m throughout the Atlantic. Jones (1976) listed 8 species in 3 genera from depths down to 200m. The present key extends the depth range to the lower slopes down to 500m and contains 17 species in 5 genera.

Procampylaspis armata Bonnier, 1896
Procampylaspis macronyx Hansen, 1920*
Procampylaspis bituberculata Hansen, 1920*
Campylaspis alba Hansen, 1920
Campylaspis affinis Sars, 1870
Campylaspis costata (Sars, 1865)
Campylaspis glabra Sars, 1878
Campylaspis globosa Hansen, 1920
Campylaspis horrida Sars, 1870
Campylaspis intermedia Hansen, 1920
Campylaspis legendrei Fage, 1951
*Campylaspis macrophthalma G O Sars, 1879**
Campylaspis rostrata Calman, 1905
Campylaspis rubicunda (Liljeborg, 1855)
Campylaspis sulcata G O Sars, 1870
Campylaspis verrucosa G O Sars, 1865
Campylaspis undata Sars, 1864
Nannastacus brevicaudatus Calman, 1905
Nannastacus longirostris G O Sars, 1879*
Nannastacus unguiculatus (Bate, 1859)
Cumella (Cumella) pygmaea G.O. Sars, 1865
Cumella decipiens Jones, 1984*
Cumella tarda Hansen, 1920*
Cumella sp.aff polita? Jones, 1984*
Styloptocuma gracillimum (Calman, 1905)
Styloptocuma angustata Jones, 1984*

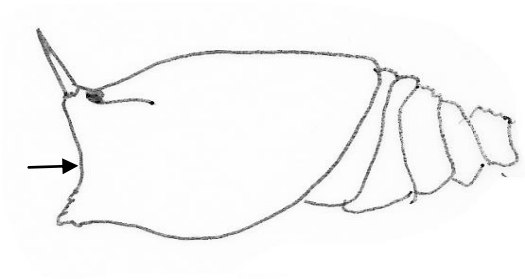
* Species not in the key but to be considered.

Key to the British species of Nannastacidae

1- Molar process of mandible styliform, pointed. Anterolateral angle of carapace absent or only slightly prominent 2

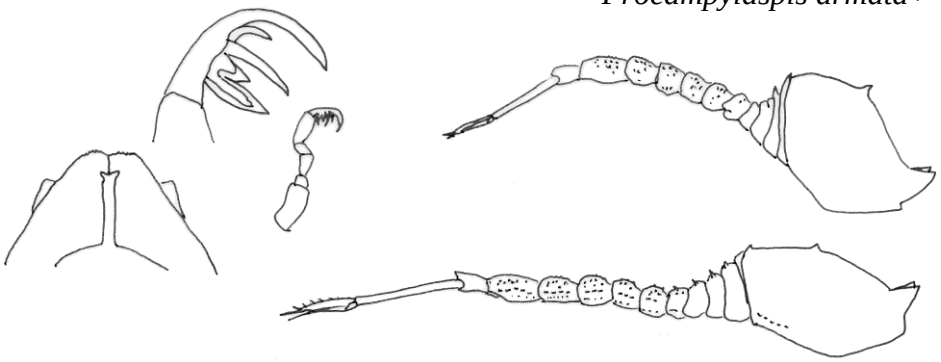


Molar process of mandibles thick and truncate. Carapace of female with well developed anterolateral angle. 15



2- Maxilla 2 with one lobe; maxilliped 2 with the dactyl shaped like a rake; pereopod 1 with ischium long; eyelobe extending almost to the end of the pseudorostrum

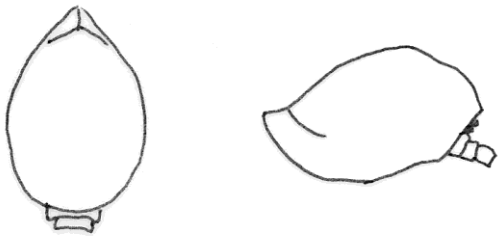
Procampylaspis armata+



Maxilla 2 rudimentary, without lobes; maxilliped 2 dactyl normal; pereopod 1 with ischium not specially long (*Campylaspis*) 3

