

**TAXONOMY OF THE LYSIANASSOIDEA OF THE NORTHEAST
ATLANTIC AND MEDITERRANEAN: AN INTERACTIVE
IDENTIFICATION KEY AND STUDIES ON PROBLEMATIC
GROUPS.**

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PhD Thesis



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ABSTRACT

A DELTA (DEscriptive Language for TAXonomy) database was constructed for 135 species of lysianassoid amphipods of the Northeast Atlantic and Mediterranean Sea, representing almost 20% of the total estimated number of amphipod species from this region. The database utilised 97 characters to output an illustrated, interactive species-level identification key to the taxon. This is presented in electronic format on the accompanying CD. Generally, images were copied from literature sources after formal copyright permission had been obtained. However, in many cases it was necessary to illustrate specimens, as adequate images could not be found in the literature. In some cases scanning electron micrographs were taken of some of the surface and sensory structures of the animals. These are also presented in the key. The key will be published on the amphipod website www.amphipoda.com, and the crustacean website www.crustacea.net. Also generated by DELTA was an associated descriptive monograph for each species. This is also presented electronically, as well as in a supplemental volume accompanying the thesis. In addition, details of new species records for Irish waters are given. Among these is a new species, *Tryphosella lowryi*, which is described, and this genus in the British Isles is reviewed. Another new record for the area is *Orchomenella crenata*, and this is re-established as a valid species. Finally the genera *Normanion* and *Sophrosyne* in the north Atlantic were recognised as particularly problematic and are here revised.

1 INTRODUCTION

1.1 General Introduction

The Lysianassoidea are a large superfamily of marine gammaridean Amphipoda (Crustacea). In the Northeast Atlantic and Mediterranean, they constitute almost 20% of the total estimated number of amphipod taxa. They are, therefore, an important part of marine ecosystems. Scavenging members of the taxon play a particularly important role in nutrient recycling. However, species-level identification within the group is difficult, due in some part to the large size of the taxon, but also because of the poorly-detailed original descriptions and illustrations of some species. Consequently, there are many problems in the systematics of the group. A revision of these problematic taxa is necessary to avoid contributing to the existing problems, and to ensure the accuracy of their identification. Species-level identification is a fundamental part of biological studies, including, amongst other things, biodiversity investigations, environmental impact assessments, and investigations into ecosystem functioning. Accuracy is, therefore, highly important. Species are generally identified with the aid of identification keys. These are specialised tools, compiled by taxonomists with considerable expertise on particular taxa. Interactive identification keys to some other amphipod taxa of the Northeast Atlantic and Mediterranean are already in existence on the amphipod website (www.amphipoda.com), however, no such identification guide exists for the Lysianassoidea of the same region. The aim of this thesis is, thus, two-fold — firstly, to recognise and revise problematic taxa within the Lysianassoidea, and secondly to create an illustrated, interactive key to all lysianassoid species within the Northeast Atlantic and Mediterranean.

1.2 Introduction to the Amphipoda (Crustacea)

Subphylum CRUSTACEA Brünnich, 1772

Class MALACOSTRACA Latreille, 1802

Subclass EUMALACOSTRACA Grobben, 1892

Superorder PERACARIDA Calman, 1904

Order AMPHIPODA Latreille, 1816

Amphipods are a group of small- to medium-sized crustaceans that have diversified in pelagic and benthic habitats of mostly marine, but also freshwater and, to a lesser

extent, terrestrial, environments of the world (Bousfield, 1978). Described to date are more than 6300 species (Gruner, 1993), however, extrapolation of rates of new species descriptions yields an estimate of more than 25,000 species worldwide (Bousfield, 1978).

The Amphipoda have one of the most disappointing fossil records of any of the Malacostraca. The earliest known amphipod, which is morphologically similar to modern gammarideans, is of the genus *Palaeogammarus* from the Baltic amber of the Late Eocene-Early Oligocene (Schram, 1986). Other peracarids such as mysids, tanaids, cumaceans and isopods, on the other hand, have fossil records extending back as far as the Triassic, Permian and Carboniferous (Bousfield, 1978). Thus, amphipods are generally thought to have evolved relatively recently. Because of this supposed young age of the group, and their high species richness, amphipods are often thought of as 'explosive speciators' (Watling, 1981). However, many authors have hypothesised an earlier origin for the Amphipoda. Bousfield and Shih (1994), for example, suggest a late Palaeozoic origin for the Amphipoda, with most superfamily groups emerging since the mid-Mesozoic. Watling (1981) also considers that the Amphipoda must be at least as old as the Mysidacea, i.e. from the Triassic.

The classification of the Order Amphipoda above follows that of Martin & Davis (2001). Adult malacostracans have the following features in common: the head bears five pairs of appendages; the body is composed of a thorax of eight somites and an abdomen of six (rarely seven) somites and a telson; the pereopod endopod is developed into the walking leg; and the posterior part of the foregut is differentiated into anterior chewing and posterior filtering parts (Watling, 1981). The Peracarida may be further distinguished from other members of the Malacostraca by having the first thoracic segment incorporated into the head, a mandible consisting of a crushing molar, biting incisor, lacinia mobilis and setal row, and by having eggs and young carried in a brood pouch (Watling, 1981). Finally, amongst the peracaridans, the Amphipoda are separated by a combination of the following characters: carapace absent; eyes sessile; thorax with seven pairs of uniramous limbs, legs 1–4 oriented posteriorly, 5–7 oriented anteriorly; abdomen with segments 1–3 bearing biramous, multi-articulate, swimming legs and segments 4–6 with more robust biramous, 1- or 2-articulate appendages (Lincoln, 1979).

The Amphipoda may be further divided into four suborders — the Gammaridea, Hyperiidea, Corophiidea and the Ingolfiellidea. Of these the gammarideans, to which the lysianassoids belong, are the most dominant.

1.3 Introduction to the Gammaridea

All gammaridean amphipods follow the same general body plan as outlined below. It is the variation and slight differences in the body outline and appendages that provide valuable characters of taxonomic significance for separating the group into its assorted families, genera and species.

The amphipod body may be divided into three main parts — the cephalothorax (so-called as the first pereonal segment is fused with the true head), the pereon (i.e. thorax) and the pleon (i.e. abdomen) (fig. 1.1).

Two pairs of antennae and the mouthparts are incorporated on the cephalothorax. The first antenna, termed antenna 1, has a peduncle of 3 articles and a multi-articulate flagellum. It is usually a bi-articulate structure comprised of the main antenna and a smaller accessory flagellum. The second antenna, antenna 2, had a 5-articulate peduncle and a multi-articulate flagellum. The upper and lower lips, mandible, maxillae 1 and 2, and the maxilliped together comprise the mouthparts (fig. 1.2).

The pereon contains 7 segments, each with its own pair of legs — the pereopods (of which the first 2 pairs are usually termed gnathopods). In the live animal, there is a gradual shift in orientation from gnathopod 1 to pereopod 7, with the greatest shift in orientation between pereopods 4–5, to the extent of about 90°. This opposing orientation of amphipod pereopods enables them to grasp (Steele, 1988). Each of these appendages is comprised of 7 segments — the coxal plate, the basis, ischium, merus, carpus, propodus and the dactylus (figs 1.3a–b). Attached to the inner base of the first of these segments (i.e. the coxal plate) are the respiratory organs, the coxal gills or the branchiae.

Finally, the pleon (fig. 1.3c) may be further subdivided into the pleosome and urosome, each consisting of 3 segments with associated appendages. A pair of biramous swimming legs, known as pleopods, are found on each segment of the pleosome. Although swimming is their primary function, they also function to aerate the gills and, in the female, to ventilate the marsupium (Lincoln, 1979). The urosome

contains 3 pairs of uropods and the telson (figs 1.3c–e). The uropods are bi-articulate and (in most cases) biramous appendages, the first two pairs of which provide the animal with a grip on the substratum (Lincoln, 1979). The third pair has various functions depending on the lifestyle of the animal. For example, in swimming species, it is thought to act as a kind of rudder. In domicolous fauna, by contrast, they are used to anchor the animal in its tube. The posteriorly located telson covers the anus. The exact function of this appendage is unclear, but is thought to vary depending on its morphology. Like the third uropod, a cleft telson is thought to act as a type of rudder for the animal, whereas an entire telson armed with apical hooks may be more anchor-like.

Within the Gammaridea, there are numerous superfamily groups which are currently under revision by Myers & Lowry. The Lysianassoidea are one of the largest of these superfamily groups.

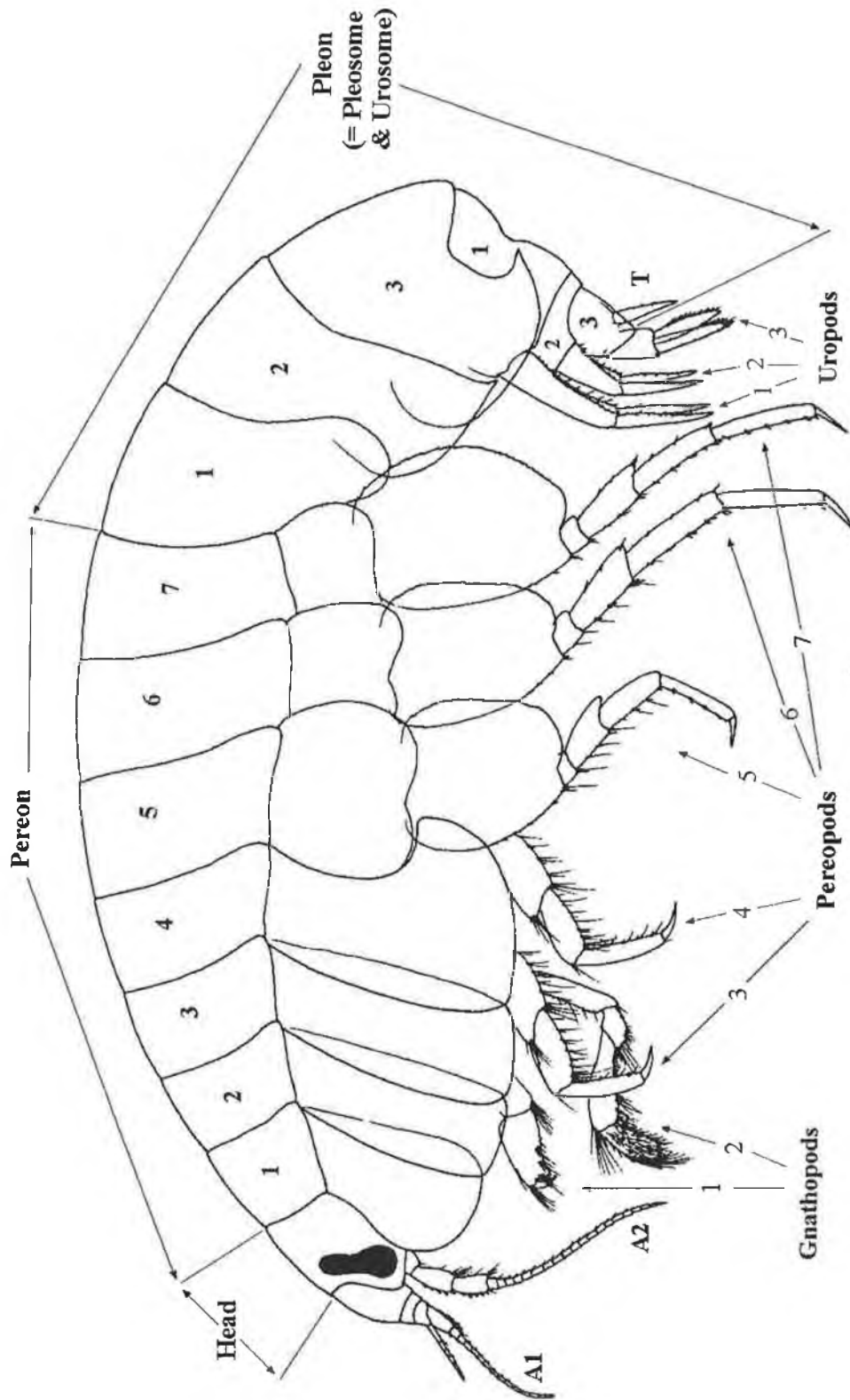


Figure 1.1: General external body morphology of a typical amphipod. (A = antenna; T = Telson). [Illustration by Diviacco & Ruffo, 1989].

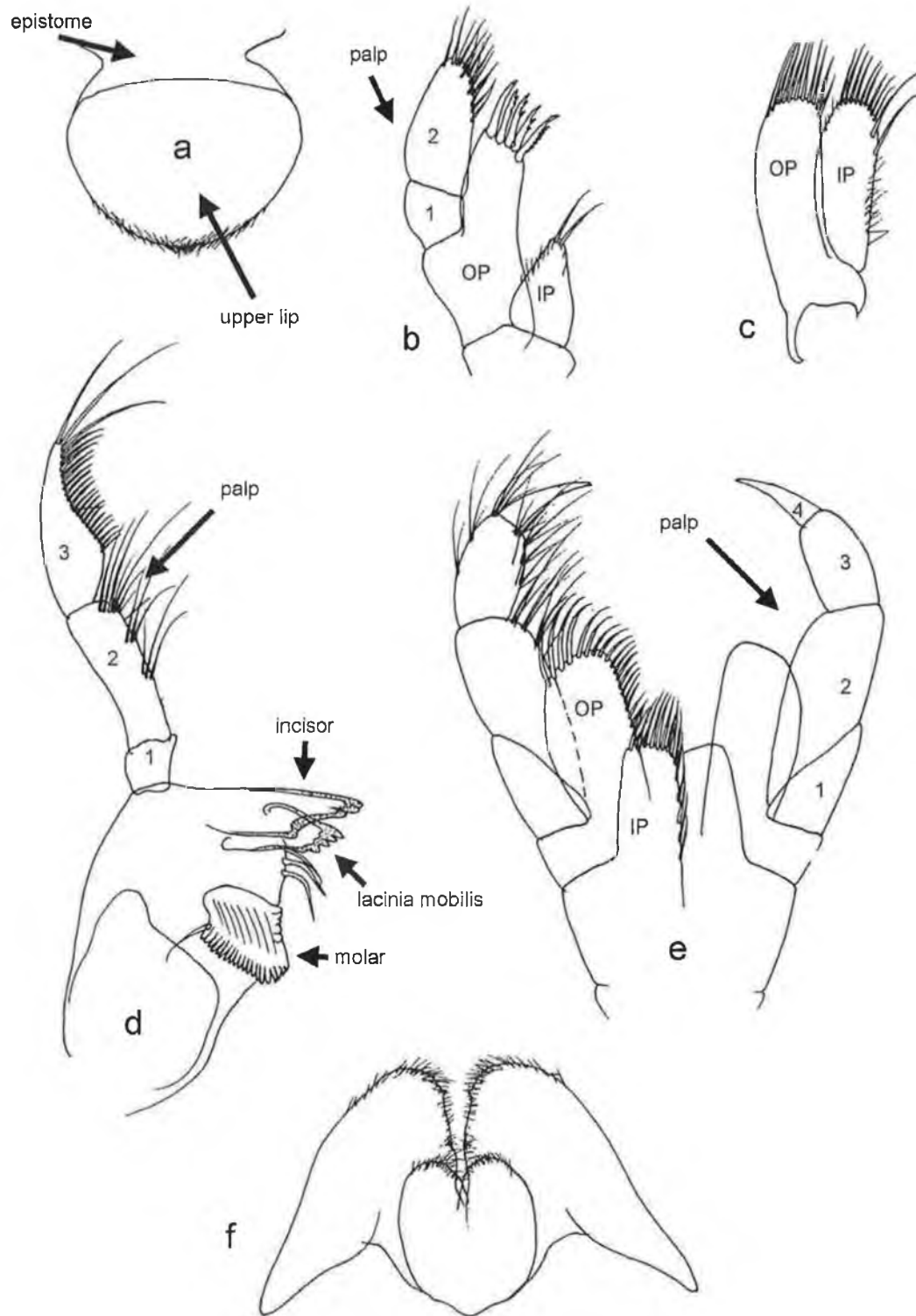


Figure 1.2: Typical amphipod mouthparts. (a) Upper lip; (b) maxilla 1; (c) maxilla 2; (d) mandible; (e) maxilliped; (f) lower lip. IP = inner plate, OP = outer plate. [Illustrations by Lincoln, 1979].

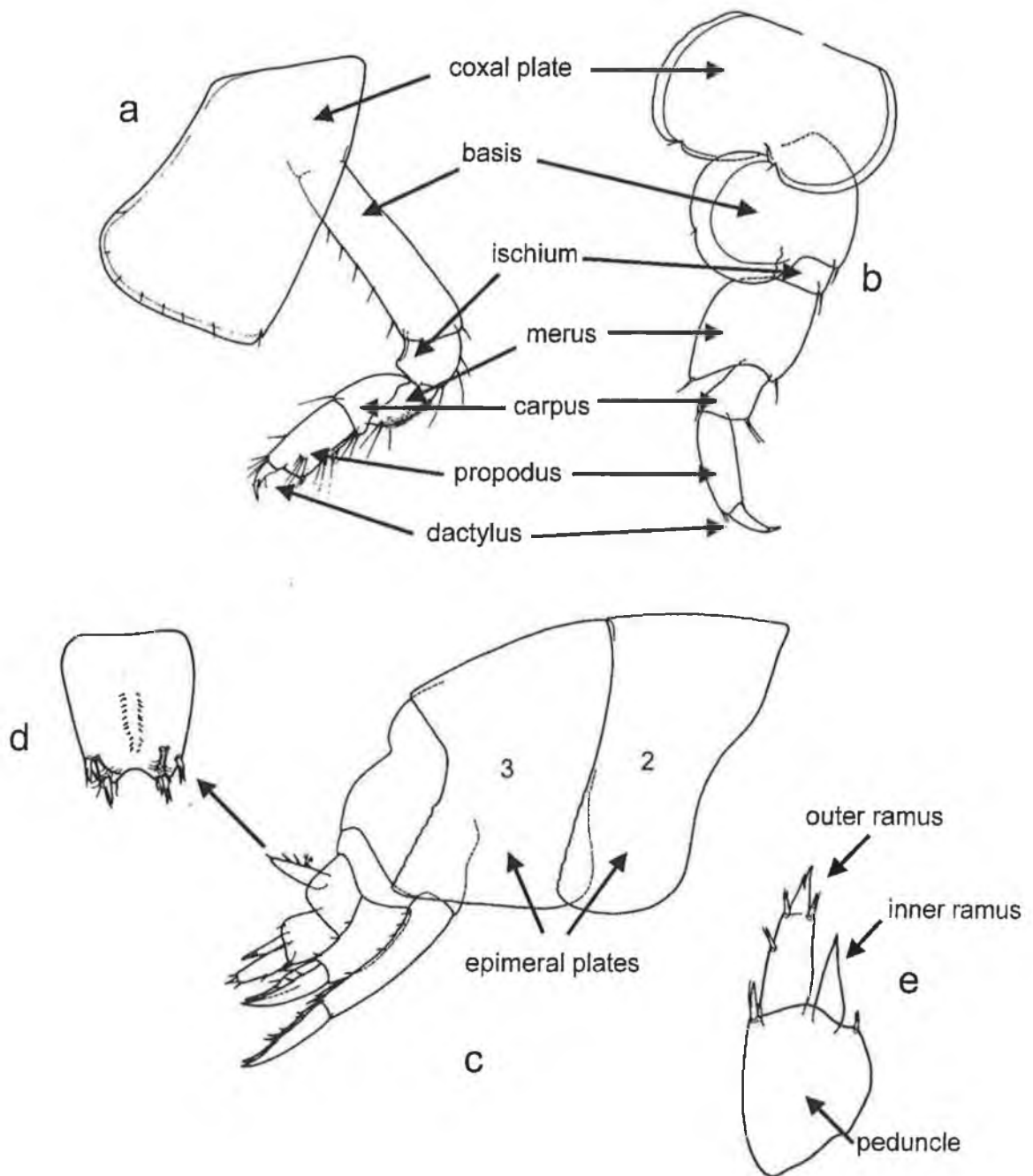


Figure 1.3: Amphipod morphology. (a) gnathopod 1; (b) pereopod 5; (c) pleon; (d) telson; (e) uropod 3. [Illustrations by Diviacco & Ruffo, 1989].

1.4 Introduction to the Lysianassoidea

1.4.1 Systematics

The superfamily Lysianassoidea has a long taxonomic history, beginning in 1849 when J.D. Dana erected the family Lysianassidae. Since that time, due largely to the efforts of early authors like Chevreux, Stebbing, Sars, and Stephensen, amongst others, the number of new species described and designated to the group has proliferated. When Stebbing (1906) revised the family, he included 50 genera. By 1963 a further 64 had been added (Hurley, 1963), most of which are still considered valid. At this stage it was recognised that the family Lysianassidae formed certain natural groupings, and attempts were made to divide the taxon according to these. Dahl (1959), for example, acknowledged the existence of distinct 'Alicella' and 'Scopelocheirus' groups, while Barnard (1961) refers to an 'Ambasiid' group. Hurley (1963) was the first to formalise such groupings by establishing the subfamilies Lysianassinae and Uristidinae (which was subsequently raised to family level by Lowry and Stoddart (1992)). After the introduction of the superfamily concept for gammaridean amphipods by Bousfield (1978; 1983) the family Lysianassidae was elevated to superfamily position (i.e. Lysianassoidea). Consequently, many of what were previously recognised as 'natural groupings' were now thought of as individual families within the superfamily. Attempts to produce a formalised taxonomic classification of these component families are still ongoing, with much work already completed by Lowry & Stoddart (e.g. Lowry & Stoddart, 1983; 1992; 1995; 1997; 2002a; 2002b) (see table 1.1). Characters such as the arrangement of the setal seeth on the maxilla 1, the form of the mandible molar, and the chelation of the 1st gnathopod, are fundamental in this re-structuring (e.g. Lowry and Stoddart, 1990; 1992), and are defining characteristics of many family groups.

Currently the superfamily contains over 150 genera comprising more than 800 species worldwide, with new species regularly being described. The group is one of the largest taxa in the suborder Gammaridea (Takekawa *et al.*, 2004).

Table 1.1: Families and informal groups within the superfamily Lysianassoidea of the northeast Atlantic.

<u>SUPERFAMILY LYSIANASSOIDEA</u>	
AMBASIID GROUP	LYSIANASSIDAE Dana, 1949
ARISTIIDAE Lowry & Stoddart, 1997	Subfamily LYSIANASSINAE Hurley, 1963
CEBOCARID GROUP	Subfamily TRYPHOSINAE Lowry & Stoddart, 1997
CYPHOCARIDIDAE Lowry & Stoddart, 1997	1997
ENDEVOURIDAE Lowry & Stoddart, 1997	OPISIDAE Lowry & Stoddart, 1995
EURYTHENEIDAE Stoddart & Lowry, 2004	PACHYNID GROUP
HIRONDELLEID GROUP	PODOPRIONIDAE Lowry & Stoddart, 1996
KERGUELENEID GROUP	SCOPELOCHEIRIDAE Lowry & Stoddart, 1997
	URISTIDAE Hurley, 1963
	TRISCHIZOSTOMATIDAE Lilljeborg, 1865

1.4.2 Description of the superfamily Lysianassoidea

Within this group there is an enormous variation of taxonomically important characters (Lincoln, 1979), thus making the seemingly distinctive Lysianassoidea very difficult to define morphologically when all genera are considered (Lowry, 2001). However, in general, the lysianassoid-type body form is easily recognisable.

Diagnosis: (modified from Barnard & Karaman, 1991):

Body smooth and stout; antenna 1 robust, peduncle articles 2–3 generally much shorter than article 1 and telescoped basally; accessory flagellum typically well developed; antenna 2 slender, may show sexual dimorphism; mandibular incisor lacking teeth in most genera; tendency towards the reduction of the right lacinia mobilis; molar variable; maxilliped palp 3– to 4–articulate, but may form 1–articulate ‘shield’ in some genera; coxal plates usually large but some may be reduced; gnathopod 1 simple, subchelate or chelate; gnathopod 2 characteristically long and slender, ischium always elongate, usually longer than propodus, carpus longer than or subequal to propodus, propodus ‘mitten’-shaped, palm minute, dactylus generally minute but may be well developed in some species; pereopods 3–4 typically slender; uropods usually biramous; telson may be entire, emarginate, cleft, but rarely absent.