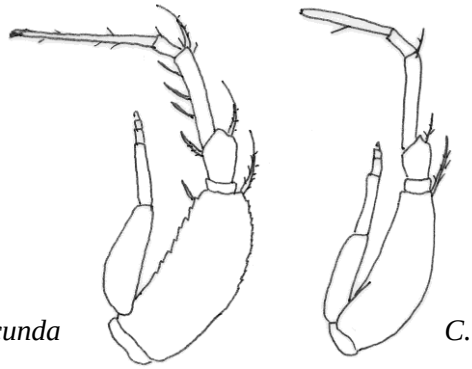
3- Carapace smooth without tubercles, spines, ridges or lateral grooves 4
Carapace with tubercles, spines or ridges or at least a shallow lateral groove 6

4- Eyelobe small and rudimentary *Campylaspis alba*



Eyelobe of normal size 5

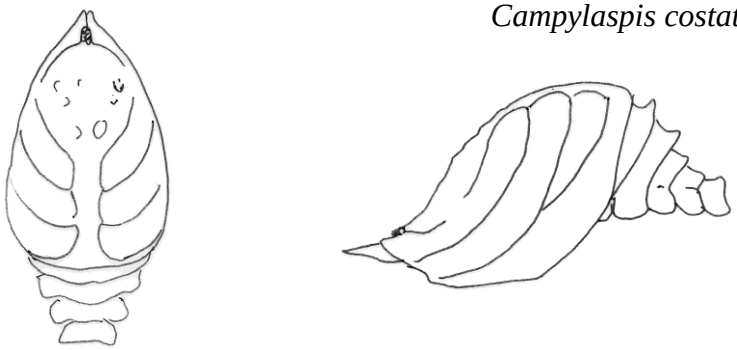
5- Dactyl of pereopod 2 longer than the carpus and propodus together
Campylaspis rubicunda
Dactyl of pereopod 2 not longer than carpus and propodus together
Campylaspis glabra



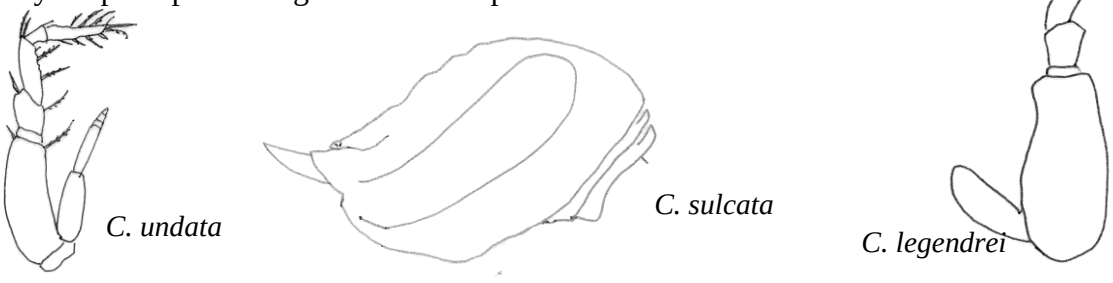
C. rubicunda *C. glabra*

6- Carapace with lateral furrow or ridges, but without tubercles, spines or other large prominences 7
Carapace may or may not have lateral furrow, but with at least a pair of tubercles or many spines or large prominences, which may or may not form lateral ridges 10

7- Two oblique ridges arising anteriorly and extending for greater part of the length of the carapace on either side 8
Three or more oblique ridges extending similarly on the carapace, posterior ridge branched
Campylaspis costata



8- Dactyl of pereopod 2 shorter than the carpus *Campylaspis undata*
Dactyl of pereopod 2 longer than the carpus 9



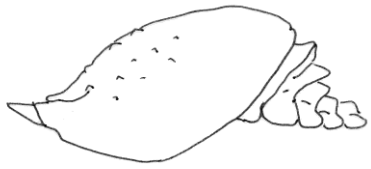
C. undata *C. sulcata* *C. legendrei*

9- Dactyl of pereopod 2 with terminal seta. Carapace with longitudinal depressions each divided into two unequal parts *Campylaspis legendrei*

Dactyl of pereopod 2 with no terminal seta. Carapace with depressions undivided
Campylaspis sulcata

10- Carapace with a few low dorsal protubercles

Campylaspis affinis



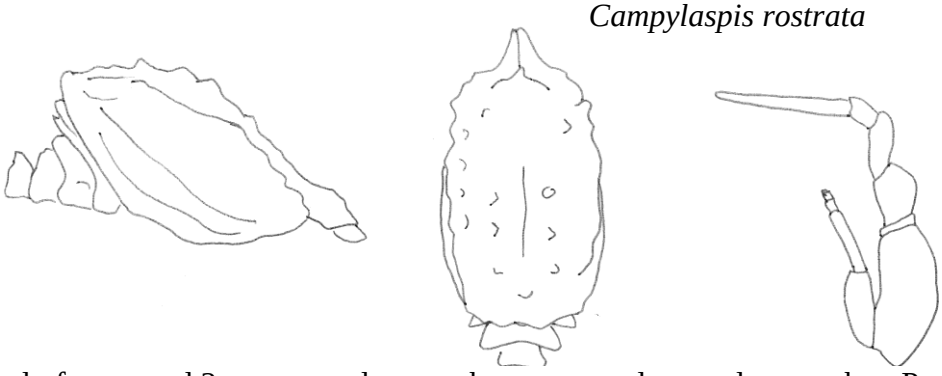
Carapace with many conspicuous tubercles 11

11-Carapace with tuberculate ridges or with some large tubercles situated in distinct rows along the sides 12

Carapace without tuberculate ridges, but low tubercles may be situated along the sides in rows 14

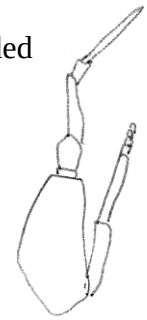
12- Dactyl of pereopod 2 much longer than the carpus and propodus together. Pseudorostrum relatively long and prominent. Carapace with few large tubercles

Campylaspis rostrata



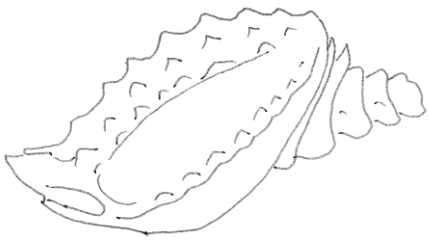
Dactyl of pereopod 2 at most as long as the carpus and propodus together. Pseudorostrum relatively short and not prominent. Carapace with many large tubercles 13

13- Side of carapace with three lateral ridges, the two uppermost bearing large rounded tubercles *Campylaspis intermedia*



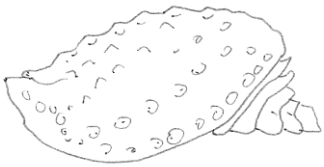
Side of carapace with two lateral ridges, formed of conical tubercles

Campylaspis horrida



14- Merus of maxilliped 3 as long as carpus and propodus together, tubercles on the carapace low and rounded, no depressed area on the side of the carapace

Campylaspis verrucosa

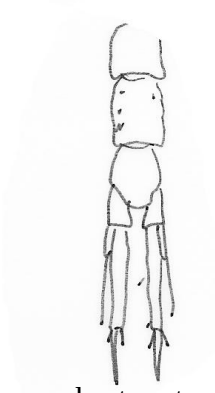


Merus of maxilliped 3 much shorter than carpus and propodus together, tubercles on the carapace low and rounded, depressed area on the side of the carpus present
Campylaspis globosa