Type genus: *Lysianassa* Milne Edwards, 1830

1.4.3 Ecology and life history

The superfamily Lysianassoidea (Crustacea, Amphipoda) is the largest of all gammaridean taxa (Barnard, 1969; Takekawa *et al.*, 2004). Lysianassoids are strictly marine amphipods, and are an abundant and diverse component of many marine environments, occurring from the littoral down to the hadal zone. They are apparently most successful in cold water, though their importance at lower latitudes is being increasingly recognised (Lowry & Stoddart, 1997). Most gammaridean amphipod families are strictly benthic in habitat, but the large and abyssally important lysianassoids are both pelagic and benthic (Barnard, 1961). They are numerous at all depths in all oceans, and while some are predatory, parasitic, or commensal, the overwhelming majority are scavengers, taking freshly killed or wounded animals (Steele, 1983). These scavenging lysianassoids, therefore, play a highly important role in the recycling of nutrients within the marine realm.

Of all the Amphipoda, the species most specialised for a scavenging lifestyle are encountered among the Lysianassoidea (Bellan-Santini, 1998). Thus, they are readily captured in baited traps. In fact, according to Dahl (1979), apart from more or less accidental findings by Chevreux (1900, 1935), all deep-sea amphipods caught in baited traps belong to the superfamily Lysianassoidea. However, according to Sainte-Marie & Lamarche (1985), the importance of carrion in the diets of various lysianassoid species may have been overemphasized because of this spectacular response to bait. Gut content analysis of *Anonyx* spp., for example, have revealed significant amounts of detritus in the diet, particularly in the smaller species of the genus (Sainte-Marie & Lamarche, 1985). Ontogenetic dietary shifts have been reported for some species, with juveniles frequently relying, either exclusively or supplementarily, on detritus. In a study of the scavenging *Tmetonyx similis*, Kaim-Malka (2005) noted that the first juvenile stages were not captured in baited traps, leading him to conclude that the diet of juveniles of this species is probably different from that of the adults. Sainte-Marie & Lamarche (1985) found that detritus is more abundant in the guts of small individuals of both large and small *Anonyx* spp., possibly indicating a heavier reliance of juveniles on detritus.

Most lysianassoids are generally regarded as generalist scavengers, however, some species show preferences towards, or are specialists of, selected food items. *Orchomenella nana*, for example, was shown to be significantly more attracted to crab carrion than to either fish or scampi (*Nephrops* sp.) (Moore & Wong, 1995a).

Aroui setosus is known to be a specialist scavenger of spatangoid echinoids, with *Scopelocheirus* species also exhibiting a preference for these (Lowry & Stoddart, 1989).

Among the non-scavenging lysianassoids, there are a number of genera known to be commensal or parasitic on fishes and marine invertebrates. Sars (1890-95) collected *Normanion* species 'clinging to living and dead fishes taken on long lines'. *Opisa eschrichtii*, has also been found on gadoid fish, and is considered an obligate fish associate (Vader & Romppainen, 1985). *Trischizostoma raschi* is more host-specific than either *Normanion* or *Opisa*, and is associated with the Velvet Belly shark (*Etmopterus spinax*). *Trischizostoma nicaeense* is also a fish ectoparasite, albeit of lower host-specificity, while two other *Trischizostoma* species from South Africa are parasitic on sponges (Vader & Romppainen, 1985). *Acidostoma* species appear to have mouthparts that adapted for sucking (Dahl, 1964), and are ectoparasitic on sea anemones (Diviacco & Ruffo, 1989).

Nocturnal activity of scavenging lysianassoid amphipods, particularly those populations inhabiting shallow waters, has been reported by a number of authors. Moore & Wong (1995b) found that only baited traps deployed overnight attracted *Orchomenella nana* in shallow water (5–6 m), while in deeper water (25–85 m) activity of the species was not confined to the night time, although trapping of amphipods was infrequent during the day. Takekawa *et al.* (2004) found similar results from Onagawa Bay, northeastern Japan. Two *Anonyx* species, *A. omorii*, and *A. abei* were caught only at night. *Scopelocheirus onagawae* adults were also only caught during the night, though some juveniles were trapped during daylight hours. Their experiments were carried out at 30 m. Ingólfsson & Agnarsson (1999) noted that *Anonyx sarsi* Steele & Brunel is primarily a nocturnal feeder in the intertidal, and is common during the winter (in their sampling area), but no specimens were trapped at all during the summer months June–August. They attribute this temporal activity to the significant light levels during the night at the high latitudes where their work was carried out (Reykjavik), and remark that although Sainte-Marie (1986) found that *A. sarsi* was attracted to bait both during the night and day, in summer, and at depths of 3.5–5 m, he was working at a much lower latitude. The larger individuals in his samples were more attracted to traps during the night. These findings are consistent, according to Moore & Wong (1995b), with the view that benthic and epibenthic crustaceans in shallow water tend to be night-active for predator avoidance, whereas

in progressively deeper water peak activity may shift from the night time to daylight hours. Takekawa *et al.* (2004) agreed with this view and added that the appearance of juveniles during the day in their study may suggest that feeding takes precedence over predator avoidance for the juveniles of some species.

Some studies have shown that ovigerous females of many lysianassoid species are not attracted to baited traps (Thurston, 1979; Bregazzi, 1972; Moore, 1994; Hessler *et al.*, 1978; Sainte-Marie & Lamarche, 1985; Takekawa *et al.*, 2004). In general, this appears to be dependent on the breeding strategy of the females. Broadly speaking, brooding females of semelparous species (i.e. those species that produce only one large brood during their lives) are not captured in baited traps, while those of iteroparous species (i.e. species which produce a number of small broods throughout their lives) remain receptive to odour and may generally be captured (Sainte-Marie & Lamarche, 1985). It is, therefore, thought to be maladaptive for females of semelparous species to expose themselves and their brood to predation or cannibalism, which can occur in dense feeding aggregations. In the case of iteroparous species, the energy gained from carrion feeding (which may eventually result in increased fecundity) may outweigh the risks involved (Hessler *et al.*, 1978; Thurston 1979; Sainte-Marie & Lamarche, 1985).

1.4.4 Functional morphology and ecological adaptations within scavenging lysianassoids

Within the scavenging lysianassoids, many of the body appendages have become modified to suit this lifestyle. Many of these modifications are highly significant from a systematic viewpoint, for example modifications to the mouthparts are routinely used as diagnostic characters to separate species, genera and even families. Dahl (1979) reports that organisms that utilize a scavenging feeding strategy require a number of very important adaptations. Firstly is the ability to localise and recognise potential food; secondly, the ability to feed on large and muscular food items; and, finally, the ability to consume large quantities of food within short time periods, (Dahl, 1979). Many lysianassoids have evolved all three. In fact, in the deep-sea carrion feeders, such morphological adaptations have evolved independently at least twice (Dahl, 1979).

Ingram & Hessler (1983) recognised two foraging patterns among deep-sea lysianassoids. Members of the 'pelagic guild' seek carrion odour plumes in the

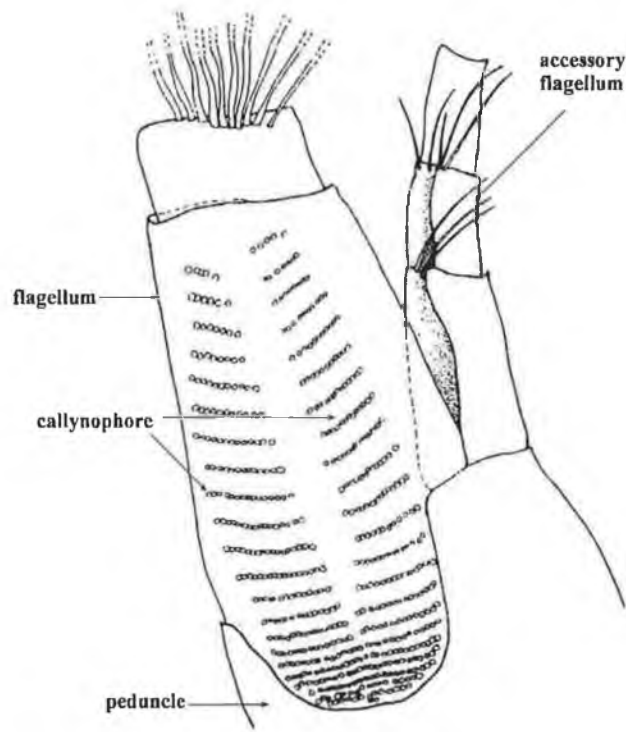
benthic boundary layer, many metres above the bottom, from where they are attracted to large pieces of carrion. Species of the 'demersal guild' forage within 1 m of the bottom, and are presumed to be less efficient at detecting odour plumes emanating from distant carrion, consequently relying on a more general food regime, including detritus (Ingram & Hessler, 1983; Sainte-Marie, 1984). In a study of the morphological adaptations of four shallow-water lysianassoid species, Sainte-Marie (1984) suggested that these occupy either one of two near-shore niches equivalent to those of the deep-sea pelagic and demersal guilds respectively.

1.4.4.1 Chemosensory activity

As amphipods are still attracted to bait after 24 hours (Hessler *et al.*, 1978; Thurston, 1979) it would seem that chemosensory, as oppose to mechanical, stimulation is the most likely method of detecting and localising carrion (Dahl, 1979). Lowry (1986) defined the callynophore (fig. 1.4a) as 'the completely or partially fused proximal articles of the flagellum of the first antenna which bear transverse rows of aesthetascs'. Where the distal end of the aesthetasc has been examined, it always carries a terminal pore. A section of the callynophore of *Orchomene chevreuxi*, examined with electron microscopy by Dahl (1979), exhibited sensory cell nuclei and dense bundles of nerve fibres which innervate the aesthetascs. It is hypothesised, therefore, that the callynophore serves an olfactory purpose. While recognition of sexually receptive females has been suggested as one function (Lowry, 1986), in demersal scavenging species where it occurs in both sexes (as with many lysianassoids), the callynophore is considered to be a chemosensory organ adapted for the purpose of food localisation (Dahl, 1979; Smith & Baldwin, 1982; Lowry, 1986). The callynophore may be absent, or present in either 1 or 2 fields (i.e. with rows of aesthetascs arranged in 1 or 2 bundles) depending on the species, and is, thus, a taxonomically useful character.

Optimal chemoreception of chemicals in the surrounding water currents is aided by the beating of the pleopods of the resting animal. These produce a micro-current of water particles that sweeps over the proximal part of the animal to the antennae and, thus, the callynophore (Dahl, 1977; 1979).

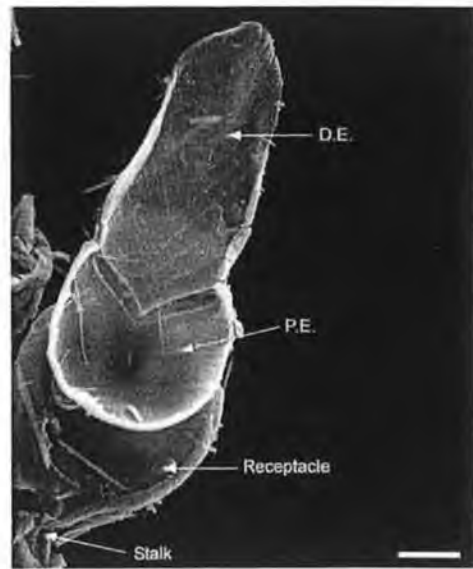
Another enigmatic antennal organ, the calceolus (fig. 1.4b), has also been suggested by Dahl *et al.* (1970) to have a chemosensory function. However, Lincoln & Hurley (1981) and Lincoln (1985) tentatively rejected this hypothesis in favour of



a



b(i)



b(ii)

Figure 1.4: (a) example of a lysianassoid callynophore [illustration by Lowry, 1986]; (b) the calceoli of *Ichnopus spinicornis* as seen under SEM, (i) the arrangement of the calceoli on the antenna (scale = 100 μm), (ii) morphology of the calceolus as designated by Lincoln & Hurley (1981) (scale = 10 μm ; D.E. = distal element, P.E. = proximal element). [Images by author].

some form of vibration sensitivity. A satisfactory explanation for the function of the calceolus has yet to be found, but, as they are a sexually dimorphic character of most species in which they occur,^{*} it is possible that they are used at least in the mating process, e.g. mate recognition, copulation, etc. It is probable that they have more than one function. Calceoli are also quite a useful taxonomic character. Hurley (1980) provides a provisional list of the amphipod species known to have calceoli, giving information for both sexes.

1.4.4.2 Morphological adaptations

The basic gammaridean amphipod mandible (fig. 1.2d) has a strong and rather irregularly serrated incisor and a well-developed lacinia mobilis on both mandibles (Dahl, 1979). When biting, as the mandibles swing on a horizontal hinge line (Watling, 1983), the left incisor passing anterior to the right one, which in turn enters the space between it and the left lacinia mobilis, which comes to lie in front of the right lacinia (Dahl, 1979).

Within the scavenging lysianassoids, the mouthparts, and in particular the mandibles (fig. 1.5), have become adapted to enable them to feed on large and muscular food items, and do so in a relatively short time period. The mouthparts of *Anonyx*, for example, are formed and arranged so that long ribbons of food can be cut off using a shearing action (Steele & Steele, 1993). This capacity for shearing is also found in other scavenging amphipods. In general, a typical scavenging lysianassoid may have a sharp, elongate incisor for shearing food; a tendency towards reduction of the right lacinia mobilis; a depressed, bowl-shaped corpus mandibulae; and a molar of varying form which eventually functions to push food down into the stomodeum (i.e. the foregut). Therefore, regardless of species, the mandibles of these amphipods may have as many as three separate functions – cutting, grinding and ingestion (Steele & Steele, 1993).

Biting in these amphipods, therefore, differs slightly from the pattern described above. According to Dahl (1979) in *Eurythenes* spp. and *Hirondellea* spp., the right incisor glides along a low oblique edge traversing the posterior side of the left incisor. The right lacinia is absent but the left one, which is usually long and slender, is presumed to stabilise the right incisor in its effective position. Movement of the mandibles, similar to most other amphipods, is controlled by the dorsal adductors — two large muscles

^{*} Calceoli are only known from Gammaridean amphipods. So far as is known, they may be found on both antennae, but never on antenna 1 alone; and on the males of species, or on both sexes, but never the females alone.

which, when contracted, cause the cutting surfaces to slide past each other from anterior to posterior (Steele & Steele, 1993). There is a rounded knob on the anterior surface distal to the palp, and this fits precisely into a corresponding socket on the posterior side of the upper lip. Together they form an articulation for the movement of the mandible, which provides the shearing action (Steele & Steele, 1993).

While in the group as a whole, the mouthparts are widely varied, Thurston (1979) noted that there is a tendency in the more voracious scavenging species for the incisor edge of the mandible to become long and sharp. This is particularly true of the deep-sea *Hirondellea-Eurythenes-Paralicella* group (Dahl, 1979). *Anonyx* species also exhibit elongate, narrow mandibles with broadened incisor edges for shearing food (Sainte-Marie, 1984; Steele & Steele, 1993), which, according to Sainte-Marie (1984), is comparable to that of the deep-sea lysianassoids.

There is disagreement regarding the deeply depressed shape of the corpus mandibulae of many scavenging lysianassoids. Dahl (1979) and Sainte-Marie (1984) thought that this was to accommodate the animal biting out and storing large chunks of food, however, Steele and Steele (1993) point out that in intact specimens, this space is filled with the thickened portion of the upper lip and therefore cannot be used to accommodate food. Thus, the importance of such adaptation of the corpus mandibulae to these scavenging animals remains largely unknown.

In the plesiomorphic state, while the incisors are biting, the molars also meet and rotate so as to grind up food on their triturating surfaces before it enters the mouth. The rotation of the molars also pushes food into the mouth (Steele & Steele, 1993). In lysianassoids, the type of molar is highly variable between genera, being variously triturative (i.e. ridged for crushing and grinding foods), laminar, setulose, or in some cases, completely absent (e.g. *Acidostoma* spp.). In fact, almost all permutations of amphipod molar development can be found within the Lysianassoidea (Lincoln, 1979) (fig. 1.5). In *Anonyx* spp. the gaping molars are conical in shape and are densely setose. They are devoid of a triturating area, but instead are in a position to push pieces of food into the stomodeum when the mandible is adducted (Sainte-Marie, 1984; Steele & Steele, 1993). This is comparable to the non-triturative molars of *Eurythenes* and *Hirondellea*. In these, the setose molar tends to become transformed into an elongate tongue or flap (Dahl, 1979; Stoddart & Lowry, 2004), which reaches into the opening of the stomodeum (Dahl, 1979). When the molars close upon each other the two molar processes, with their setose edges, form a more or less complete funnel. Dahl (1979) hypothesised that this

serves to guide larger food particles when they are being sucked up into the stomodeum. Thus, this type of molar hastens the ingestion of carrion by firstly, eliminating the chewing process and secondly, actively funnelling carrion into the gut (Sainte-Marie, 1984). This is highly adaptive for a scavenging mode of life, as it allows the animal to feed on large food items in a short space of time.

The mandible of *Orchomene* differs from those described above in being more slender with a shorter and blunter incisor edge and a triturative mandible (Oleröd, 1975; Thurston, 1979; Dahl, 1979). Triturating molars are always considered plesiomorphic to a setose tongue or flap molar (Lowry & Stoddart, 1992). Thurston (1979) found that the morsels of food taken by the deep-sea *Orchomene* species in his collection were smaller than those ingested by the other species and in contrast to them showed signs of being chewed.

Dahl (1979), in a study of 5 deep-sea lysianassoid species, found that the alimentary tract of all 5 species showed adaptations for accumulation and storage of food (fig. 1.6). He noted that 'all species had the capacity to gorge themselves with food far beyond what is normal in amphipods'. In the genus *Paralicella*, for example, the soft body wall can be extended so that the animal can swell to over double its normal size (Shulenberger & Hessler, 1974; Thurston, 1979).

In *Eurythenes*, *Hirondella*, and *Paralicella* the stomodaeum is short so that the pylorus lies just behind the head. In these three genera food is stored in the midgut, which can be expanded so that it fills the entire body cavity, pressing the other organ systems against the body wall. For example, the maximum diameter of the mid-gut when packed with food is about 10 times greater than the diameter when empty in *Paralicella* spp. (Thurston, 1979). In 2 deep-sea species of *Orchomene*, on the other hand, the stomodaeum is very much elongated and enlarged and serves for storage of food while the midgut is normal and not at all distended (Dahl, 1979). In a comparison between these two deep-sea *Orchomene* spp. and a shallower-water shelf species of the same subgenus, the shelf species had a storing stomodeum much longer than in other non-scavenging amphipods, but still much shorter than in its deep-water congeners (Dahl, 1979).

In a similar study of other shallower water species, Sainte-Marie (1984) noted that *Anonyx sarsi*, *Orchomenella pinguis* and *Onisimus littoralis* all foreguts expanded with carrion. In *Anonyx sarsi* carrion was also stored in the midgut, although this occurred

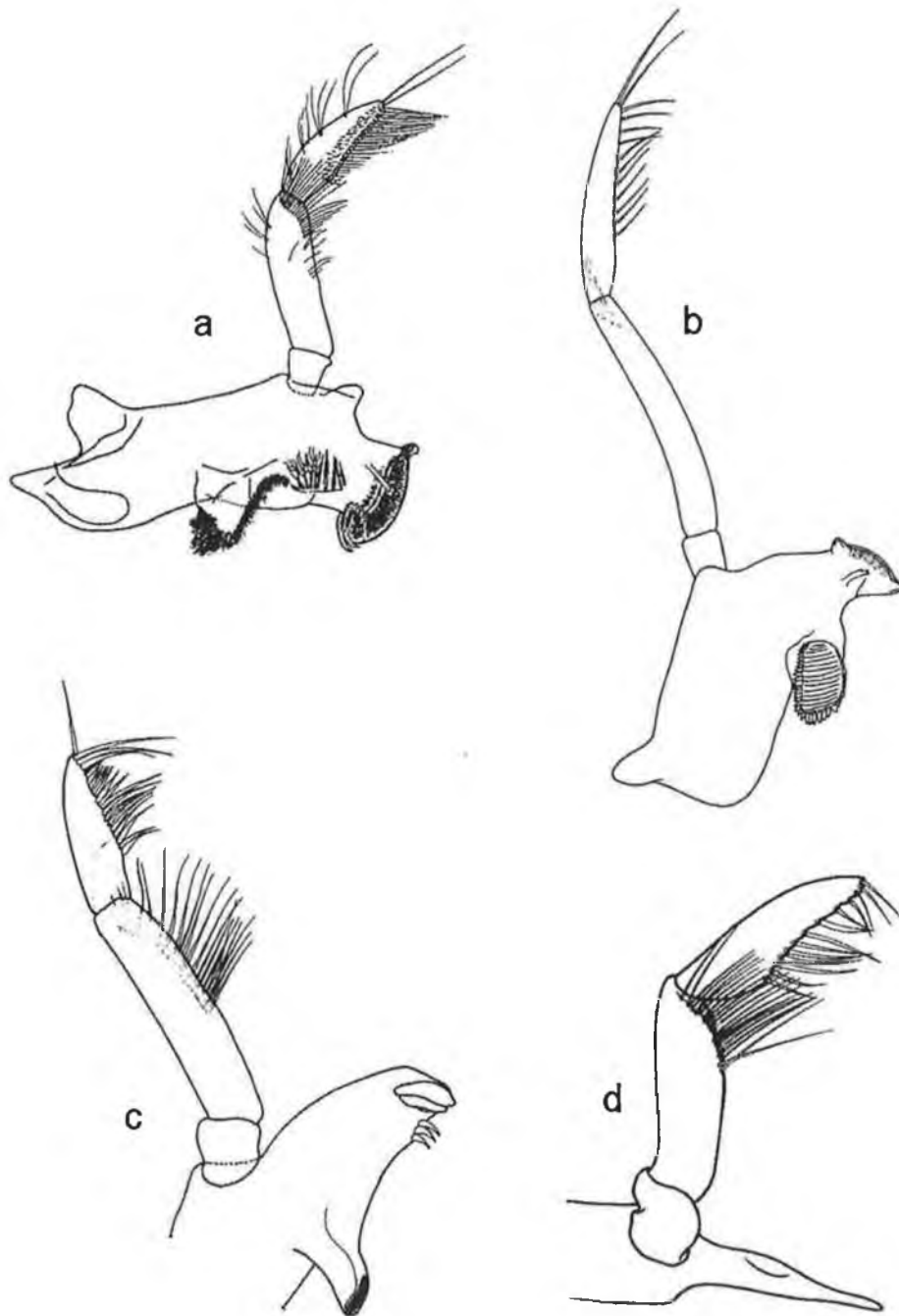


Figure 1.5: Mandible morphology of some lysianassoid amphipods. (a) *Anonyx laticoxae* — note the broad shearing incisor, narrow lacinia mobilis, and setose, flap-like molar; (b) *Hippomedon massiliensis* displays a large, tritulating molar for grinding food; (c) *Aroui setosus* exhibits a conical molar with a small tritulating surface; and (d) *Trischizostoma raschi* with a long, styliform mandible apparently adapted for a parasitic lifestyle—the molar is absent in this species. [Illustrations: (a) by Steele & Brunel, 1968, (b–d) by Diviacco & Ruffo, 1989].

only upon filling of the foregut. Feeding never resulted in the distortion of the body as does in some of the deep-water lysianassoids (e.g. *Paralicella*).

The evolution of such great food-storage abilities in the deep-water species is probably an adaptation to living in an environment where food is scarce, as oppose to shallow water where carrion is more frequent. The differing food-storage regimes of these amphipods would seem to indicate that the ability to store large quantities of food evolved separately, and a number of times, within the Lysianassoidea. In any case, this adaptation, and those mentioned above, i.e. specialised mouthparts, and a keen chemosensory system for the location of carrion, has allowed these animals to become specialised scavengers.

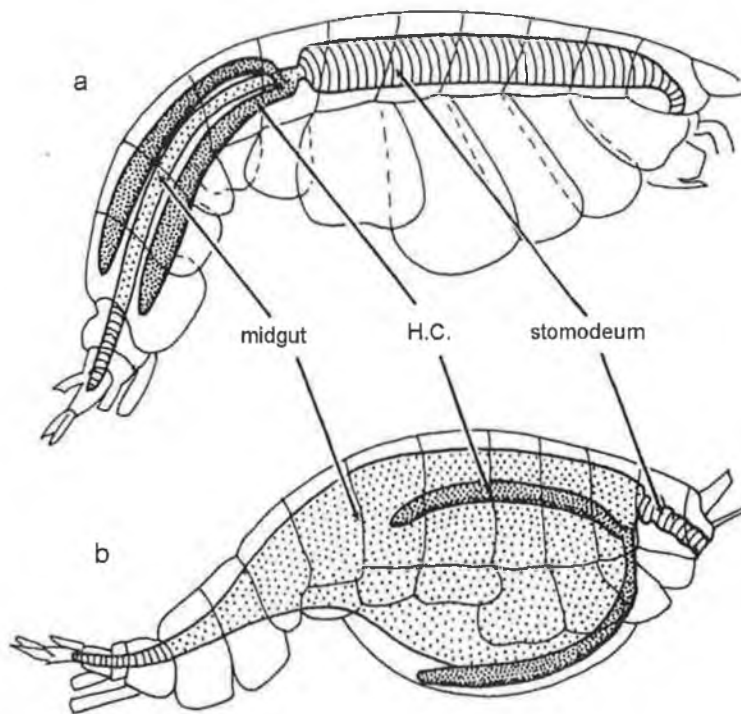


Figure 1.6: Comparison of food-storage in lysianassoid amphipods; (a) stomodeal storage in *Orchomene* spp., and (b) midgut storage in the *Hirondellea-Eurythenes-Paralicella* group. (H.C. = hepatopancreatic caeca). [Diagram from Dahl, 1979].