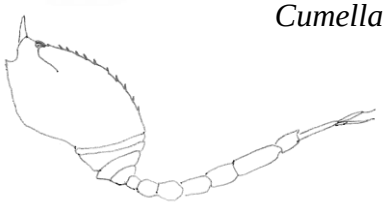
15- Two ocular groups more or less separated (*Nannastacus*) 16

A single median ocular group 17

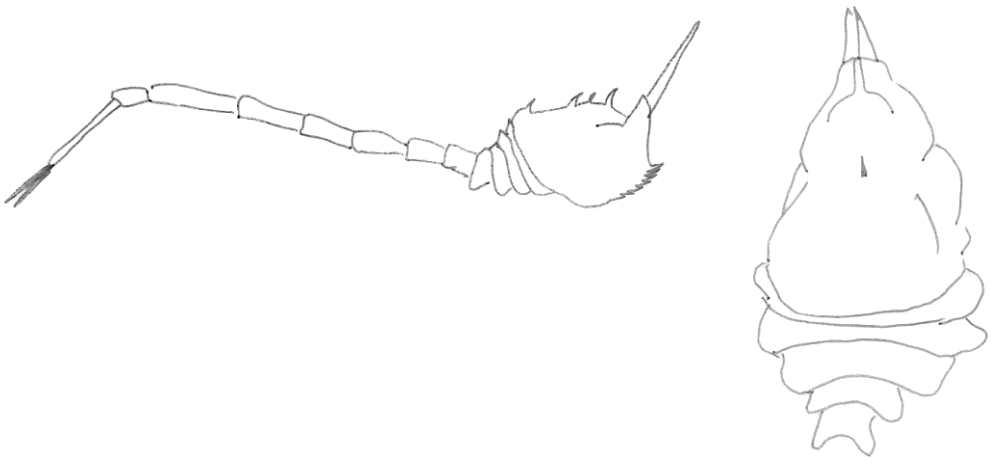
16- Uropods about two-thirds as long as the last two pleonites together
Nannastacus brevicaudatus
Uropods longer than the last two pleonites together
Nannastacus unguiculatus



17- Eye lobe with lenses, narrow, short, not reaching end of pseudorostral lobes
Cumella pygmaea#



Eye lobe without lenses, narrow, generally elongate, reaching to end of pseudorostral lobes or beyond *Styloptocuma gracillimum**



Other species not in the key but to be considered:
+Procampylaspis macronyx Hansen, 1920
+Procampylaspis bituberculata Hansen, 1920
#Cumella decipiens Jones, 1984
#Cumella tarda Hansen, 1920
#Cumella sp.aff polita? Jones, 1984
** Styloptocuma angustata* Jones, 1984

Family LEUCONIDAE

Diagnosis (from Jones, 1976): No free telson. Pleopods without an external process on the inner ramus, 2 pairs, rarely 1 or 0, in male. In the male, exopods present on the third maxillipeds and on the first four pairs of pereopods, rarely the first two pairs; in the female exopods present on the first three pairs, rarely the first two pairs. The mandibles are broadened at the base. The endopod of the uropod with two articles or rarely uniarticulate. All the pereon somites are visible from above.

Remarks: The Leuconidae is one of the earliest-recognised cumacean families, established by Sars (1878). Leuconidae is a very diverse family, containing 121 species in 16 genera. Jones (1976) listed 4 species in 3 genera from depth down to 200m. The present key extends the depth range to the lower slopes down to 500m with the addition of only one extra species. The additional species is *Leucon* (*Crymoleucon*) *noerrevangi* Watling and Gerken (1999), which was recorded from the west of Shetland at 434m deep. The family has a deep-sea affinity worldwide. The genus *Eudorella* needs revision.