**2 TAXONOMY OF PROBLEMATIC
GROUPS: A SERIES OF PAPERS**

2.1 Introduction

Amphipod taxonomy has its origins in the North Atlantic (the description of *Anonyx nugax*, for example, dates back to 1774), and, due to the nature of the discipline at this time, many of the earlier authors did not adequately draw or describe new species. Consequently, some of these older publications are useful as historical references only, and have become insufficient for distinguishing between taxa as the number of described species proliferates. Furthermore, the large size of the Lysianassoidea as a group, as well as their long and confusing taxonomic history, means that many taxa within the superfamily remain difficult to identify, while others are in need of revision.

This combination of factors has led to confusion in certain cases, sometimes causing invalid new species descriptions, other times causing some species to be incorrectly synonymised. Other problems include undesignated type material, mislaid type material, or the labelled type material not agreeing with the illustrations and descriptions of the original author, as is the case with *Normanion quadrimanus* (Bate & Westwood). Thus, over the course of the work it became quickly obvious that, despite much progress in lysianassoid systematics over the last number of years, there are still some groups that are in serious need of revision. These were problems that needed to be addressed as soon as possible in order to avoid adding to the existing confusion.

Thus, this chapter contains a series of papers and submitted articles[†] which intend to resolve several of these issues. While some are examined on a local scale (i.e. British Isles), others pertain to taxa within the entire North Atlantic and Mediterranean. The first paper in the series is a review of the genus *Tryphosella* in the British Isles. It originated as a new species description, but it was quickly realised that mis-identification of the member species of this genus from Irish waters was common due to their apparent similarity, and a review of the genus in the British Isles was required. A new species, *Tryphosella lowryi*, is described and another, *Tryphosella minima* is described from the region for the first time.

The second paper is a re-description and re-establishment of *Orchomenella crenata*. Like *Tryphosella minima* above, this was recorded from the Irish coast for the first time. Initially it was considered that this was a new species. However, it was soon

[†] As all individual papers in this section are intended for publication, they are formatted in the style of the journal in which they are published/were submitted to. Consequently, the figures and tables within each paper are out of sequence with the remainder of the thesis.

discovered that it was in fact a previously described species that had been synonymised with *Orchomenella nana* by preceding authors. This occurred mainly due to the poor original description and illustrations. It is not a commonly recorded species.

The genus *Normanion* is the third paper in the series, and may be the most important one in terms of resolving problems within entire taxa. *Normanion* occurs only in the North Atlantic and Mediterranean, and has a particularly confusing taxonomic history. The problems associated with this taxa arose because of the mis-leading description of the type of the genus, *N. quadrimanus*, by the original authors. This issue is resolved here by the description and comparison of all members of the genus.

The fourth and final paper deals with the issue of *Sophrosyne robertsoni*. Previously this species had only been recorded from the west coast of Scotland, in the Firth of Clyde and the Lynn of Lorne. Prior suggestions that this species may actually be a junior synonym of *Sophrosyne hispana* were investigated. Topotypic material of *S. robertsoni*, along with new material described from the Atlantic coast of Ireland, were compared to the holotype and other material of *S. hispana*. Both species are re-described and their distinguishing characters illustrated. The conclusion is that these are, in fact, separate species, albeit morphologically very similar.

A review of the genus *Tryphosella* (Crustacea: Amphipoda) from Britain and Ireland, with the description of a new species *Tryphosella lowryi*

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A review of the shallow-water species of the genus *Tryphosella* from the British Isles is presented and a new species, *Tryphosella lowryi*, is described. In addition, *Tryphosella minima* is recorded from this region for the first time. This brings to five the total number of species of this genus now known from the British Isles. All taxa are fully described and illustrated, and a key to the species is provided.

INTRODUCTION

Tryphosella Bonnier is a commonly recorded genus of Lysianassoid amphipod found from the infralittoral zone down to abyssal depths. Worldwide, the genus comprises over 60 species, most of which are found in the colder waters of higher latitudes (Lincoln, 1979). In the British Isles, however, only three species have been recorded to date: *T. nanooides* (Lilljeborg, 1865), *T. horingii* (Boeck, 1871), and *T. sarsi* Bonnier, 1893. Although the genus is quite distinctive and easily recognizable, identification of species is difficult.

The first described species of *Tryphosella* was *Anonyx nanooides* Lilljeborg, 1865. This species was later transferred to a new genus *Tryphosa* by Boeck (1871), who simultaneously described the new species *Tryphosa horingii* in the same publication. Later *Tryphosa nana* was mistakenly placed in the synonymy of *Anonyx nanus* Krøyer by Sars (1890–1895). However, Bonnier (1893) noted this error and established it as a new species, *Tryphosella sarsi*, in a new genus *Tryphosella*. Also transferred to this new genus were the previously recorded species *Tryphosa nanooides* and *Tryphosa horingii*. Only these three members of the genus have been recorded to date from the British Isles. Costello et al. (1989) and Lincoln (1979) give records for these species in Ireland and the entire British Isles respectively. Here, an additional species of *Tryphosella* is described from Irish waters and another, *Tryphosella minima* (Chevreux, 1911) is recorded for the first time. The genus *Tryphosella* was placed in the subfamily Tryphosinae by Lowry & Stoddart (1997).

Some confusion does exist between *Tryphosella* and the genus *Tmetonyx* (Stebbing, 1906). However, presently they are, in most cases, distinguishable by the slightly shortened, tapering first coxa of *Tryphosella*, and the elongate ischium of gnathopod 1 on *Tmetonyx*, although there are species in both genera that do not fit these criteria, such as the Mediterranean species *Tryphosella dilatata* (Chevreux, 1903), that does not have the slightly shortened, tapering first coxa typical of the genus. These aberrant species need to be revised and possibly removed from the genus.

MATERIALS AND METHODS

Material examined was restricted to shallow water (within the 200 m isobath). Material was studied from the collections of the Zoological Museum of the University of Copenhagen (ZMUC), the Natural History Museum, London (NHML—formerly British Museum (Natural History)), the Zoological Museum of the University of Oslo (ZMO) and the National Museum of Ireland (Natural History) (NMI(NH)). Additional material was sampled off the west coast of Ireland in August 1976 and July 2002.

Specimens were dissected and mounted in Faure's solution. Illustrations were made using a compound microscope with a drawing attachment. Descriptions were generated from a DELTA (DEscriptive Language for TAXonomy) database (Dallwitz et al., 1999).

SYSTEMATICS

Order AMPHIPODA Latreille, 1816

Suborder GAMMARIDEA Latreille, 1802

Family LYSIANASSIDAE Dana, 1849

Subfamily TRYPHOSINAE Lowry & Stoddart, 1997

Genus *Tryphosella* Bonnier, 1893

Diagnosis

Coxa 1 tapering distally, slightly shorter than and partly concealed by coxa 2; gnathopod 1 subchelate; ischium short; carpus long, subequal to propodus. Uropod 2 inner ramus without marginal constriction. Uropod 3 outer ramus 2-articulate. Telson deeply cleft.

Key to the genus *Tryphosella* in the British Isles

1. Urosomite 1 with dorsal depression, posterodistally produced into a dorsal carina 2
- Urosomite 1 with or without dorsal depression, with or without rounded hump dorsodistally, but never carinate 3

2. Urosomite 1 produced into strong dorsal carina; gnathopod 2 subchelate to weakly chelate; pereopod 5 subequal in length and breadth; uropod 3 inner ramus extending beyond article 1 of outer ramus . . . *T. horingii*
 — Urosomite 1 carina weakly produced; gnathopod 2 distinctly chelate; pereopod 5 slightly longer than broad; uropod 3 inner ramus not extending beyond article 1 of outer ramus *T. lowryi*
3. Gnathopod 2 distinctly chelate, propodus palm obtuse; epimeron 3 posterodistal corner produced into a small spine, may be very minute 4
 — Gnathopod 1 propodus palm acute; gnathopod 2 subchelate, propodus palm transverse; epimeron 3 posterodistal corner quadrate to slightly acute, but not produced; urosomite 1 with slight dorsal depression, slightly more pronounced in male *T. sarsi*
4. Gnathopod 1 propodus palm transverse; epimeron 3 posterodistal corner producing small but distinct spine; urosomite 1 with distinct dorsal depression in both sexes, not forming rounded hump posteriorly *T. nanoides*
 — Gnathopod 1 propodus palm acute; epimeron 3 forming only minute, almost imperceptible, spine; urosomite 1 with dorsal depression in male only and followed posteriorly by rounded dorsal hump, distinctly raised above urosomite 2 in both sexes *T. minima*

Tryphosella lowryi sp. nov.
 (Figures 1–3)

? *Tryphosa horingii*.—Duhig & Humphries, 1955: 124.—
 Duhig, 1960: 64.

Tryphosella horingi.—Costello et al., 1989: 36 (not *T. horingii*
 Boeck, 1871).

Type material

Holotype: ovigerous female, 3.2 mm, from Clew Bay, County Mayo, Ireland (53°49.09'N 09°39.54'W), 7.6 m. NMI(NH): 2005.101. Collected by AQUAFAC International, July 2002.

Paratype: male, 3.5 mm completely dissected and mounted on three slides, from Clew Bay (53°49.09'N 09°39.54'W), 7.6 m. NMI(NH): 2005.102. Collected by AQUAFAC International, July 2000.

Additional material

Male, 3.5 mm from Mulroy Bay, County Donegal, Ireland. NMI(NH): 1981.58. Collected by D. Minchin, Summer 1980.

Description of adult female

Antenna 1 shorter than antenna 2; flagellum article 1 slightly elongate; 2-field callynophore present, calceoli absent. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute, almost rounded.

Mouthpart bundle subquadrate. Mandible incisor smooth, lacinia mobilis present on left mandible; mandibular molar setulose, palp attached opposite molar. Maxilliped palp 4-articulate; outer plate with one apical robust seta, inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, slightly shorter than coxa 2, tapering posterodistally; ischium short, about 1.5 times longer than broad; carpus long, greater than three times as long as broad, of subequal length to propodus; propodus margins subparallel, palm acute, margin serrated, with two terminal robust setae at posterodistal corner; dactylus well developed, with accessory tooth on inner margin. Gnathopod 2 minutely chelate; carpus distinctly longer than propodus; propodus suboval, densely setose distally; dactylus minute. Pereopods 3–4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa almost equilobate, produced into very slight posterior lobe; basis longer than broad, anterior margin armed with robust setae, posterior margin minutely crenate, merus posterodistally produced to about half length of carpus. Pereopod 6 coxa produced into posterior lobe; basis distinctly longer than broad, anterior margin armed with robust setae, posterior margin minutely crenate; merus posterodistally produced downward to about half length of carpus. Pereopod 7 coxa produced into posterior lobe; basis broadly rounded posteriorly, anterior margin armed with robust setae, posterior margin minutely crenate; merus posterodistally produced to about half length of carpus.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, posteriorly followed by a weak carina. Uropod 1 peduncle slightly longer than rami; rami subequal. Uropod 2 peduncle subequal to rami; rami subequal in length, inner ramus without marginal constriction(s). Uropod 3 peduncle slightly shorter than outer ramus; outer ramus 2-articulate, article 2 long, approximately 40% length of article 1, rami distinctly unequal with inner ramus not extending beyond article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft to about 70%, with one apical robust seta and three dorsal robust setae on each lobe.

Adult male (sexually dimorphic characters)

Antenna 1 flagellum article 1 distinctly elongate; antenna 2 greater than half the body length; calceoli present. Uropod 3 bearing long plumose setae.

Distribution

West and north coasts of Ireland, ?Dublin Bay.

Remarks

Tryphosella lowryi is very similar to *T. horingii* but is distinguishable from that species by the shortened inner ramus of the third uropod, that does not extend beyond article 1 of the outer ramus (much longer than article 1 of the outer ramus in *T. horingii*), by the extension of the posterodistal margin of the merus on pereopods 5–7 to about half the length of the carpus (much less than half length of carpus in *T. horingii*), and by the very different shape of the first urosomite, which is evenly truncated in *T. lowryi* but angularly carinate in *T. horingii*. Lincoln (1979) noted that *T. horingii* was recorded from a number of localities in the British Isles, including the Firth of Forth, West Channel, Anglesey, Dublin, Clyde and Argyll. However, he states that he was unable to locate any British material and his descriptions are based on material from the Swedish coast. Duhig & Humphries (1955) and Duhig (1960) record this same species from Dalkey Island in Dublin Bay.

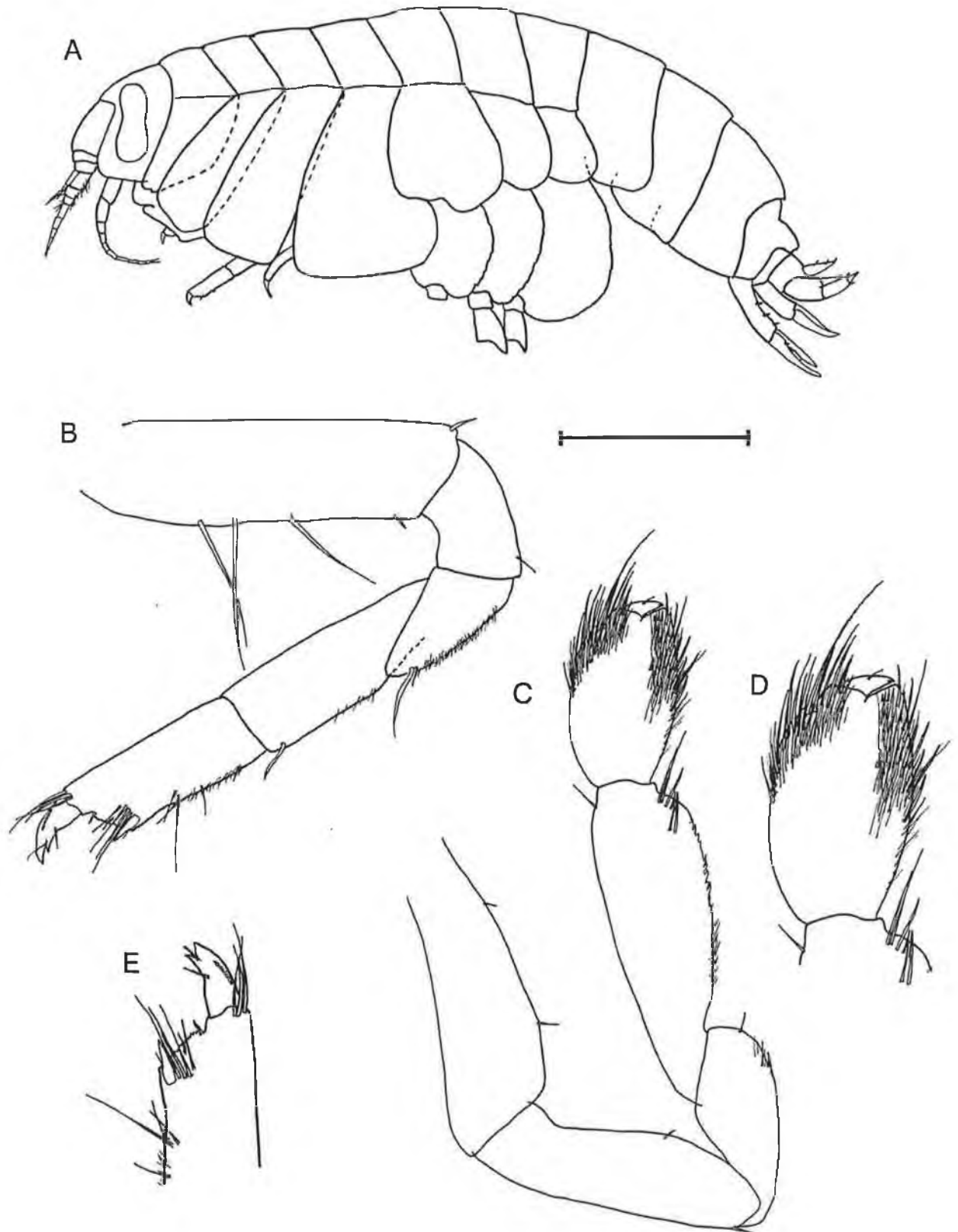


Figure 1. *Tryphosella lowryi* sp. nov. (A) *Habitus*, female holotype; (B) gnathopod 1; (C) gnathopod 2; (D) gnathopod 2 propodus; and (E) gnathopod 1 propodus. Scale bar: A, 0.8 mm; B,C, 0.2 mm; D,E, 0.15 mm. From Clew Bay, County Mayo.

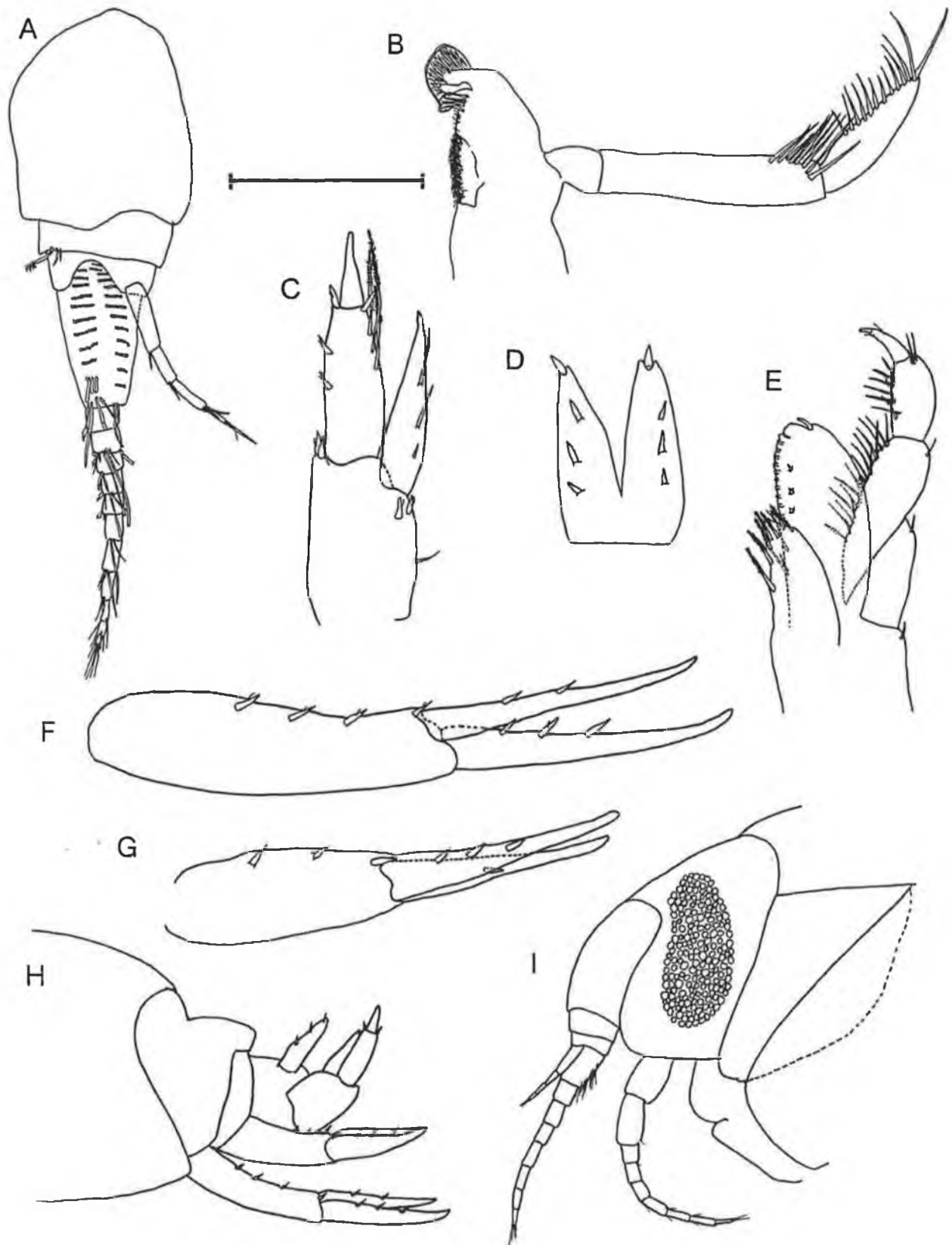


Figure 2. *Tryphosella lowryi* sp. nov. (A) Antenna 1, male; (B) mandible; (C) uropod 3, male; (D) telson; (E) maxilliped; (F) uropod 1; (G) uropod 2; (H) head and antennae, female holotype; and (I) epimeron 3 and urosome, female holotype. Scale bar: A, 0.3 mm; B–G, 0.2 mm; H, I, 0.4 mm. From Clew Bay, County Mayo.

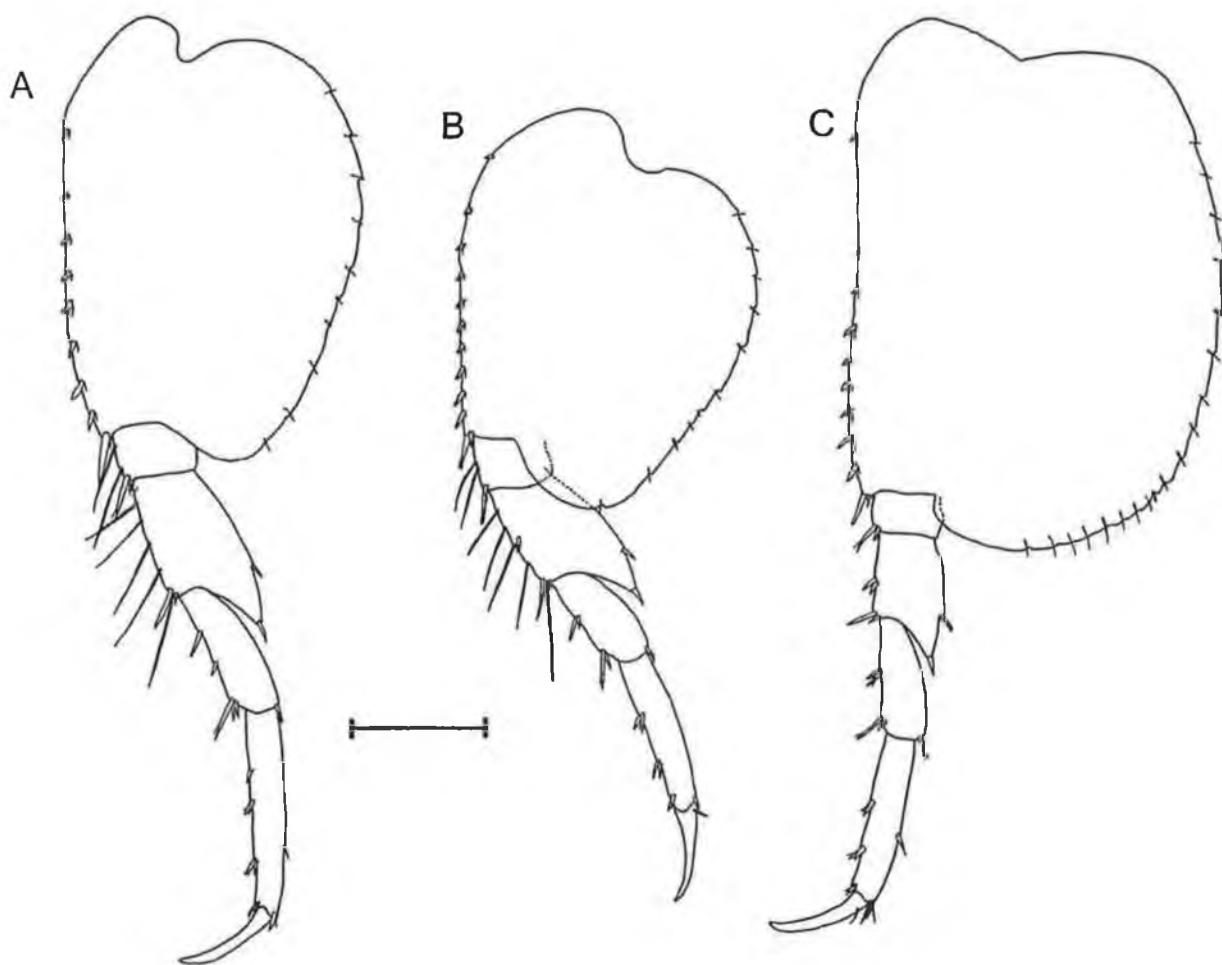


Figure 3. *Tryphosella lowryi* sp. nov. (A) Pereopod 6; (B) pereopod 5; and (C) pereopod 7. Scale bar: A–C, 0.2 mm. From Clew Bay, County Mayo.

Unfortunately Duhig's collection has been lost (Costello et al., 1989) and so it is impossible to confirm this record. The record for *T. horingii* from Mulroy Bay, County Donegal given in Costello et al. (1989) was re-examined and is a male *T. lowryi*. Like Lincoln (1979), we have been unable to locate any true *T. horingii* material from the British Isles and, thus, cannot confirm the presence of this species from this region. It is probable that Duhig's record, as well as other records of *T. horingii* from latitudes below 55°N, may actually represent the new species, *T. lowryi*, described here. *Tryphosella horingii* may be a northern boreal species that does not occur as far south as the British Isles.

Etymology

The species is named after Dr J.K. Lowry the leading authority on world Lysianassidae.

Tryphosella horingii (Boeck, 1871)

Figures 4 & 5

Tryphosa horingii Boeck, 1871: 118.—Boeck, 1876: 182.—G.O. Sars, 1891: 77, pl. 27, figure 2.—Stebbing, 1906: 71.

Tryphosella hörningii.—Bonnier, 1893: 171.

Tryphosella horingi.—Lincoln, 1979: 86, figure 34.

Tryphosa horingi.—?Dauvin et al., 1994: 551, table 3.

Type material

Holotype: registered as ZMUC CRU-6730, however, a search of the ZMUC collection did not yield any material and thus the type material is presumed to be lost.

Type locality

Unknown.

Material examined

Female, 3.5 mm BMNH 1977: 548; male, 4 mm BMNH 1977: 548—both from Koster Fjord, Säcken, Sweden; 6 females, 5–8 mm, ZMUC CRU-4914 from 61°15'N 9°35'W; male 5 mm, Thor Station 273, 9 October 1904, 640 m, ex ZMUC.

Description of adult female

Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate, with strong 2-field callynophore. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes narrowly rounded to subacute. Mouthpart bundle subquadrate. Mandible incisor smooth, lacinia mobilis present on left mandible; mandibular molar setulose to weakly tritulating, palp attached opposite molar. Maxilliped palp 4-articulate, inner plate well developed, greater than half-length of outer plate; outer plate with one apical robust seta.

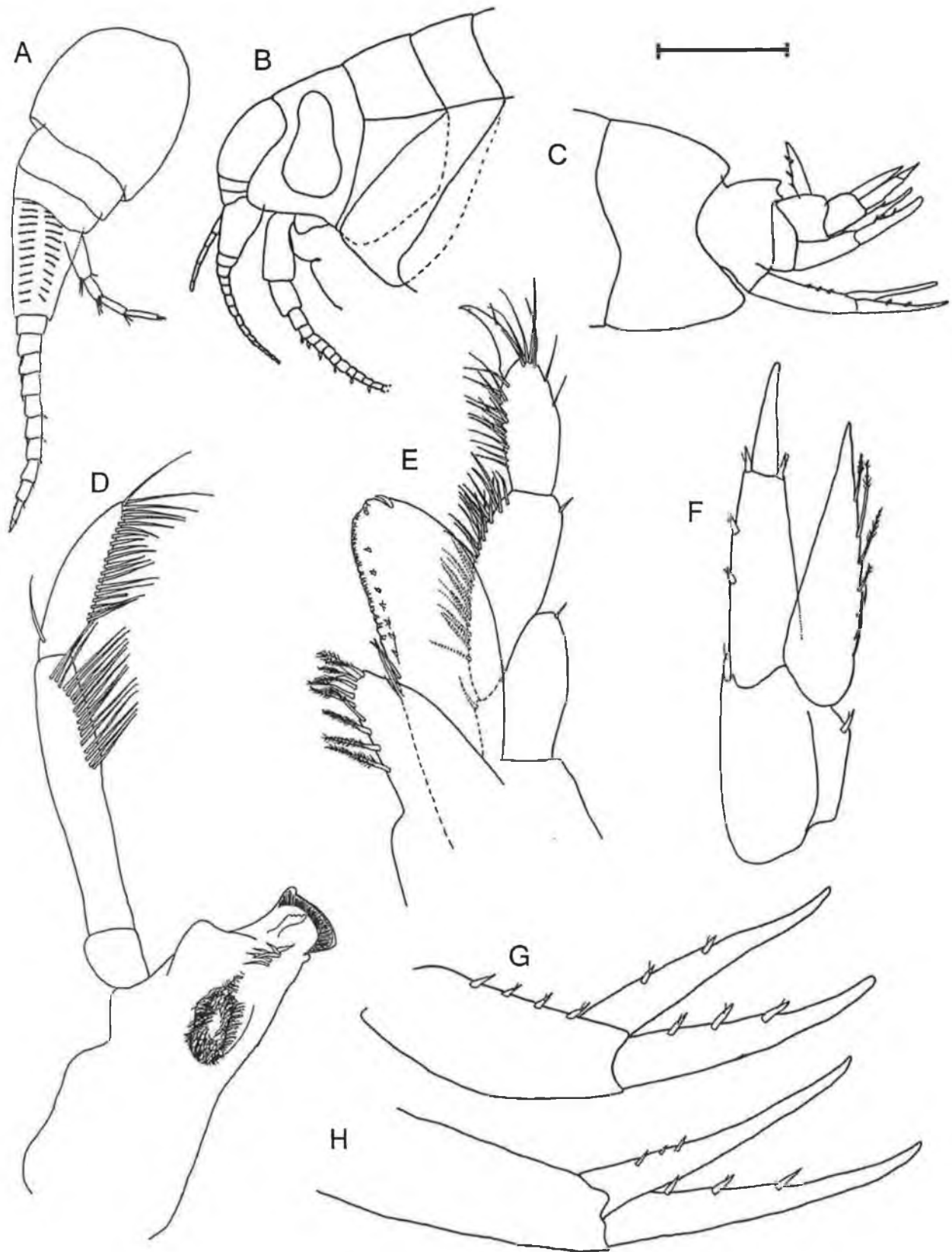


Figure 4. *Tryphosella horingii* (Boeck, 1871). Male. (A) Antenna 1; (B) head and antennae; (C) epimeron 3 and urosome; (D) mandible; (E) maxilliped; (F) uropod 3; (G) uropod 2; and (H) uropod 1. Scale bar: A, 0.4 mm; B, C, 0.16 mm; D–H, 0.2 mm.

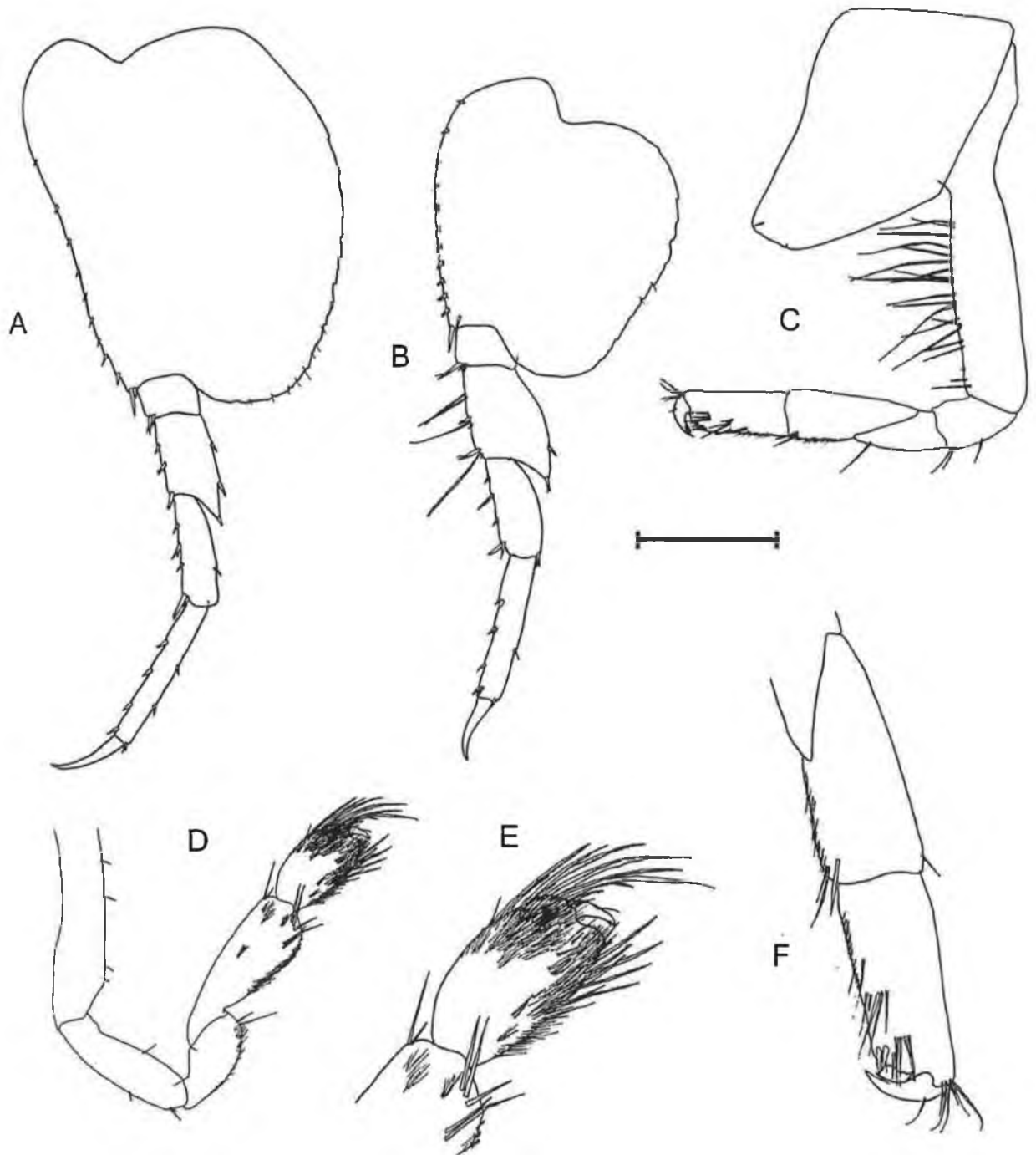


Figure 5. *Tryphosella horingii* (Boeck, 1871). Male. (A) Pereopod 7; (B) pereopod 5; (C) gnathopod 1; (D) gnathopod 2; (E) gnathopod 2 propodus; and (F) gnathopod 1 propodus. Scale bar: A–D, 0.4 mm; E, F, 0.2 mm.

Gnathopod 1 subchelate; coxa large, slightly shorter than coxa 2, tapering posterodistally; ischium short, less than 1.5 times longer than broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm slightly acute to acute, margin serrated, with two terminal robust setae at posterodistal corner; dactylus well developed, with accessory tooth on inner margin. Gnathopod 2 minutely sub-chelate slightly chelate; carpus distinctly longer than propodus; propodus densely setose distally; dactylus minute. Pereopods 3–4 propodus with blunt, locking robust setae at posterodistal

corner. Pereopod 5 coxa equilobate; basis about as long as broad, anterior margin armed with robust setae, posterior margin minutely crenate, merus posterodistally produced to less than one-third length of carpus. Pereopod 6 coxa produced into posterior lobe; basis distinctly longer than broad, anterior margin armed with robust setae, posterior margin minutely crenate; merus posterodistally produced downward to less than half length of carpus. Pereopod 7 coxa produced into posterior lobe; basis broadly rounded posteriorly, anterior margin armed with robust setae, posterior

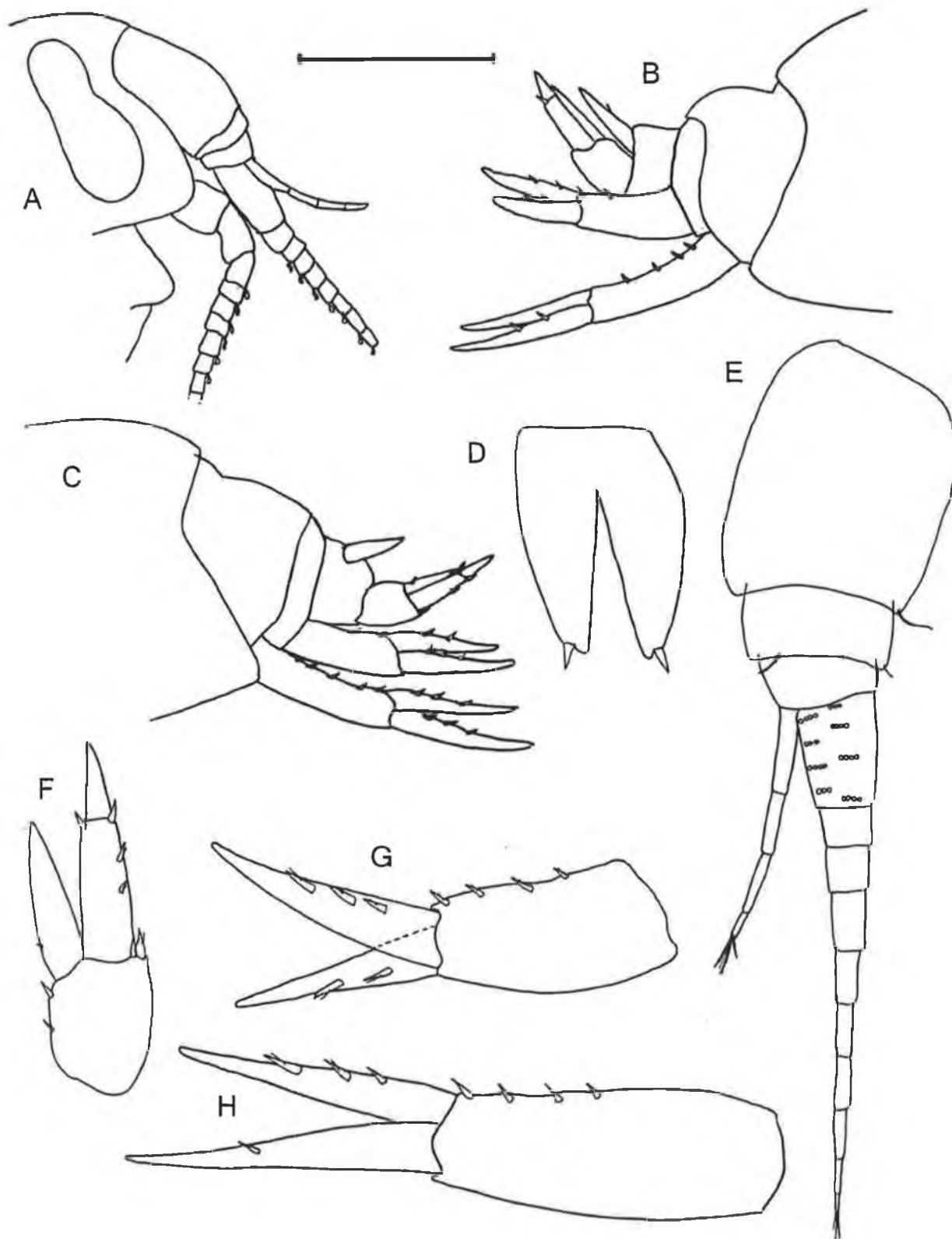


Figure 6. *Tryphosella sarsi* (Bonnier, 1893). (A) Head and antennae, male; (B) epimeron 3 and urosome, male; (C) epimeron 3 and urosome, female; (D) telson; (E) antenna 1, female; (F) uropod 3; (G) uropod 2; and (H) uropod 1. Scale bar: A–C, 0.4 mm; D–H, 0.2 mm. Both from Risør, Skagerrak.

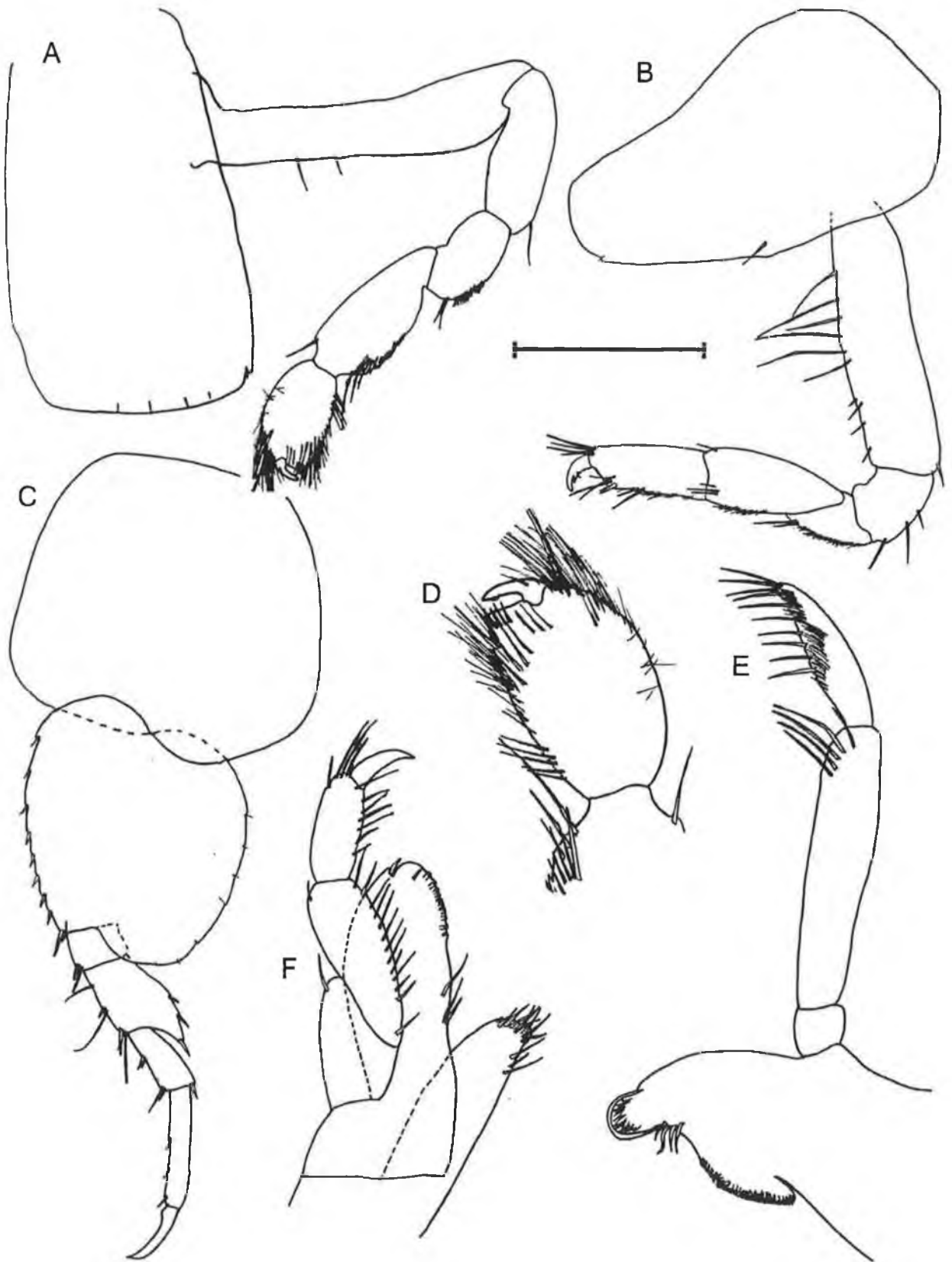


Figure 7. *Tryphosella sarsi* (Bonnier, 1893). Female. (A) Gnathopod 2; (B) gnathopod 1; (C) pereopod 5; (D) gnathopod 2 propodus; (E) mandible; and (F) maxilliped. Scale bar: A,B, 0.3 mm; C, 0.4 mm; E,F, 0.15 mm. From Risør, Skagerrak.

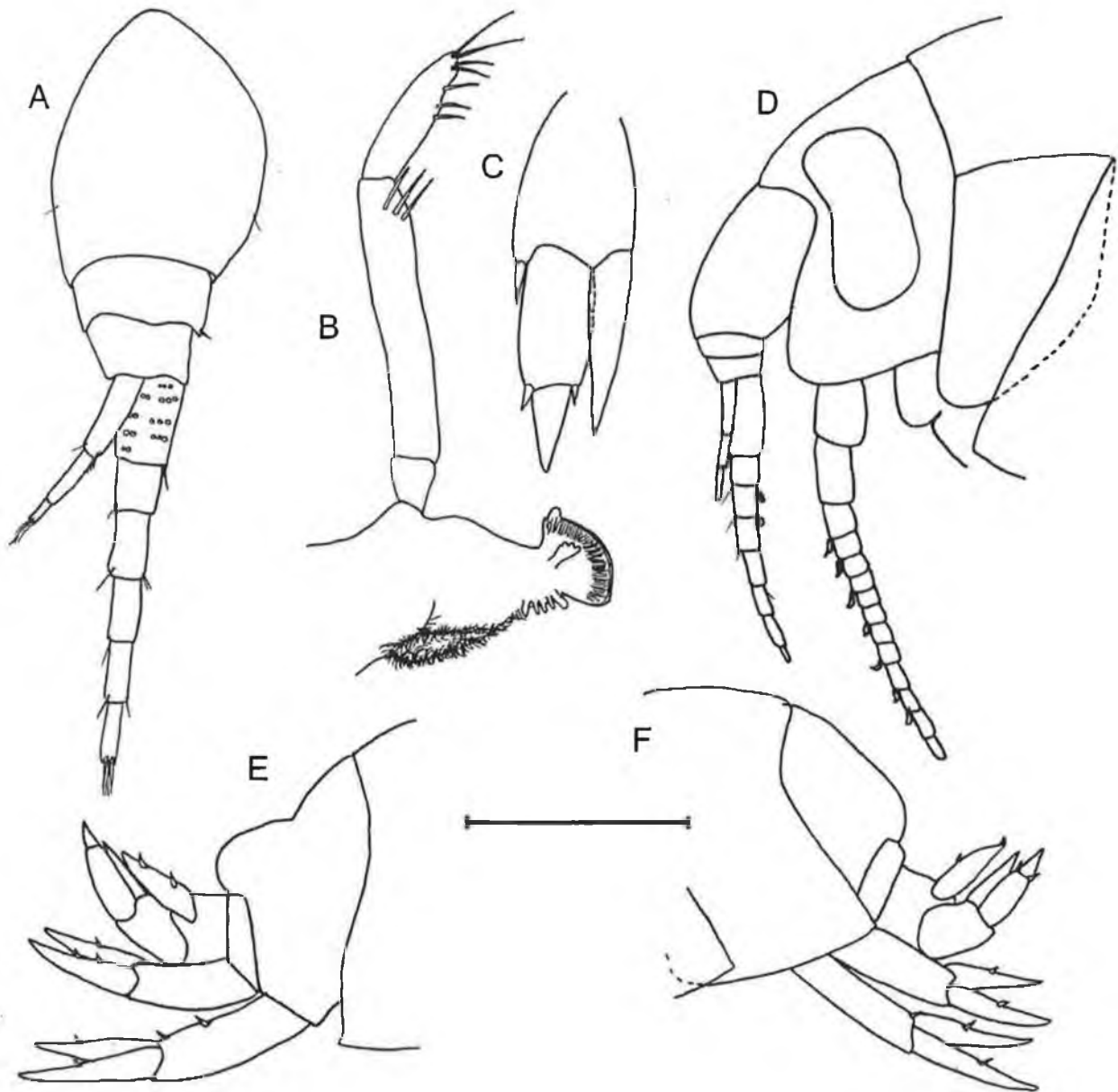


Figure 8. *Tryphosella minima* (Chevreux, 1911). (A) Antenna 1, female; (B) left mandible; (C) uropod 2; (D) head and antennae, male; (E) epimeron 3 and urosome, male; and (F) epimeron 3 and urosome, female. Scale bar: A, 0.2 mm; B,C, 0.15 mm; D,E, 0.4 mm; F, 0.3 mm. From Clew Bay, County Mayo.

margin minutely crenate; merus posterodistally produced to about one-quarter length of carpus.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, strongly carinate dorsally. Uropods 1–2 rami subequal; uropod 2 inner ramus without marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft to about 70%, with one apical robust seta and three dorsal robust setae on each lobe.