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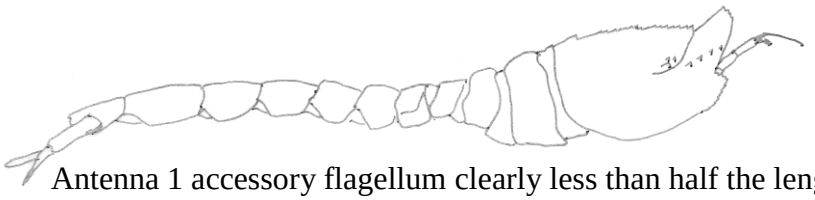
Leucon (*Crymoleucon*) *noerrevangi* Watling and Gerken (1999)
Leucon (Leucon) nasica (Krøyer, 1841)
Leucon acutirostris G O Sars, 1864*
Eudorellopsis deformis (Krøyer, 1846)
Eudorella emarginata (Krøyer, 1846)
Eudorella truncatula (Bate, 1856)
Eudorella species A (Bate, 1856)*

* Species not in the key but to be considered.

Key to the British Species of Leuconidae

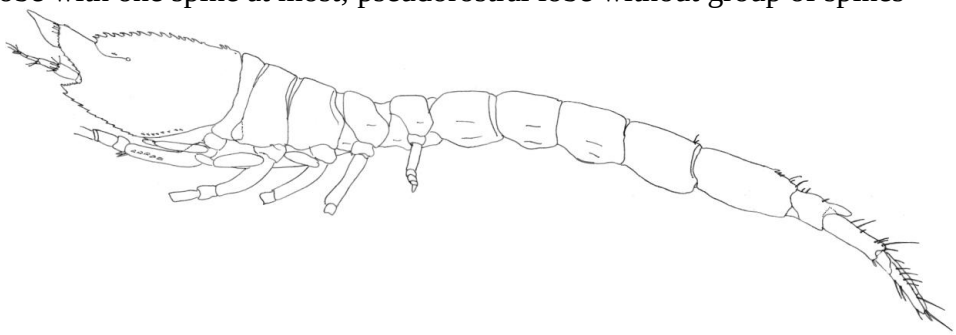
1- Efferent orifice anterior or anterodorsal 2
Efferent orifice distinctly dorsal, pseudodorsal lobes directed dorsally 3

2- Antenna 1 accessory flagellum extending at least to midlength of main flagellum first article; frontal lobe with lateral group of spines; pseudorostral lobe with group of spines
Leucon (*Crymoleucon*) *noerrevangi*

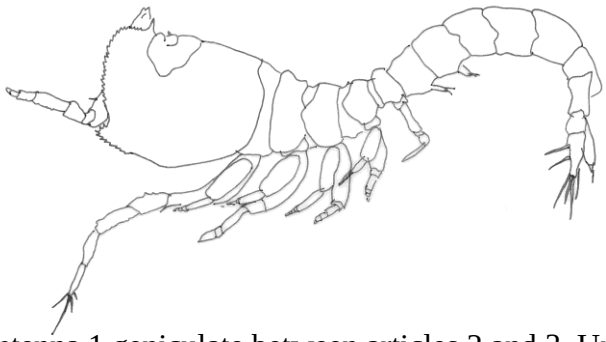


From Watling and Gerken (1999)

Antenna 1 accessory flagellum clearly less than half the length of main flagellum first article; frontal lobe with one spine at most; pseudorostral lobe without group of spines

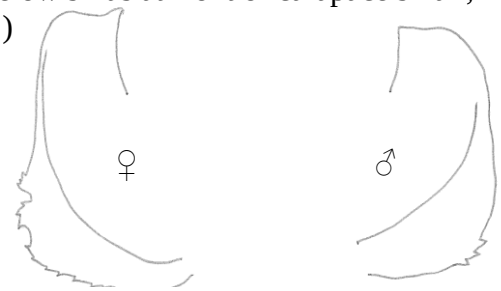


3- Antenna 1 geniculate between articles 1 and 2. Uropod endopod shorter than exopod
Eudorellopsis deformis



Antenna 1 geniculate between articles 2 and 3. Uropod endopod longer than exopod 4

4- Tooth below sinus at front of carapace small, not projecting beyond upper teeth (applies best to ♀♀)
Eudorella truncatula



Tooth below sinus large, projecting beyond the upper teeth (applies best to ♀♀)
Eudorella emarginaia