Adult male (sexually dimorphic characters)

Differing from female in the length of antenna 2 which is approximately half the body length and bearing

calceoli; uropod 3 inner ramus fringed with long plumose setae.

Length
6 mm.

Distribution

Arctic Ocean, North Sea, Norwegian Sea, off southwest Faeroes, ?British Isles, ?Bay of Biscay. Approximately 50–900 m depth.

Tryphosella sarsi Bonnier, 1893
Figures 6 & 7

Tryphosa nana G.O. Sars, 1891: 76, pl. 27 (not *Anonyx nanus* Krøyer, 1846: 30).

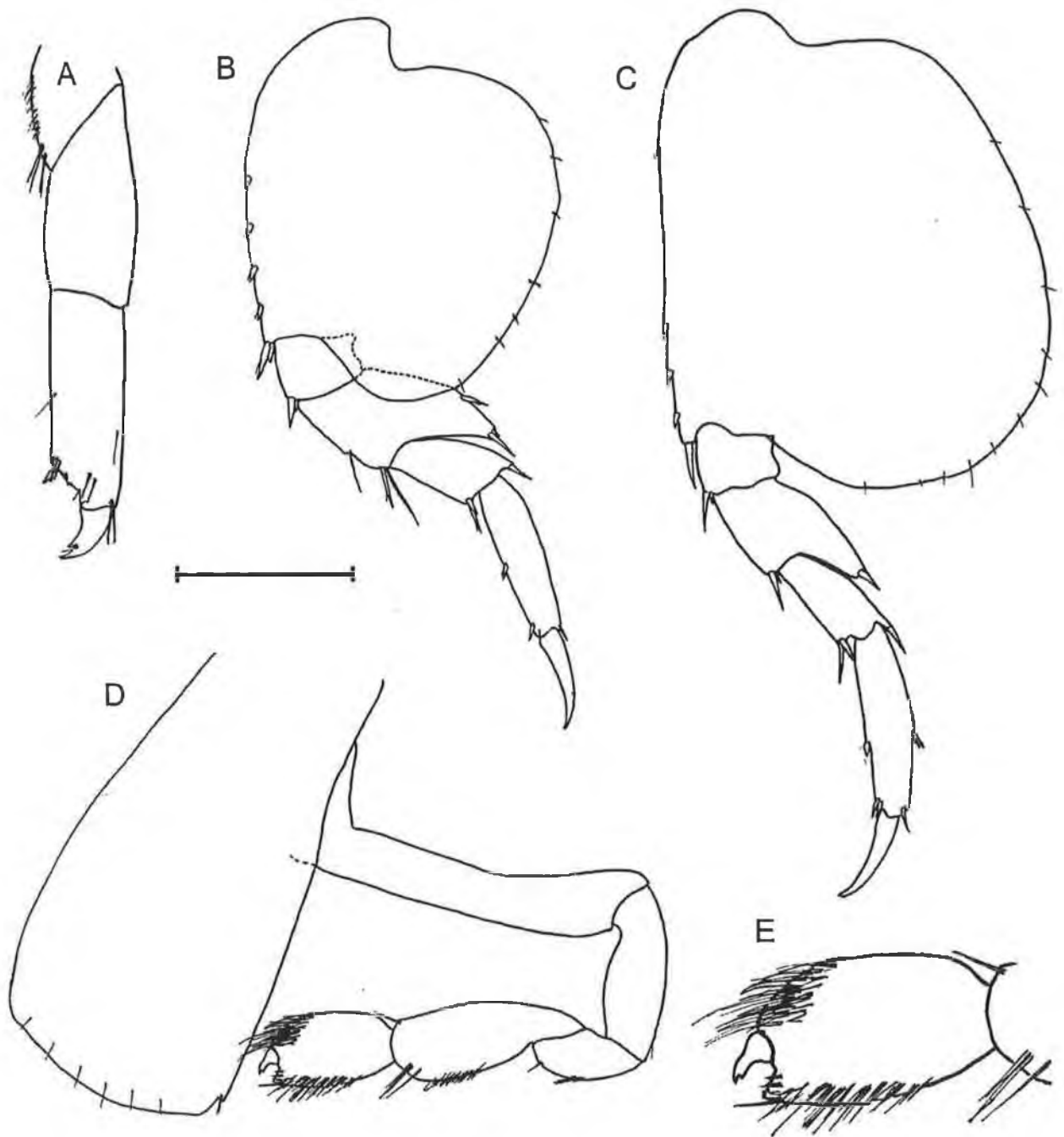


Figure 9. *Tryphosella minima* (Chevreux, 1903). (A) Gnathopod 1 carpus and propodus; (B) pereopod 5; (C) pereopod 7; (D) gnathopod 2; and (E) gnathopod 2 propodus. Scale bar: A, 0.16 mm; B–D, 0.2 mm; E, 0.1 mm. From Clew Bay, County Mayo.

Tryphosella sarsi Bonnier, 1893: 171.—Lincoln, 1979: 84, figures 32g & 33e–j.—Barnard & Karaman, 1991: 537, figures 90G, 92R, 94C.

Tryphosa sarsi.—G.O. Sars, 1895: 684.—Stebbing, 1906: 70. ?*Tryphosa grandimana*.—Chevreux & Fage, 1925: 66.

Type material

Probably lost.

Type locality

Risør, Skagerrak, southern Norway (approximately 58°44'N 9°15'E).

Material examined

Female, 3 mm, ZMO F21165a; male, 3.5 mm, ZMO F14246a, both from Risør, Skagerrak.

Description of adult female

Antenna 1 slightly shorter than antenna 2; flagellum article 1 slightly elongate, bearing weak calynophore. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes rounded. Mouthpart bundle subquadrate. Mandible incisor smooth, molar weakly triturating, palp attached opposite molar. Maxilliped palp 4-articulate, inner plate well

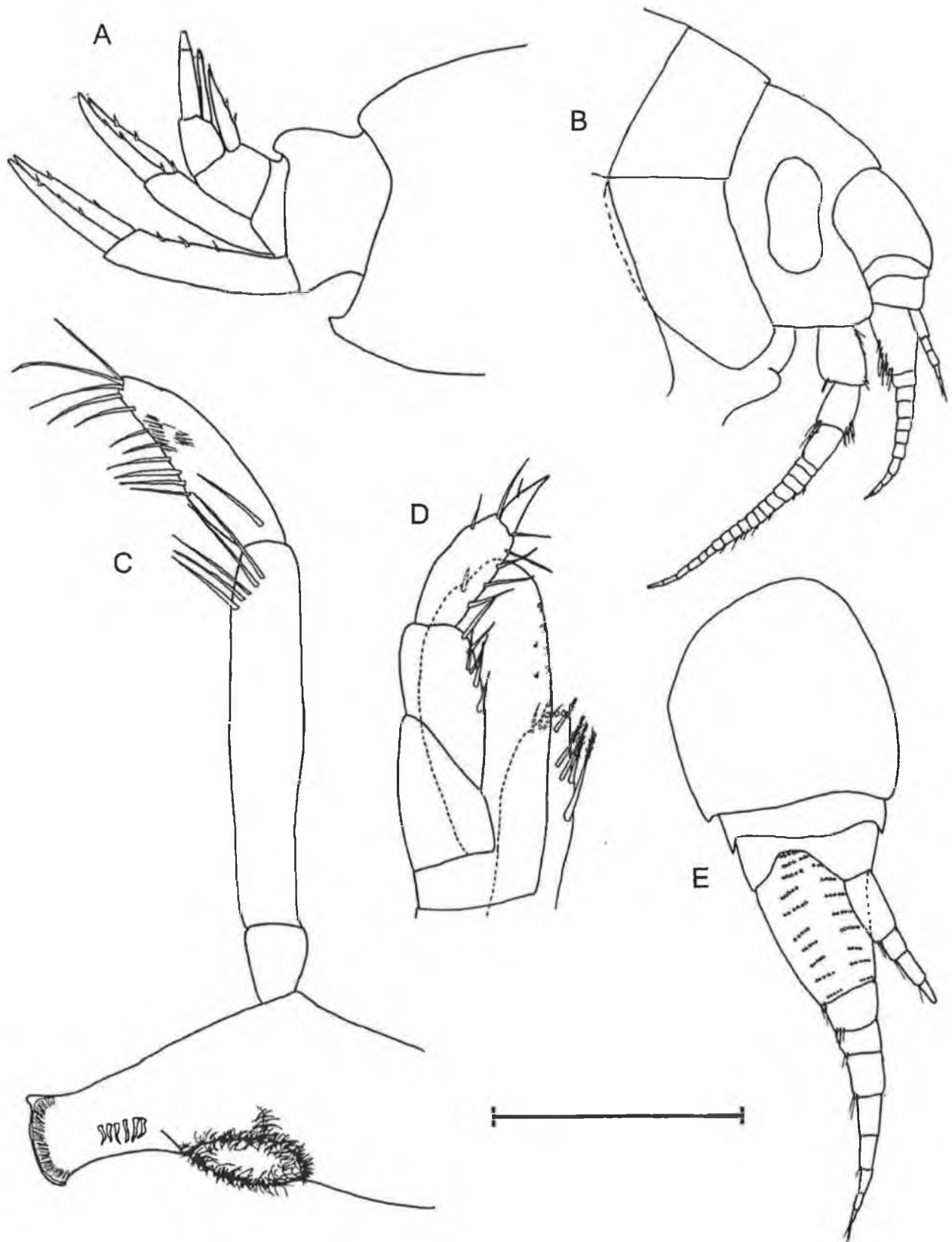


Figure 10. *Tryphosella nanoides* (Lilljeborg, 1865). (A) Epimeron 3 and urosome; (B) head and antennae; (C) right mandible; (D) left maxilliped; and (E) antenna 1. Scale bar: A,B, 0.8 mm; C,D, 0.2 mm; E, 0.4 mm. Female from 53°19'N 10°35'W.

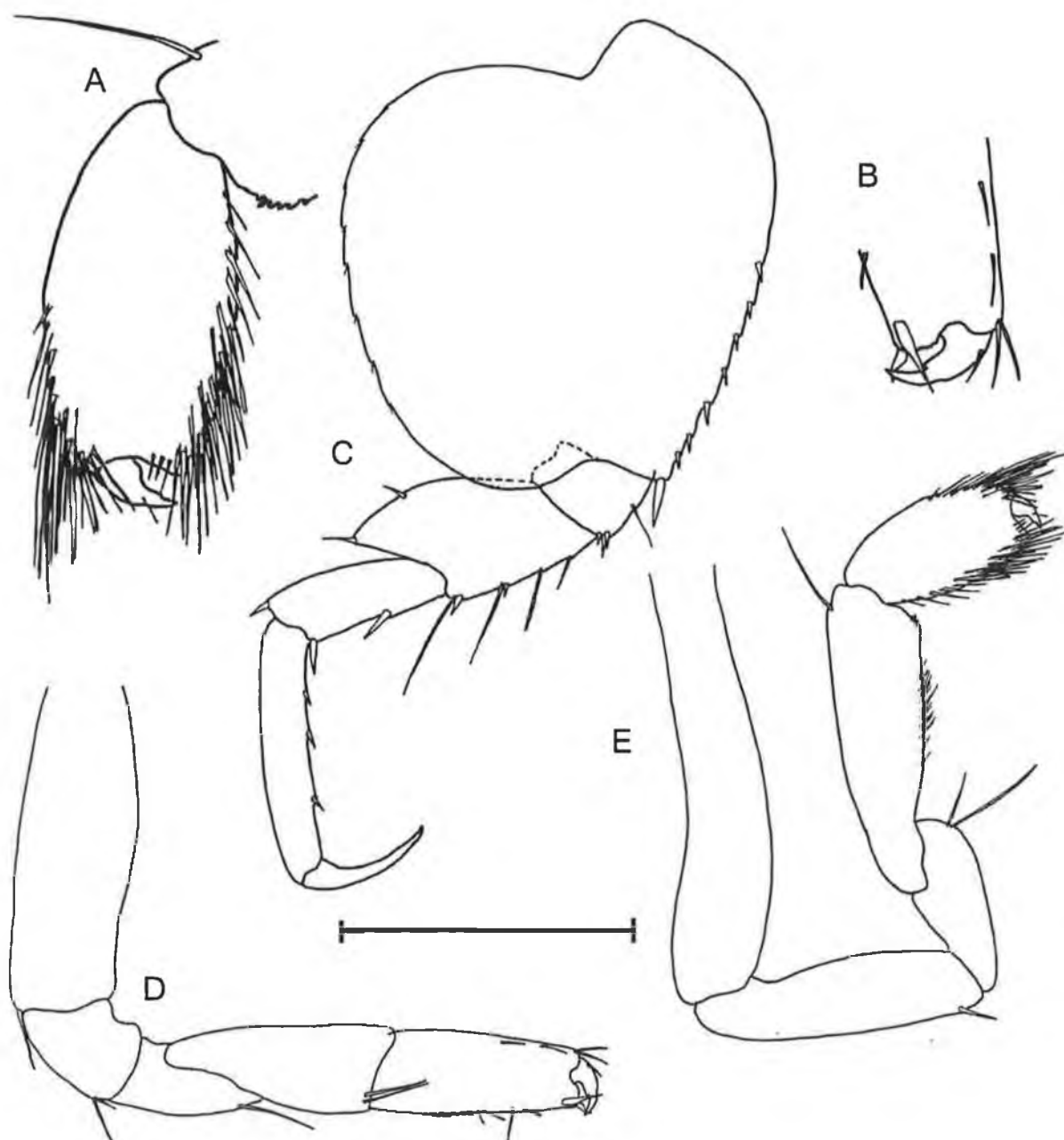


Figure 11. *Tryphosella nanoides* (Lilljeborg, 1865). (A) Gnathopod 2 propodus; (B) gnathopod 1 propodus; (C) pereopod 5; (D) gnathopod 1; and (E) gnathopod 2. Scale bar: A,B, 0.2 mm; C–E, 0.4 mm. Female from 53°19'N 10°35'W.

developed, greater than half-length of outer plate; outer plate with one apical robust seta.

Gnathopod 1 subchelate; coxa large, slightly shorter than coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3–4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad; merus produced posterodistally to about half carpus length. Pereopod 6 coxa produced into posterior lobe; basis distinctly longer than broad, anterior margin armed with robust setae, posterior margin minutely crenate. Pereopod 7 coxa produced into posterior lobe; basis broadly rounded posteriorly, anterior margin

armed with robust setae, posterior margin minutely crenate; merus posterodistally produced to less than one-quarter carpus length.

Epimeron 3 posterodistal corner acute. Urosomite 1 with slight dorsal depression. Uropods 1–2 rami subequal; uropod 2 inner ramus without marginal constriction(s). Uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending as far as article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Adult male (sexually dimorphic characters)

Antenna 1 flagellum article 1 more elongate than female, and with stronger 2-field callynophore. Antenna 2 approximately 50% of body length; calceoli present on

both antennae. Urosomite 1 with dorsal depression more pronounced than in female.

Length
8 mm.

Distribution

Norwegian Sea, North Sea, Atlantic Ocean (west coast of Ireland) (10–190 m).

Tryphosella minima (Chevreux, 1911)
Figures 8 & 9

Tryphosa minima Chevreux, 1911: 174, figure 4, pl. 8, figures 1–14.—Chevreux & Fage, 1925: 65, figures 53–54.

Tryphosella minima.—Ruffo, 1985: 282, figures 5–6.—Diviacco & Ruffo, 1989: 566, figure 389.—Barnard & Karaman, 1991: 537.

Type material

Unknown. A search of the type materials in MNHN, the Musée Océanographique, Monaco (MOM), and NHML has not located this species.

Type locality
Alger.

Material examined

Eleven specimens (8 female, 3 male) from Clew Bay, County Mayo, Ireland (53°50.87'N 09°38.12'W), 7.3 m.

Description of adult female

Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2, bearing 2-field callynophore. Calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute to rounded. Mouthpart bundle subquadrate. Mandible incisor smooth, molar weakly triturating, palp attached opposite molar. Maxilliped palp 4-articulate, inner plate well developed, greater than half-length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 weakly chelate; carpus longer than propodus; dactylus minute. Pereopods 3–4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad; merus produced posterodistally beyond half carpus length. Pereopod 6 coxa produced into posterior lobe; basis distinctly longer than broad. Pereopod 7 coxa produced into posterior lobe; basis broadly rounded posteriorly, anterior margin armed with robust setae, posterior margin minutely crenate; merus posterodistally produced to about half carpus length.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 without dorsal depression, rounded distally. Uropods 1–2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Adult male (sexually dimorphic characters)

Antenna 1 shorter than antenna 2, flagellum article 1 distinctly elongate. Antenna 2 greater than half body length. Calceoli present on both antennae. Urosomite 1 with dorsal depression, posteriorly followed by rounded hump. Uropod 3 inner ramus not extending past article 1 of outer ramus.

Length
2.5 mm.

Distribution

Atlantic Ocean (French coasts, Irish west coast); Mediterranean, 1–70 m depth.

Remarks

The present record is a significant extension to the previously known range of *Tryphosella minima*. The species was, until now, known only from the Mediterranean and the Atlantic coasts of France.

Tryphosella nanooides (Lilljeborg, 1865)
Figures 10 & 11

Anonyx nanooides Lilljeborg, 1865: 25, pl. 3, figures 32–34.

Tryphosa nanooides.—Boeck, 1876: 186.—G.O. Sars, 1891: 79, pl. 28, figure 2.—Stebbing, 1906: 71.—Stephensen, 1925: 102, chart 16.—Gurjanova, 1951: 250, figure 114.—Gurjanova, 1962: 322.

Tryphosella nanooides.—Bonnier, 1893: 171.—Lincoln, 1979: 84, figures 32a–f & 33a–d.—Ruffo, 1985: 294.—Diviacco & Ruffo, 1989: 568, figure 390.—Barnard & Karaman, 1991: 537.

Type material

Unknown. This material is not found in the collections of the Swedish Museum of Natural History (SMNH), ZMUC, or the ZMO.

Type locality
Molde (Norway).

Material examined

Female, 6 mm, from west coast of Ireland (53°19'N 10°35'W), 122 m, 25 August 1976; 5 individuals, 4–7 mm, BMNH 1986: 632: 5. Raunefjorden, Norway. 240–250 m, Beyer net, 12 September 1985.

Description of adult female

Antenna 1 slightly shorter than antenna 2; flagellum article 1 distinctly elongate and bearing 2-field callynophore. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute.

Mouthpart bundle subquadrate. Mandible incisor smooth, lacinia mobilis present on left mandible; mandibular molar setulose, palp attached opposite molar. Maxilliped palp 4-articulate; outer plate with one apical robust seta; inner plate well developed, greater than half-length of outer plate.

Gnathopod 1 subchelate; coxa large, slightly shorter than coxa 2, tapering posterodistally; ischium short, only slightly longer than broad; carpus long, of subequal length

to propodus; propodus margins subparallel, palm transverse, slightly serrated and with two terminal robust setae at posterodistal corner. Gnathopod 2 slightly chelate; carpus longer than propodus; propodus slender; dactylus minute. Pereopods 3–4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad, anterior margin armed with robust setae; merus posterodistally produced to less than half carpus length. Pereopod 6 coxa produced into a posterior lobe; basis distinctly longer than broad. Pereopod 7 coxa produced into a posterior lobe; basis broadly rounded posteriorly.

Epimeron 3 posterodistal corner produced, forming a distinct small spine. Urosomite 1 with dorsal depression. Uropods 1–2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Adult male (sexually dimorphic characters)

Antenna 2 approximately half of body length and bearing calceoli.

Length

8 mm.

Distribution

North Atlantic Ocean (from Iceland to Britain), Mediterranean Sea; 60–660 m.

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Re-establishment of *Orchomenella crenata* (Crustacea: Amphipoda) as a distinct species, with a first record of its occurrence in the British Isles

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Orchomenella crenata is recorded for the first time from the Irish Sea. Some authors have previously questioned the validity of this taxon due to its morphological similarity with *Orchomenella nana* and have placed it in the synonymy of *O. nana*. The question of its validity is resolved by the re-description and comparison of both species.

INTRODUCTION

During a recent sampling expedition in the Irish Sea, a number of amphipod specimens were taken which were subsequently identified as *Orchomenella crenata* Chevreux & Fage, 1925. This represents the first record of the species from the Irish Sea. The species is morphologically very similar to *Orchomenella nana* (Krøyer, 1846). As a result some authors have questioned the validity of *O. crenata* as a distinct species and have placed it in the synonymy of *O. nana*. This paper re-describes the two species and determines the specific validity of *Orchomenella crenata*.

Orchomenella crenata was described from Villefranche, on the Mediterranean coast of France, by Chevreux & Fage (1925). It appears to be a rarely recorded species, but two notable records from outside the Mediterranean are those of Chevreux (1925) and Reid (1951), both of whom identified specimens from the coast of tropical West Africa. *Orchomenella nana*, originally described from the Kattegat by Krøyer (1846), is, however, a widely recorded species from southern Norway to Spain and Senegal (Lincoln, 1979; Diviacco & Ruffo, 1989) and the Mediterranean.

Karaman's (1973) discussion on the variability of Adriatic specimens of *O. nana* questioned the validity of *O. crenata* as a distinct species. After examining *O. crenata* and *O. nana* material deposited in the Muséum National d'Histoire Naturelle (MNHN) (both determined by Chevreux), he remarked that he could find no differences between the two materials. However, he noted that specimens of *O. crenata* exhibit all variations of the epimeron 3 from smooth to crenated. He also noted that the specimens labelled *O. nana* appeared to have a very variable shape of the 3rd epimeron, from rounded to subacute or acute ('pointed'). He concluded that *O. crenata* must be synonymous with *O. nana*, but 'on the other hand, it seems that *O. nana* is one very variable species'.

Ledoyer (1977) recorded both *O. crenata* and *O. nana* from the north-west Mediterranean. While noting the observations of Karaman (1973), he chose to retain

O. crenata as a separate species, using the notched epimeron 3 as the distinguishing character. However, he did not discuss the matter further and the specimens were not illustrated for comparison.

In their descriptions of lysianassoid species from the Mediterranean, Diviacco & Ruffo (1989) followed Karaman (1973), and placed *O. crenata* in the synonymy of *Orchomenella nana*. Diviacco & Ruffo's illustrations, however, show what appear to be at least two distinct species, differing in the form of the 3rd epimeron. The illustrations show one specimen with an entirely smooth posterior margin of the epimeron; one with two distinct notches in the same margin, which the authors call *O. nana* (forma *crenata*); and one which appears to be intermediate between the others, having very slight, widely spaced notches on the epimeron margin. The latter of these they determined to be *O. nana* and was taken from Banyuls-sur-Mer.

In order to resolve this issue, we have examined a number of specimens of both *O. nana* and *O. crenata* from the North Atlantic and Mediterranean, including those recorded by Chevreux (1925), Reid (1951) and Ledoyer (1977). Unfortunately the type material of both species appears to be lost and, thus, cannot be studied for comparison.

MATERIALS AND METHODS

Material studied was from the collections of the Zoological Museum of the University of Copenhagen (ZMUC), the Museo Civico di Storia Naturale di Verona (MSNV), the Musée Océanographique, Monaco (MOM), and from the Irish Sea, taken by Day grab, 0.5 mm mesh, in November 2004 by Aquafact International.

Specimens for illustration were dissected and mounted in Faure's solution. Illustrations were made using a compound microscope with a drawing attachment. Descriptions were generated from a DELTA (DEscriptive Language for TAXonomy) database (Dallwitz et al., 1999).

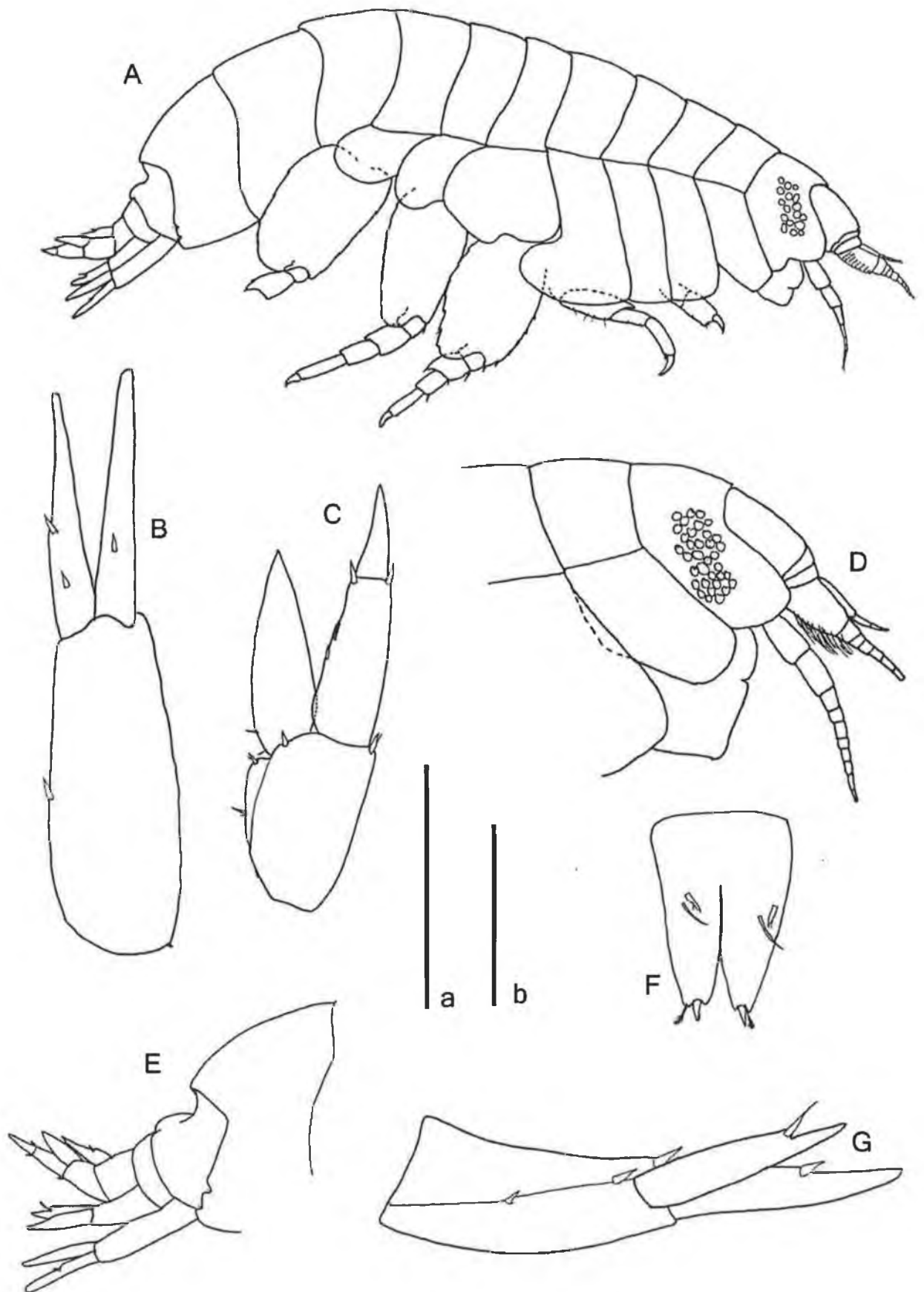


Figure 1. *Orchomenella crenata* Chevreux & Fage, 1925. Female, 2.8 mm, from Irish Sea (52°37.5'N 06°06.31'W, 22 m). (A) Entire; (B) uropod 1; (C) uropod 3; (D) head and antennae; (E) epimeron 3 and urosome; (F) telson; and (G) uropod 2. Scale bars: (a) 0.8 mm (Figure 1A), 0.2 mm (Figure 1B,C,F&G); (b) 0.4 mm (Figure 1D&E).

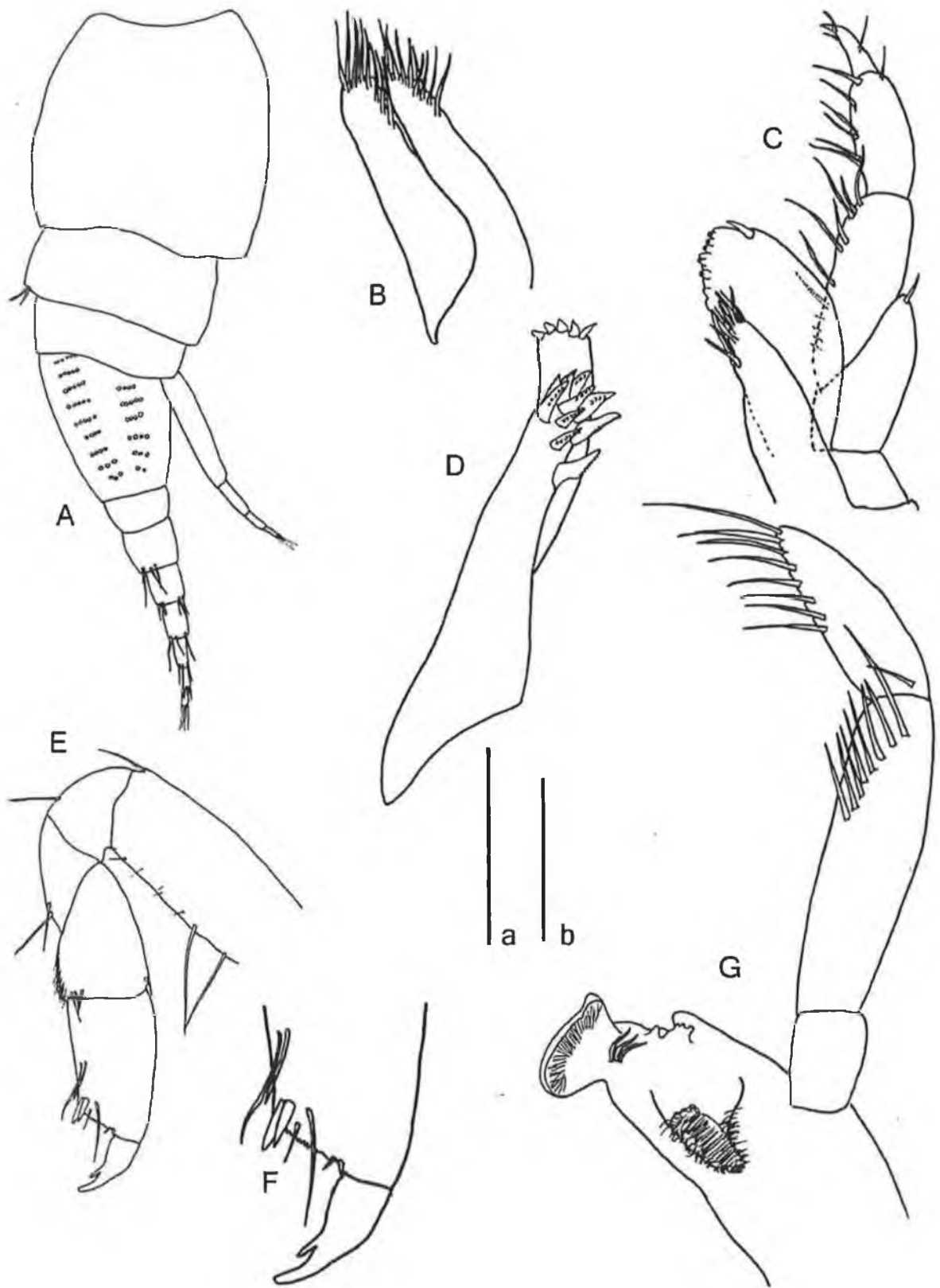


Figure 2. *Orchomenella crenata* Chevreux & Fage, 1925. Female, 2.8 mm, from Irish Sea (52°37.5'N 06°06.31'W, 22 m). (A) Antenna 1; (B) maxilla 2; (C) right maxilliped; (D) maxilla 1; (E) gnathopod 1; (F) gnathopod 1 propodus palm and dactylus; and (G) right mandible. Scale bars: (a) 0.2 mm (Figure 2A,C,E&G), 0.1 mm (Figure 2D&F); (b) 0.2 mm (Figure 2B).

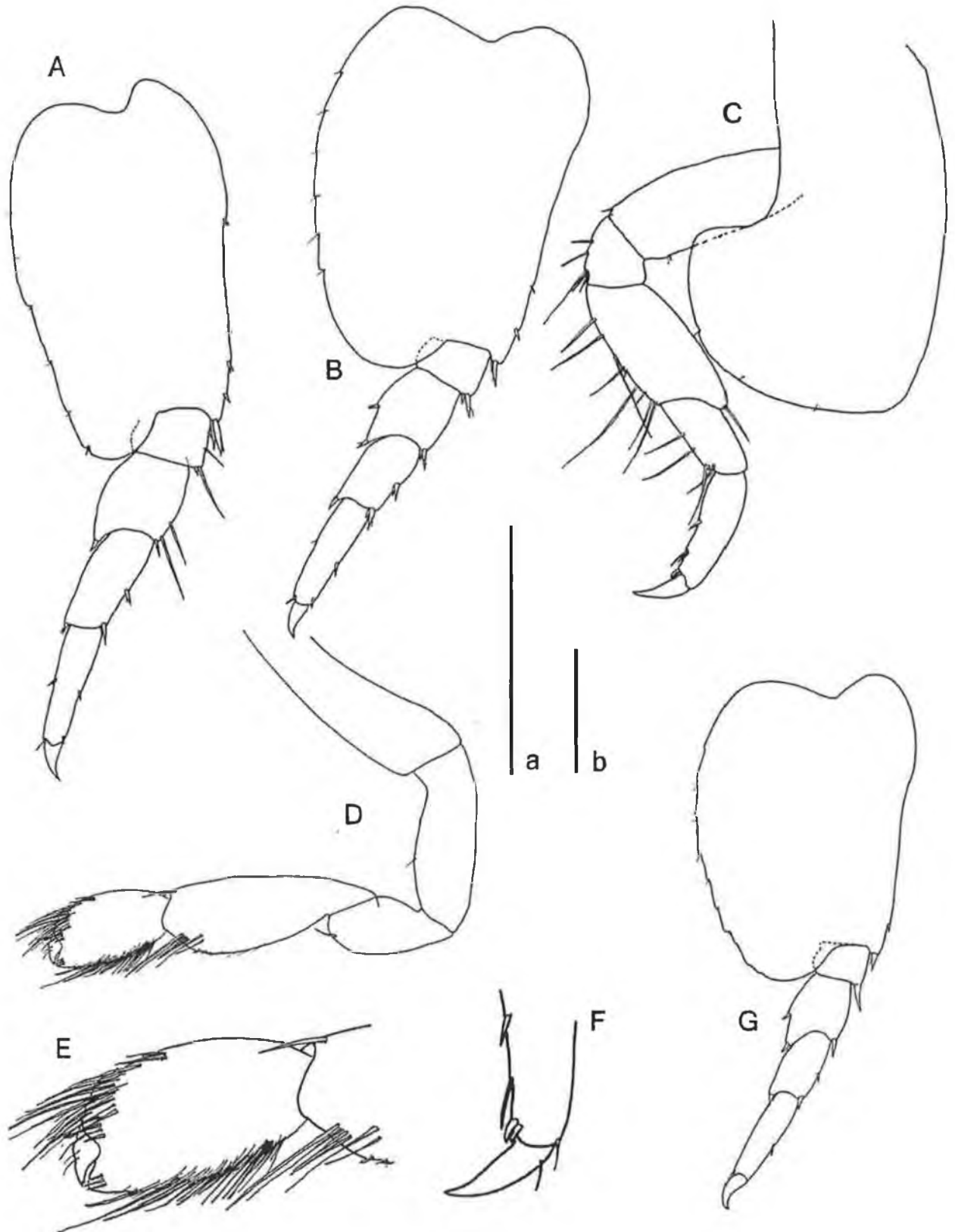


Figure 3. *Orchomenella crenata* Chevreux & Fage, 1925. Female, 2.8 mm, from Irish Sea (52°37.5'N 06°06.31'W, 22 m). (A) Pereopod 6; (B) pereopod 5; (C) pereopod 4; (D) gnathopod 2; (E) gnathopod 2 propodus and dactylus; (F) pereopod 3 propodus and dactylus; and (G) pereopod 7. Scale bars: (a) 0.2 mm (Figure 3E&F); (b) 0.2 mm (Figure 3A–D&G).

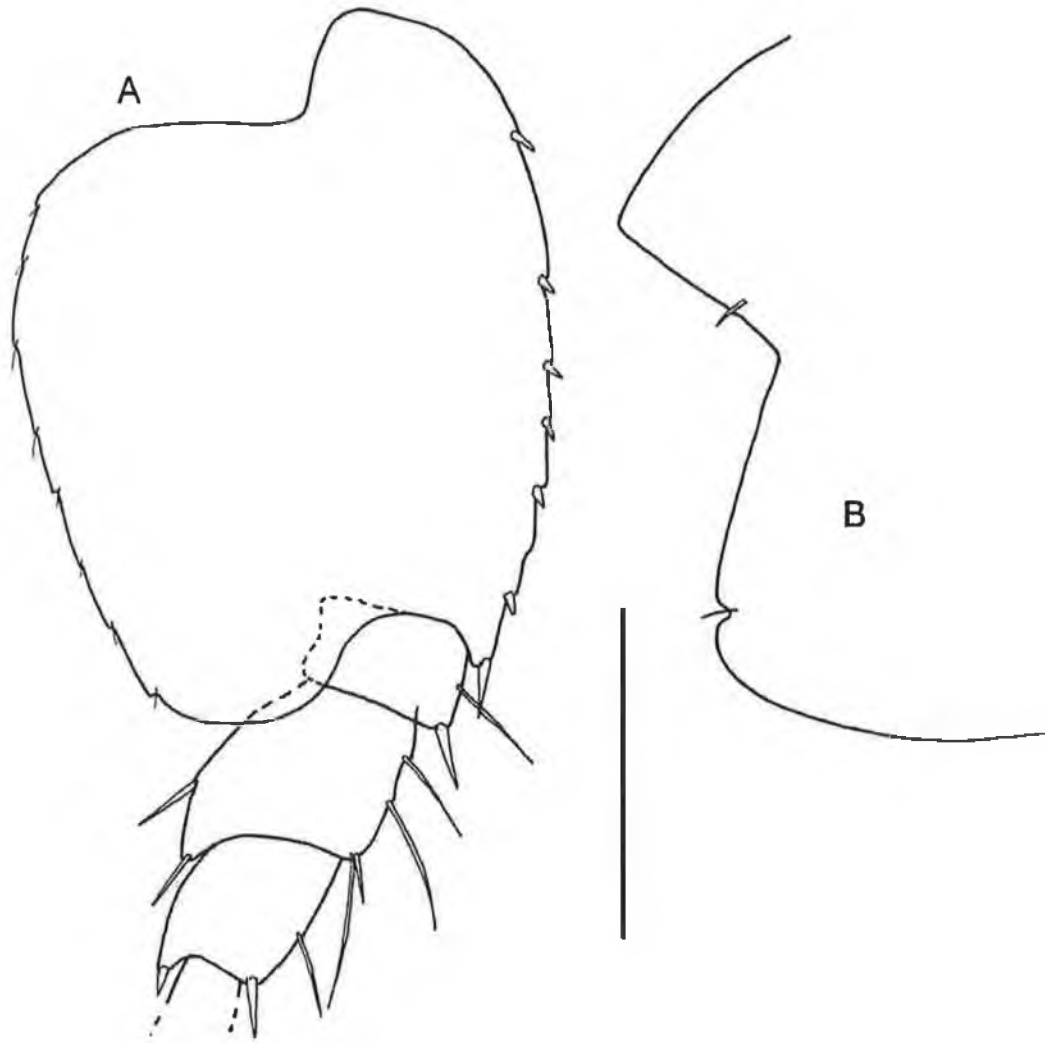


Figure 4. *Orchomenella crenata* Chevreux & Fage, 1925. Female, 2.9 mm, from Marseille, 90 m. (A) Pereopod 5; and (B) epimeron 3. Scale bar: 0.2 mm.

material examined was also determined to be conspecific to both the West Africa and Irish Sea material. This included the specimens collected by Ledoyer (1977) from Marseille. No difference was found between the specimens labelled as *Orchomenella nana* and those labelled as *Orchomenella crenata* by Ledoyer. However, as we have not examined all of Ledoyer's (1977) material it is impossible to say if this is the case for all specimens determined by him as *O. nana*.

Orchomenella nana (Krøyer, 1846)
(Figures 5–7)

Anonyx nanus Krøyer, 1846: 30.

?*Orchomenella ciliata*.—G.O. Sars, 1891: 69, pl. 25, figure 2.

Anonyx pinguis.—(non Boeck, 1861) Della Valle, 1893: 821, pl. 28, figures 22–35.

Orchomenella nanus.—Stebbing, 1906: 81.

Orchomenella nana.—Chevreux & Fage, 1925: 71, figure 62.—Chevreux, 1925: 288.—Reid, 1951: 195.—Diviacco & Ruffo, 1989: 525, figure 359 (in part).—Dauvin & Sorbe, 1995: 443, 447, 449, tables 4–5, 456.

Orchomene nana.—G. Karaman, 1973: 133, figures 14–18.—Lincoln, 1979: 70, figures 25a–g, 26c–h.—Costello et al., 1989: 34.—Dauvin et al., 1994: 550, table 3.

Orchomene nanus.—Barnard & Karaman, 1991: 509.

Type material

According to Dr Jørgen Olesen of the ZMUC, the type material of *O. nana* is lost (ex ZMUC CRU-7476).

Type locality

The Kattegat.

Material examined

The Kattegat, Skagerrak and the Øresund: 10 females, 3.6–5 mm, 7 males, 3.8–5.5 mm, ZMUC CRU-4999.

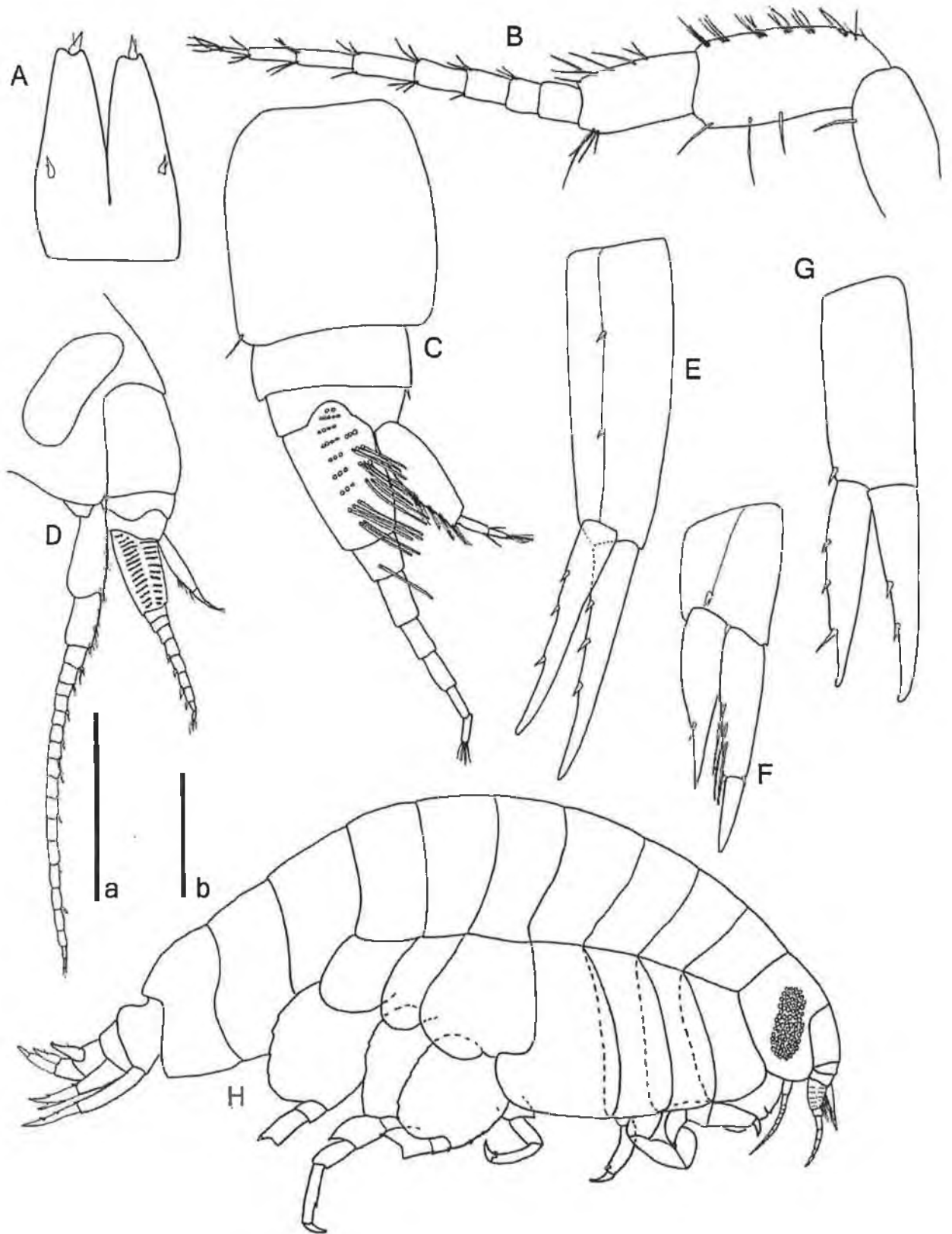


Figure 5. *Orchomenella nana* (Krøyer, 1846). Female, 3.6 mm. (A) Telson; (B) antenna 2; (C) antenna 1; (D) head and antennae (male); (E) uropod 1; (F) uropod 3; (G) uropod 2; and (H) entire. Scale bars: (a) 0.2 mm (Figure 3A,B,C&F); 0.8 mm (Figure 3H); (b) 0.4 mm (Figure 3D); 0.2 mm (Figure 3E&G).

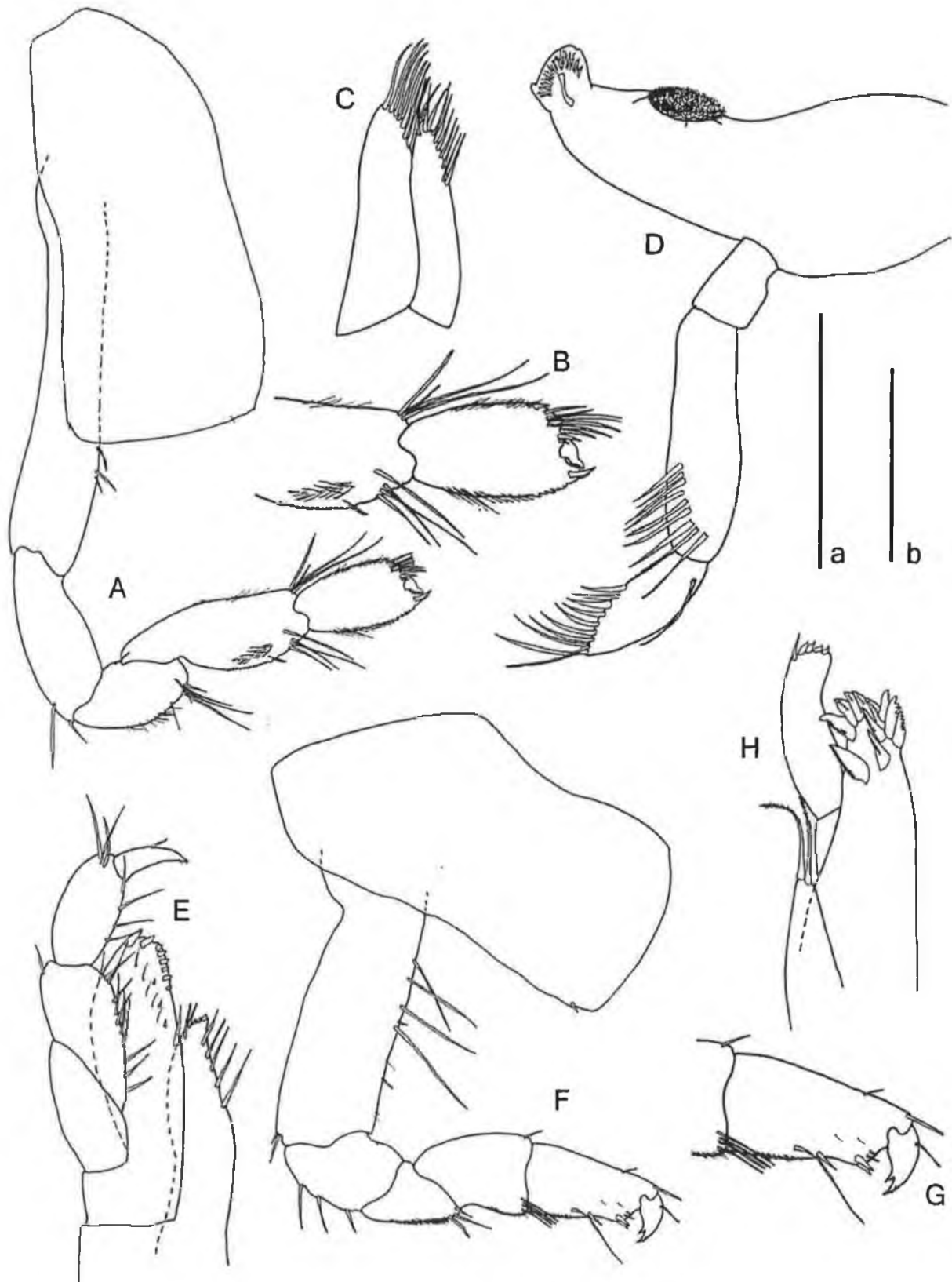


Figure 6. *Orchomenella nana* (Krøyer, 1846). Female, 3.6 mm. (A) Gnathopod 2; (B) gnathopod 2 propodus; (C) maxilla 2; (D) left mandible; (E) left maxilliped; (F) gnathopod 1; (G) gnathopod 1 propodus; and (H) maxilla 1. Scale bars: (a) 0.4 mm (Figure 5A&F); 0.2 mm (Figure 5C,D,E&H); (b) 0.2 mm (Figure 5B&G).

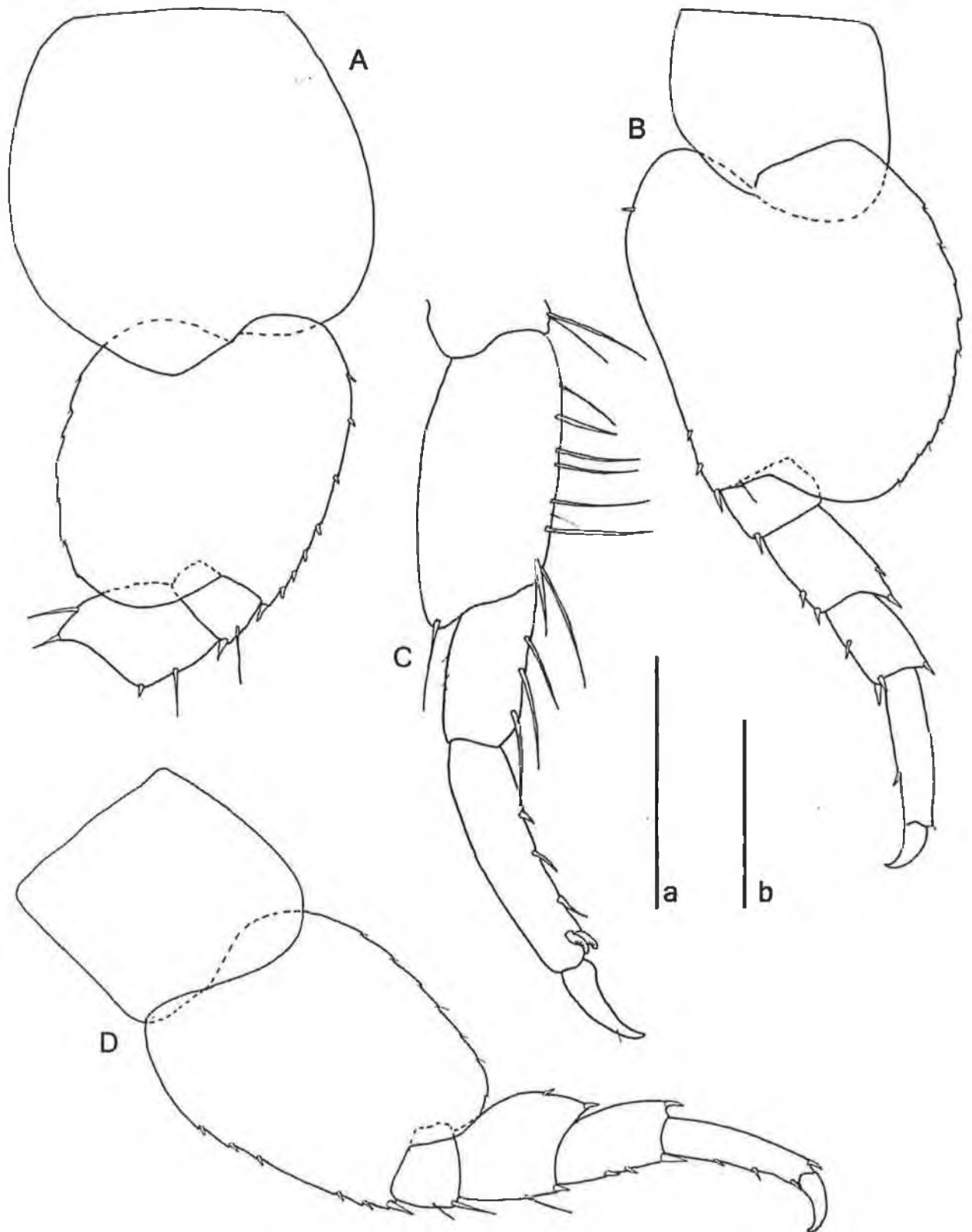


Figure 7. *Orchomenella nana* (Krøyer, 1846). Female, 3.6 mm. (A) Pereopod 5; (B) pereopod 7; (C) pereopod 4; and (D) pereopod 6. Scale bars: (a) 0.4 mm (Figure 6A,B&D); (b) 0.2 mm (Figure 6C).

Diagnosis

Maxilliped outer plate reaching well beyond palp article 2; coxa 1 subrectangular with slightly concave anterior margin; pereopod 5 subequal in length and breadth; epimeron 3 posterior margin smooth—without any notches or crenations.

Description of adult female

Antenna 1 subequal to or slightly shorter than antenna 2; flagellum article 1 distinctly elongate, about equal to next three articles combined, with strong 2-field calynophore. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute to narrowly rounded. Mouthparts forming a quadrate bundle. Mandible with palp attached slightly proximal to molar, molar triturative. Maxilliped palp 4-articulate, reaching well beyond outer plate; inner plate well developed, greater than half the length of outer plate; outer plate reaching beyond article 2 of palp.

Gnathopod 1 subchelate; coxa 1 large, about as long as coxa 2, subrectangular with slightly concave anterior margin; ischium short, about 1.5 times as long as broad; carpus short, of subequal length to propodus; propodus longer than broad, margins subparallel, palm slightly acute, margin posteriorly delimited by two large, robust setae. Gnathopod 2 minutely chelate; carpus distinctly longer than propodus. Pereopods 3–4 propodus with blunt, locking robust setae at posterodistal corner. Coxa 5 producing slight posterior lobe; pereopod 5 basis subequal in length and breadth. Coxa 6 producing posterior lobe, pereopod 6 basis longer than broad; merus posterodistally produced to less than $\frac{1}{2}$ carpus length. Pereopod 7 basis longer than broad and rounded posteriorly. Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner subacute to subquadrate, posterior margin smooth.

Urosomite 1 with dorsal depression and rounded dorsal carina posteriorly. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus with slight marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long (up to half length of article 1), rami distinctly unequal with inner ramus extending slightly past article 1 of outer ramus. Telson distinctly longer than broad, cleft to about 70%.

Length

3.5–5 mm.

Male (sexually dimorphic characters)

Antenna 1 shorter than antenna 2; flagellum article 1 as long as remaining articles combined; accessory flagellum present. Antenna 2 approximately half of body length; calceoli present. Lateral cephalic lobes subacute, somewhat narrower than in female. Length about 3.8–5.5 mm.

Distribution

North-east Atlantic, North Sea, Mediterranean Sea (?).

Depth

Infralittoral to bathyal.

Remarks

Table 1 outlines the distinguishing features of these two species.

Mediterranean specimens examined here, previously identified as *Orchomenella nana* (Krøyer) by various investigators, are in fact *O. crenata* Chevreux & Fage. No specimens of *O. nana* were found in the material examined from the Mediterranean. This species may occur in the Mediterranean, as Karaman (1973) noted specimens from the south Adriatic as lacking a crenated epimeron posterior margin, while Diviacco & Ruffo (1989) illustrate a smooth epimeron margin in specimens from the Adriatic also.

Karaman's (1973) illustrations of *Orchomene nana* from Boka Kotorska correspond with our illustrations of *Orchomenella crenata* from the Irish Sea, having a notched 3rd epimeron, a pereopod 5 basis that is longer than broad and a slightly tapering coxa 1. Conversely, in the same publication, material illustrated from the Atlantic, at Brest, have the characteristics of *O. nana* including a smooth epimeron, a pereopod 5 basis that is subequal in length and breadth, and a more subrectangular coxa 1.

Table 1. Outline of the main morphological differences between *Orchomenella nana* and *O. crenata*.

	<i>Orchomenella nana</i>	<i>Orchomenella crenata</i>
Maxilliped outer plate	Reaching beyond palp article 2	Reaching to tip of palp article 2
Coxa 1	Subrectangular, anterior margin slightly concave	Weakly tapering posterodistally
Pereopod 5 basis	As long as broad	Longer than broad
Epimeron 3 posterodistal corner	Smooth	With 1–3 notches

The authors wish to thank Dr Jørgen Olesen of the ZMUC, Professor Sandro Ruffo of the MSNV and Ms Michèle Bruni of the MOM for the loan of specimens from respective institutions.

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A revision of the North Atlantic amphipod genus *Normanion* (Crustacea: Amphipoda: Lysianassoidea)

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Abstract

Members of the lysianassoid genus *Normanion* have previously been difficult to identify, due to uncertainty regarding synonymies and validity among members of the taxon. Here, the genus is reviewed and a full description with illustrations is provided for the four eyed-species. Species are compared and synonymies are resolved.

Key words *Normanion*, Amphipoda, Lysianassoidea, Northeast Atlantic, Mediterranean

Introduction

Opis quadrimana, a species of lysianassoid amphipod, was described from the coast of Banffshire, Scotland, by Bate and Westwood (1868). This species later served as the type for the new genus *Normania* Boeck (1872). However, the latter was homonymous with a genus of Ostracod, and thus, Bonnier (1893) emended the name to *Normanion*.

Normanion is a small genus in which there are currently six described species. Species level identification is difficult owing to the superficial similarity of at least three of the species. As a result, these have been placed in the synonymy of each other by various authors at different times. The issue is further confused by the fact that the type of the genus, *N. quadrimanus*, as described and illustrated by Bate and Westwood, differs considerably from the type material deposited in the Natural History Museum, London (NHML). Bate and Westwood's illustration shows a denticulate palm on the gnathopod 1 propodus, and the authors state that "the propodos [sic] of the first pair (of gnathopods) is quadrate, the palm being...armed with a minutely denticulated thickened margin..." However, the type specimen from the NHML, as later redrawn by Lincoln (1979) has a

striated palm, devoid of any denticulations. It is this difference that caused much of the later problems regarding synonymy.

In his monograph on the Norwegian fauna, Sars (1890–1895) includes two species, *Normanion amblyops* n. sp. and *Normanion quadrimanus* (Bate & Westwood). However, Stebbing (1906) noted that Bate and Westwood's *Opis quadrimana* and Sars' *Normanion quadrimanus* differ in the form of the inner margin of the gnathopod 1 dactylus. Bate and Westwood's illustration displayed a smooth dactylus, whereas that of Sars' was distinctly serrated. Thus, Stebbing established a new species for Sars' specimen, attributing it to him under the name *Normanion sarsi*. Simultaneously, Stebbing also placed Sars' other species, *N. amblyops*, in the synonymy of *N. quadrimanus* (Bate & Westwood).

Chevreur (1920) pointed out that *Normanion quadrimanus sensu* Bate and Westwood has a denticulate gnathopod 1 propodus palm, whereas that of the two species described by Sars were striated. Thus, he re-established *N. amblyops* as a valid species. Included in the same publication is an amphipod from the coast of Brittany, which Chevreux considered to be *N. quadrimanus* due to its denticulate gnathopod 1 palm. The same author had previously described another species, *Normanion abyssi* Chevreux, 1903, from 2,368 m depth, in a baited trap off the coast of Monaco. This is a highly distinctive taxon due to the rudimentary 4th article on the maxilliped palp and the apparent absence of eyes.

At this stage there were four described species of *Normanion* — *N. quadrimanus* (Bate & Westwood), *N. amblyops* Sars, *N. abyssi* Chevreux and *N. sarsi* Stebbing.

No major changes were made to the genus in the North Atlantic for a number of years until Lincoln (1979) redescribed *N. quadrimanus*. He redrew the 1st gnathopod from the type material in the NHML. The result was a gnathopod 1 propodus palm that was striated, not denticulate as illustrated by Bate and Westwood. Lincoln included Sars' (1890–95) identification of *N. quadrimanus* in his synonymy section for the same species, and, as such, he did not recognise the validity of *N. sarsi*. However, as he offers no comment on the matter, his reasons for this decision are unknown.

It is also unknown whether Lincoln agreed with the move by Chevreux (1920) to retain *N. amblyops* as a valid species. However, in light of the redescription of *N. quadrimanus* as having a striated gnathopod 1 palm rather than a denticulate one, Chevreux's (1920) reasoning for considering *N. amblyops* as a distinct species is unsound. As Diviacco and Vader (1988) point out, "*N. amblyops* may or may not be identical with *N. quadrimanus*". Despite this comment, it was the opinion of these latter authors that *N. amblyops* is a valid species; however, as their study was limited to Mediterranean species, they did not investigate the matter further.

Diviacco and Vader (1988) described two new species of *Normanion* from the Mediterranean — *N. chevreuxi* with a denticulate gnathopod 1 palm, and *N. ruffoi* with a striated palm. This brought the total number of possible *Normanion* species to six. In the present work only the *Normanion* species with eyes are investigated further. The sixth species, *Normanion abyssi*, is excluded. It is known from the type material only, and this

material could not be located. However, because of its unique combination of characters (the presence of a rudimentary 4th article on the maxilliped palp and the apparent absence of eyes) this species is distinctive and need not be included in this revision.

Normanion spp. are temporary symbionts of benthic fishes, and with the exception of the *Normanion abyssii* holotype, they have never been collected from baited traps (Vader & Romppainen, 1985).

Materials and methods

Material studied was from the collections of the Museo Civico di Storia Naturale di Verona (MSNV), the Natural History Museum, London (NHML), and the Zoological Museum of the University of Oslo (ZMO). Additional material was taken by the R.V. *Celtic Explorer* off the west coast of Ireland (52°49'N 11°40'W), by epibenthic sled, in October 2004.

Illustrations were made using a compound microscope with a drawing attachment. Descriptions were generated from a DELTA (DEscriptive Language for TAXonomy) database (Dallwitz *et al.*, 1999).

Systematics

Normanion Bonnier, 1893

Normania Boeck, 1871: 119 (homonym, Ostracoda). — G.O. Sars, 1895: 32. — Della Valle, 1893: 796.

Normanion Bonnier 1893: 167, 173 (key). G.O. Sars, 1895: 674. — Stebbing, 1906: 41. — Chevreux & Fage, 1925: 35. — Ledoyer, 1977: 378. — Lincoln, 1979: 44. — Diviacco and Ruffo, 1989: 511. — Barnard and Karaman, 1991: 504.

Type species. *Opis quadrimana* Bate & Westwood, 1868.

Diagnosis. Antenna 1 subequal with or slightly shorter than antenna 2; antenna 2 short, less than 40% of body length. Epistome not distinct from labrum. Mandible palp attached proximal to molar, molar weak. Maxilliped palp 3-articulate or article 4 rudimentary, inner plate well developed, long and narrow. Gnathopod 1 subchelate, propodus as broad as long or broader than long, palm transverse. Pereopods 5–7 long and slender, dactyls extremely long and slender. Uropods rami lanceolate, uropod 2 rami unequal. Telson entire or slightly emarginate.

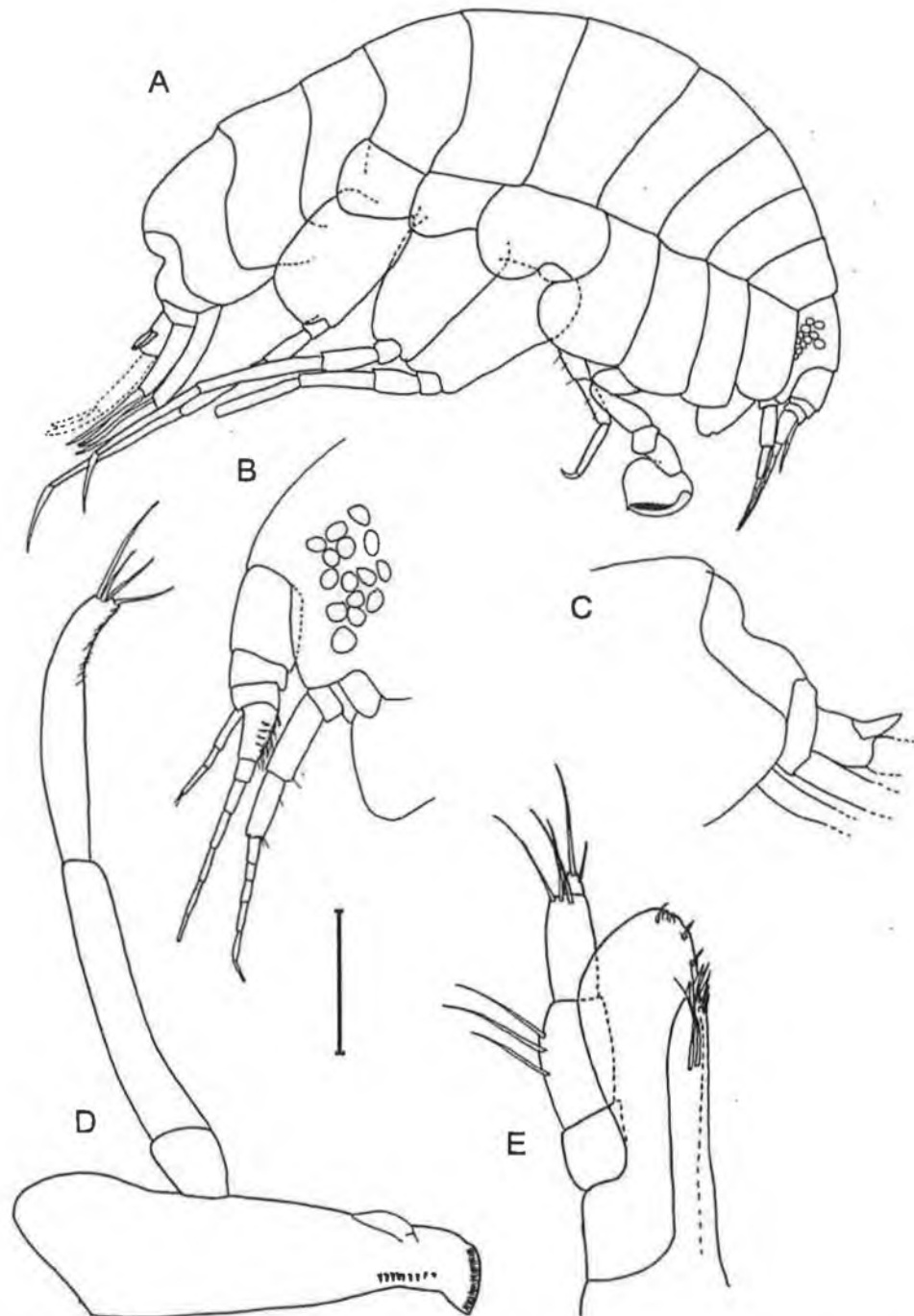


FIGURE 1. *Normanion amblyops* Sars, 1895, female, 5 mm (syntype): (A) habitus; (B) head and antennae; (C) epimeron 3 and urosome; (D) left mandible; (E) left maxilliped. Scale bar = 0.8 mm (A); 0.4 mm (B–C); 0.1 mm (D–E).

***Normanion amblyops* G.O. Sars, 1895**

Figures 1–3

Normanion amblyops G.O. Sars, 1895: 674, suppl. pl. 1, fig. 1. – Barnard and Karaman, 1991: 505.
Normanion quadrimanus. – Stebbing, 1906: 42 (in part).

Type material. SYNTYPES: 5 specimens in alcohol, 4–5.5 mm, NHML 1911. 11. 8. 12768–12772.

Type locality. Rødbjerget, Trondhjemsfjord. 366–549 m (200–300 fathoms).

Material examined. Syntypes, 5 specimens in alcohol, 4–5.5 mm, from Trondhjemsfjord, NHML 1911.11.8:12768–12772; ZMO F10526, 2 specimens on slides, 5–5.5 mm.

Description. Lateral cephalic lobes subquadrate. Eyes present. Antenna 1 more or less subequal to antenna 2; flagellum 7-articulate, flagellum article 1 distinctly elongate; callynophore present; accessory flagellum 3-articulate. Antenna 2 flagellum 6-articulate; calceoli absent. Mandible palp attached proximal to molar. Maxilliped palp 4-articulate, article 4 rudimentary, palp reaching well beyond tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus subequal in length to propodus; propodus broader than long, palm transverse, striated, and posterodistally delimited by 2 robust setae and a central spine. Gnathopod 2 minutely chelate; carpus twice as long as propodus. Pereopods 3 and 4 with short dactyls. Coxa 5 produced into a posterior lobe; pereopod 5 basis almost twice as long as broad, produced well beyond ischium; dactylus extremely long and slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis almost twice as long as broad, produced beyond ischium. Pereopod 7 basis longer than broad, not produced beyond ischium.

Pleonites 1–3 with very slight dorsal depression; epimeron 1 anterodistal corner subquadrate; epimeron 3 posterodistal corner rounded. Urosomite 1 with distinct dorsal depression, distally followed by a rounded dorsal carina. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus longer than outer ramus; uropod 3 rami subequal.

Distribution. Norwegian Sea. Approximately 360–550 m.

Remarks. *N. amblyops* differs from all other species of *Normanion*, except *N. abyssi*, in having a rudimentary fourth article on the maxilliped palp. It differs from descriptions *N. abyssi* in the presence of eyes.

***Normanion chevreuxi* Diviacco & Vader, 1988**

Figures 4–6

Normanion chevreuxi Diviacco and Vader, 1988: 118, figs 1–2. — Diviacco and Ruffo, 1989: 514, fig. 350.

Normanion quadrimanus. — Chevreux, 1920: 75, fig. 1. — Chevreux and Fage, 1925: 35, figs

14–15. — Ledoyer, 1968, 180. — Bellan-Santini and Ledoyer, 1973: 920. — Ledoyer, 1977: 379, fig. 19A. — Barnard and Karaman, 1991: 505.
 Non *Opis quadrimana* Bate and Westwood, 1868: 503.

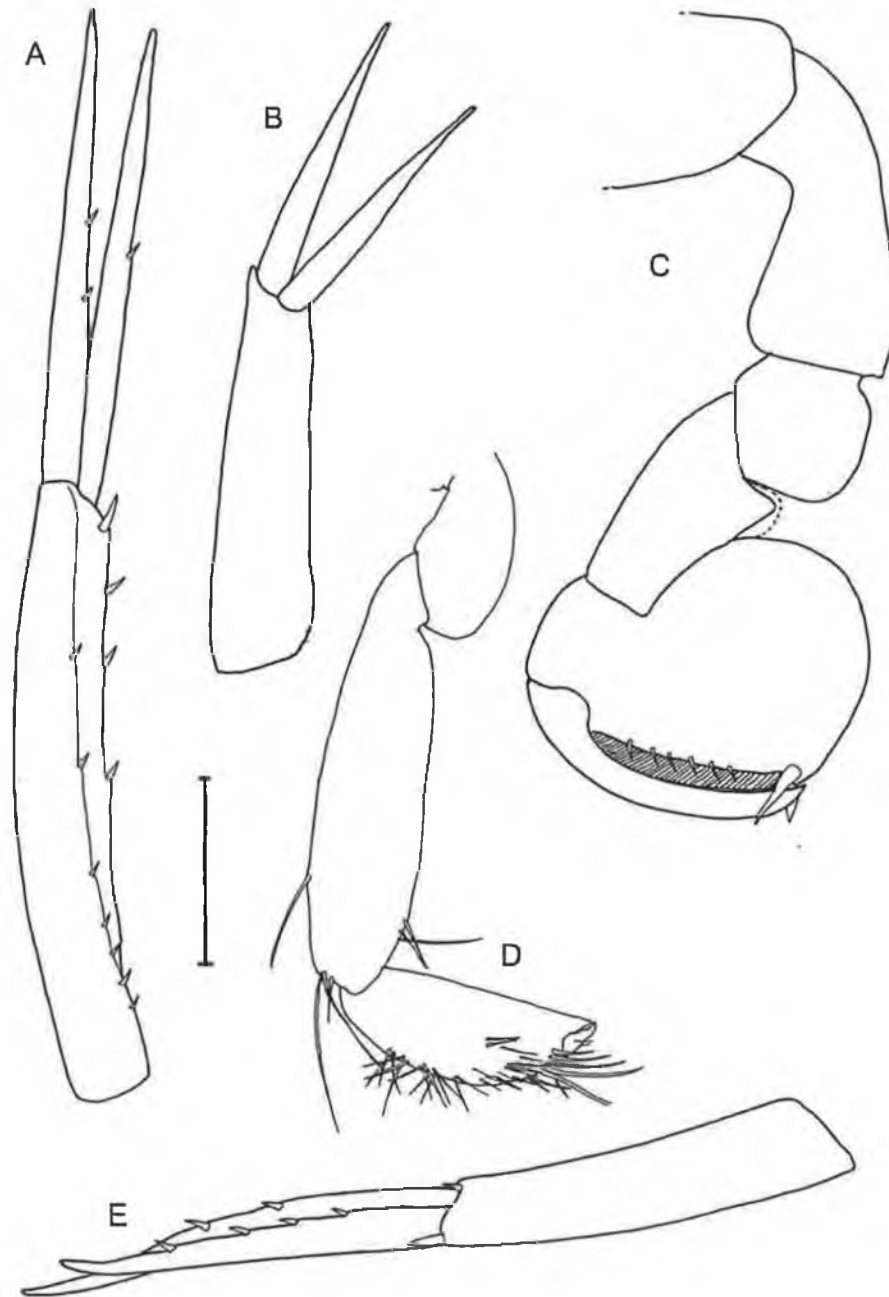


FIGURE 2. *Normanion amblyops* Sars, 1895, female, 5 mm (syntype): (A) uropod 1; (B) uropod 3; (C) gnathopod 1; (D) gnathopod 2; (E) uropod 2. Scale bar = 0.2 mm.

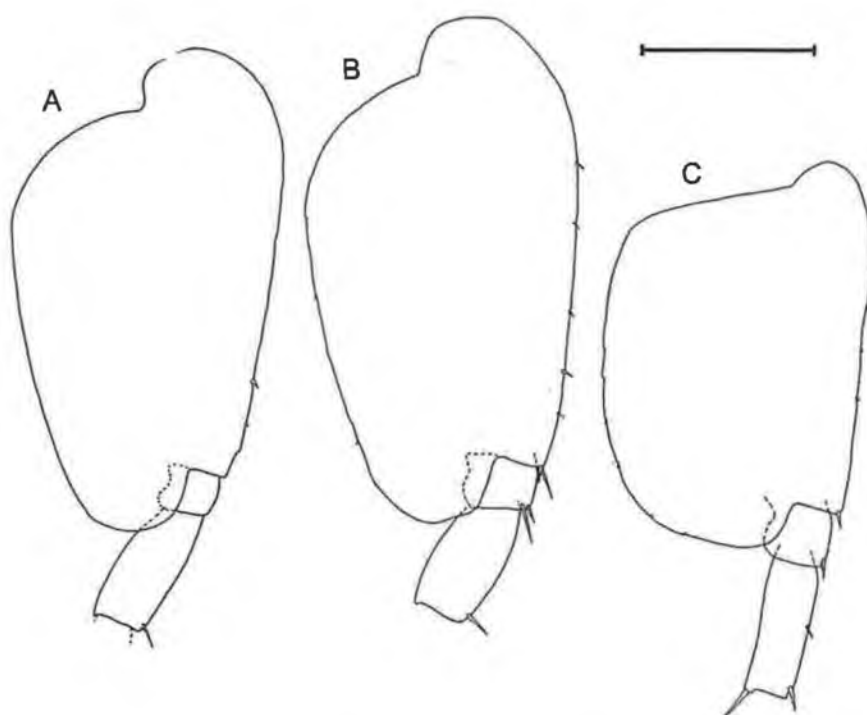


FIGURE 3. *Normanion amblyops* Sars, 1895, female, 5 mm (syntype): (A) pereopod 5; (B) pereopod 6; (C) pereopod 7. Scale bar = 0.4 mm.

Type material. HOLOTYPE: Ovigerous female, 3 mm, MSNV No. 774–777.

Type locality. Marseille.

Material examined. Holotype, 1 specimen on a slide, 3 mm, from Marseille, 90 m, dendritic bottom, MSNV 774–777; 1 specimen in alcohol, 2.5 mm, from Marseille, 80 m, MSNV FVP 25; 2 specimens in alcohol, both 3 mm, from Marseille, 90 m, dendritic bottom, MSNV FVP 33.

Description. Lateral cephalic lobes subacute. Eyes present. Antenna 1 subequal to antenna 2, flagellum 6-articulate, article 1 slightly longer than article 2; calynophore present; accessory flagellum 4-articulate. Antenna 2 flagellum 4-articulate; calceoli absent. Mandible palp attached proximal to molar, molar setose. Maxilliped palp 3-articulate, palp reaching to tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus more or less subequal in length to propodus; propodus slightly longer than broad, palm transverse, denticulate, and posterodistally delimited by 2 robust setae; inner margin of dactylus may be smooth or have small, blunt serrations. Gnathopod 2 minutely chelate; carpus twice as long as propodus. Pereopods 3–4 dactylus small. Coxa 5 produced into a posterior lobe; pereopod 5 basis twice as long as broad, produced beyond ischium; dactylus extremely long and

slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis twice as long as broad, not produced beyond ischium. Pereopod 7 basis subrectangular, slightly longer than broad, and not produced beyond ischium.

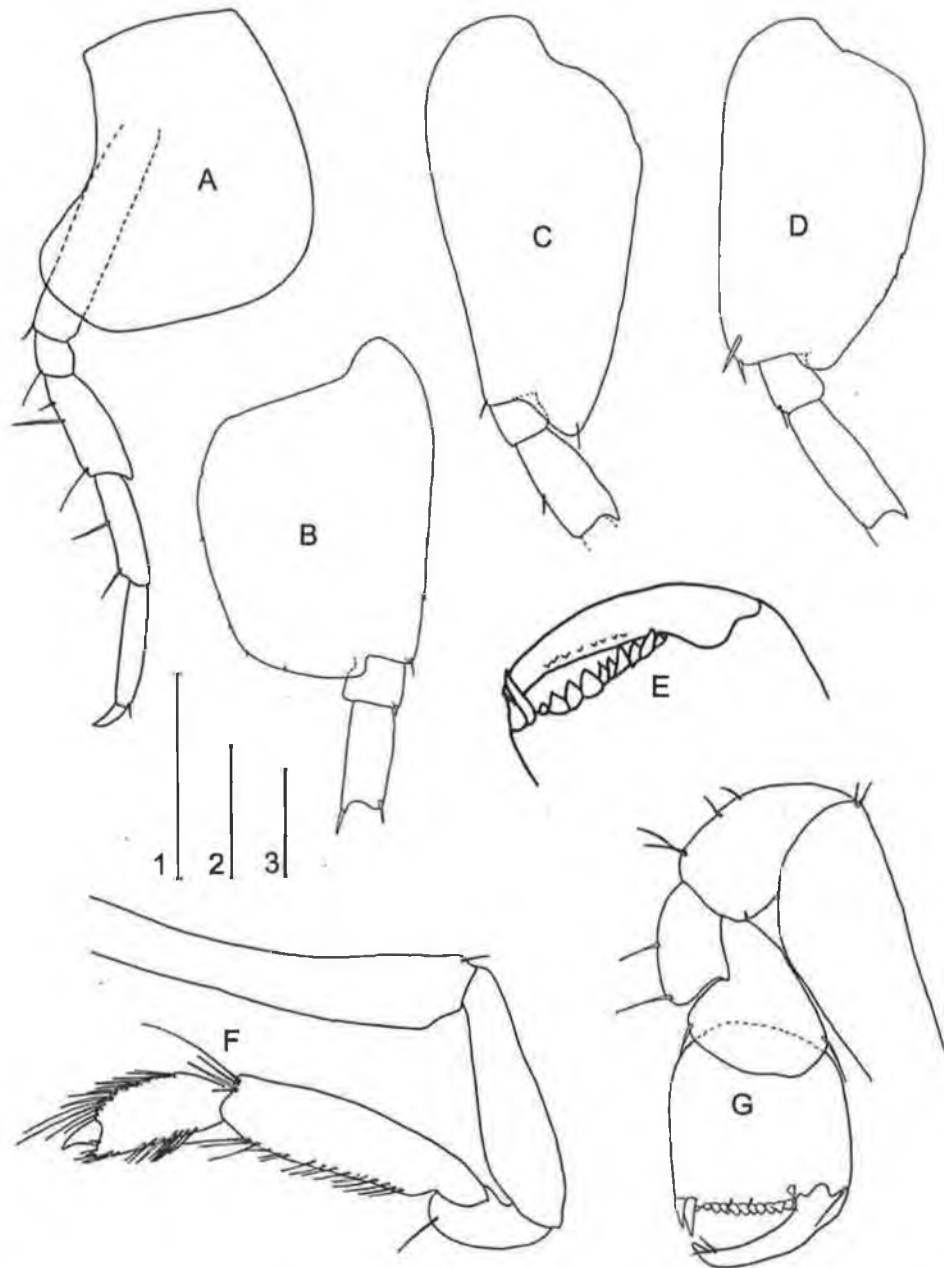


FIGURE 4. *Normanion chevreuxi* Diviacco & Vader, 1988, female, 3 mm (holotype): (A) pereopod 4; (B) pereopod 7; (C) pereopod 5; (D) pereopod 6; (E) gnathopod 1 dactylus; (F) gnathopod 2; (G) gnathopod 1. Scale bars: 1= 0.1 mm (E); 2= 0.2 mm (A–D); 3= 0.1 mm (F–G).

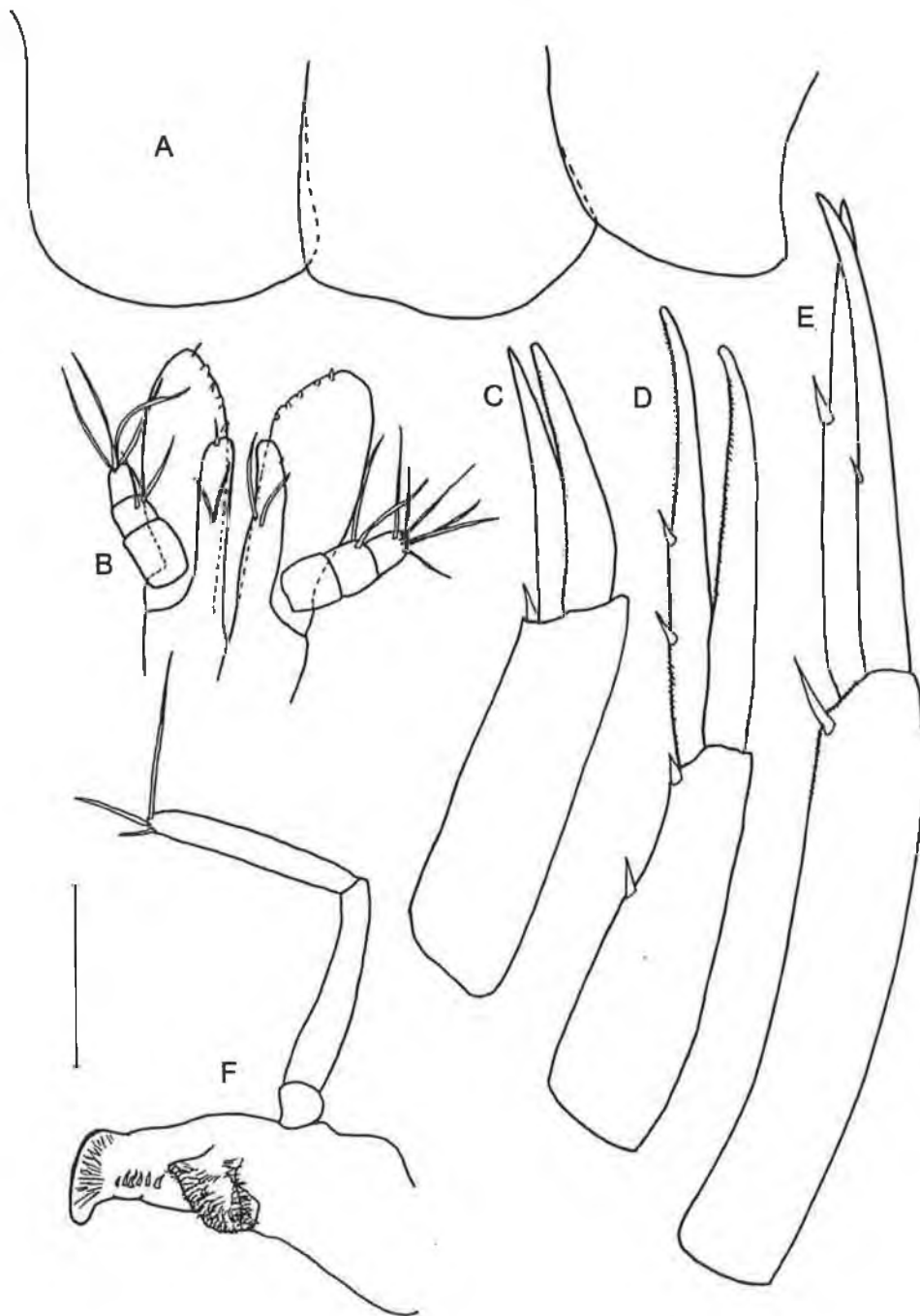


FIGURE 5. *Normanion chevreuxi* Diviacco & Vader, 1988, female, 3 mm (holotype): (A) epimera 1-2; (B) maxilliped; (C) uropod 3; (D) uropod 2; (E) uropod 1; (F) right mandible. Scale bar = 0.2 mm (A); 0.1 mm (B-F).

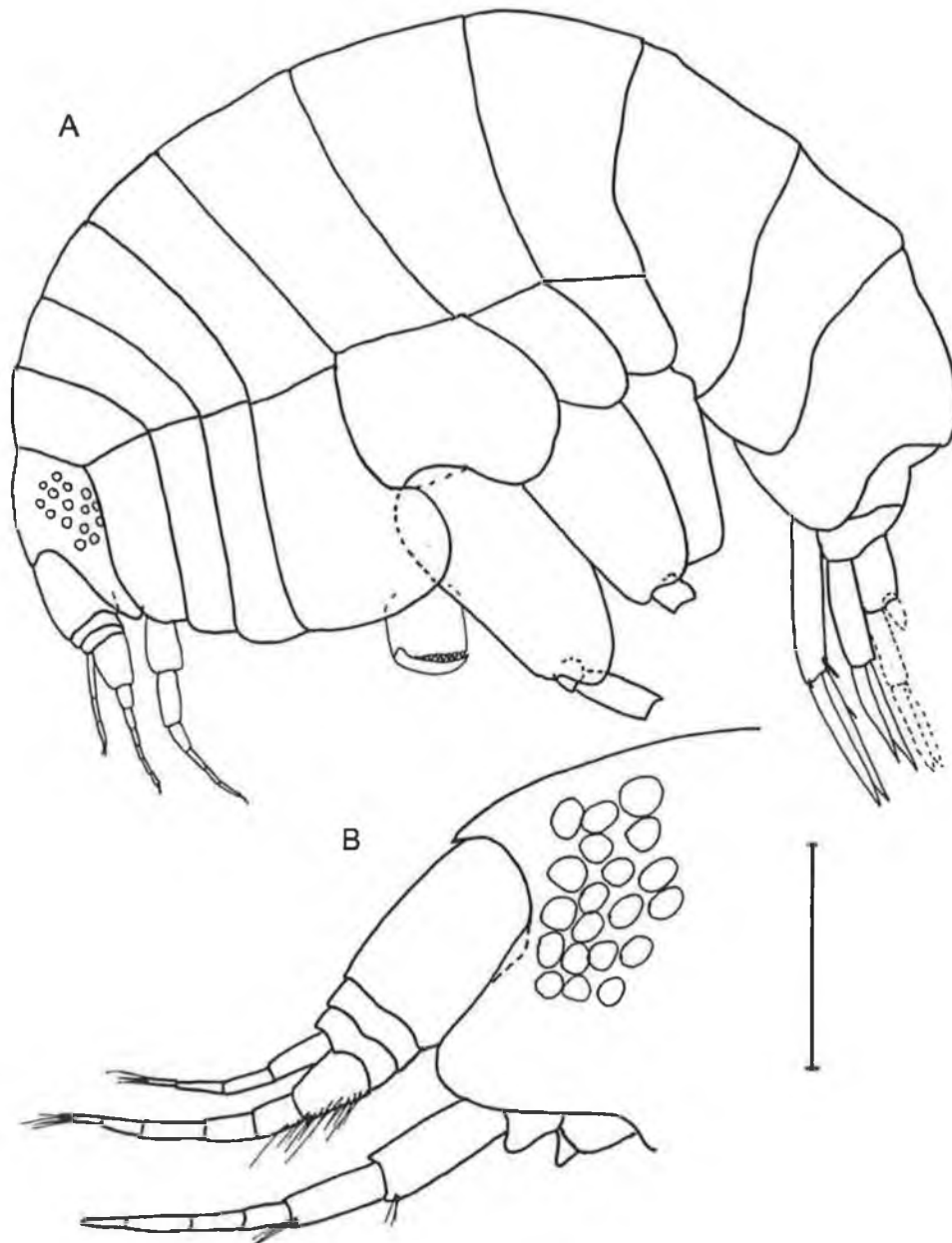


FIGURE 6. *Normanion chevreuxi* Diviacco & Vader, 1988, female, 2.5 mm (MSNV FVP 25): (A) habitus; (B) head and antennae. Scale bar: 0.4 mm (A); 0.2 mm (B).

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, with inner ramus longer than outer ramus; uropod 3 rami subequal. Telson emarginate.

Distribution. Mediterranean and Atlantic coast of France (Brittany). 35–130 m.

Remarks. *N. chevreuxi* differs from other *Normanion* species in the denticulate form of the gnathopod 1 palm. Due to the misleading description and drawings of Bate and Westwood (1868), this species had previously been confused by some authors [Chevreux (1920); Ledoyer (1977)] with *N. quadrimanus*. However, in light of the re-description of *N. quadrimanus* as having a striated palm, the coarsely denticulated gnathopod 1 palm of *N. chevreuxi* makes it a highly distinctive species.

The examined material exhibited variation in the form of the inner margin of the dactylus. While the dactylus of some specimens is perfectly smooth, others show tiny, blunt serrations. However, these serrations are far less conspicuous than those of some specimens of either *N. quadrimanus* or *N. ruffoi*.

***Normanion quadrimanus* (Bate & Westwood, 1868)**

Figures 7–9

Opis quadrimana Bate and Westwood, 1868: 503.

Normania quadrimana Boeck, 1871: 120. — G.O. Sars, 1895: 33, pl. 13, fig. 1.

Normanion quadrimanus. — Stebbing, 1906: 42 (in part). — Lincoln, 1979: 44, fig. 13 (in part). —

?Costello *et al.*, 1989: 34. — Barnard and Karaman, 1991: 505.

Normanion sarsi Stebbing, 1906: 42.

Type material. TYPE: NHML 1911. 11. 8. 654.

Type locality. Banffshire, Scotland.

Material examined. Type NHML 1911. 11. 1. 654, 3.2 mm from Banffshire, Scotland; NHML 1911. 11. 8. 1267, 2 specimens on slides, sex unknown, from Cumbrae, Scotland; ZMO F10523, 2 specimens on slides, 3–3.5 mm; ZMO F13172, 15 specimens in alcohol, 2–4 mm, both ZMO collections from Trondhjemsfjord.

Description. Lateral cephalic lobes subquadrate. Eyes present. Antenna 1 subequal to antenna 2, flagellum approximately 5-articulate, article 1 distinctly elongate; calynophore present; accessory flagellum 3-articulate. Antenna 2 flagellum 4-articulate; calceoli absent. Mandible palp attached proximal to molar, molar setose. Maxilliped palp 3-articulate, reaching to tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus shorter than propodus; propodus subequal in length and breadth, palm transverse, striated, and posterodistally delimited by 2 robust setae and a central spine; inner margin of dactylus may be smooth or have small, blunt serrations. Gnathopod 2 minutely chelate; carpus twice as long as propodus. Pereopods 3–4 dactylus small. Coxa 5 produced into a posterior lobe; pereopod 5 basis almost twice as long as broad, produced beyond ischium; dactylus extremely long and slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis longer than broad, not produced beyond ischium. Pereopod 7 basis subrectangular, longer than broad, and not produced beyond ischium.

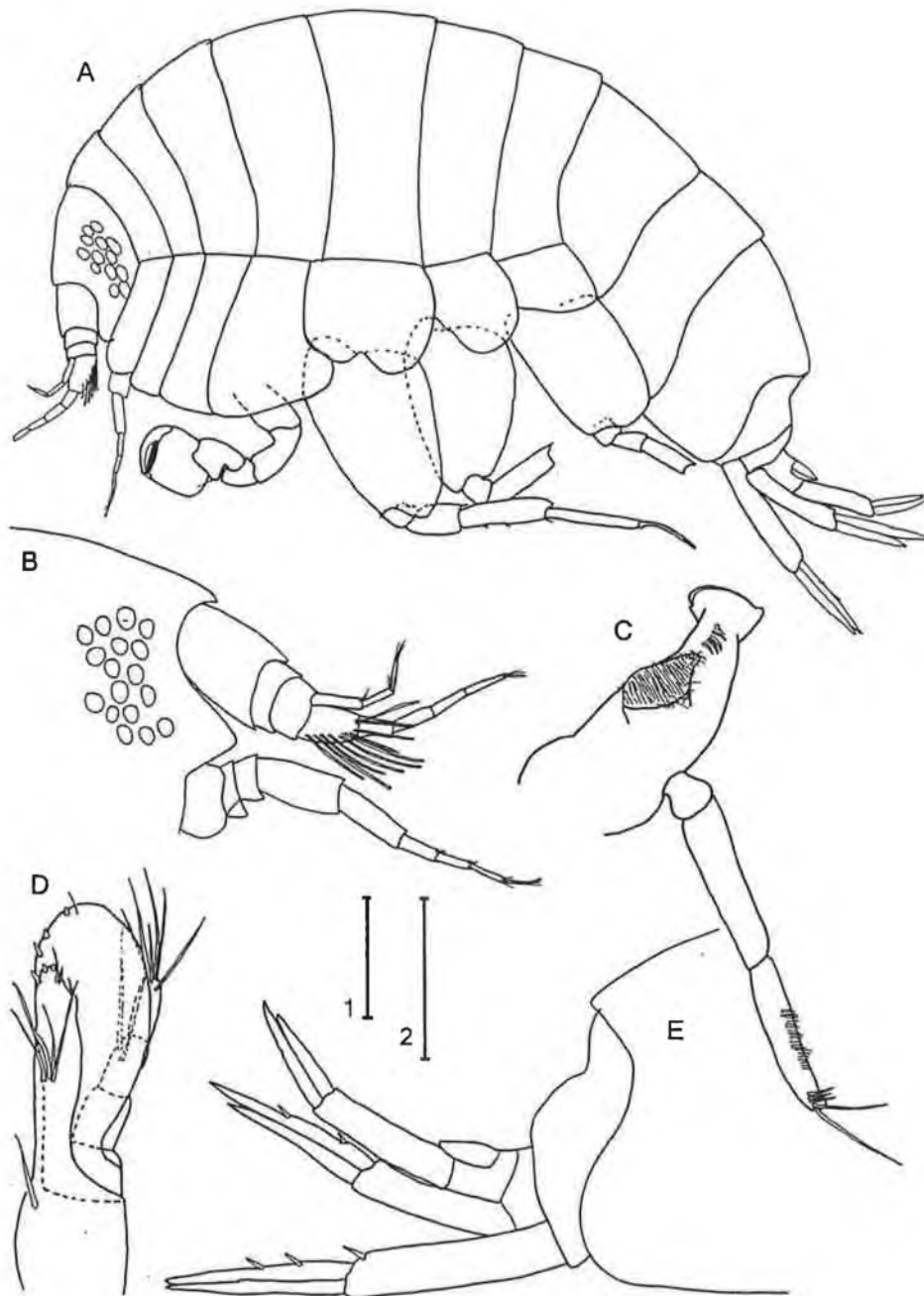


FIGURE 7. *Normanion quadrimanus* (Bate & Westwood, 1868), (A) *habitus* (female, 3.2 mm, holotype); (B) head and antennae (NHML 1911. 11. 8. 1267); (C) right mandible (NHML 1911. 11. 8. 1267); (D) right maxilliped (NHML 1911. 11. 8. 1267); (E) epimeron 3 and urosome (holotype). Scale bars: 1 = 0.4 mm (A); 0.2 mm (B, E); 2 = 0.1 mm (C–D).

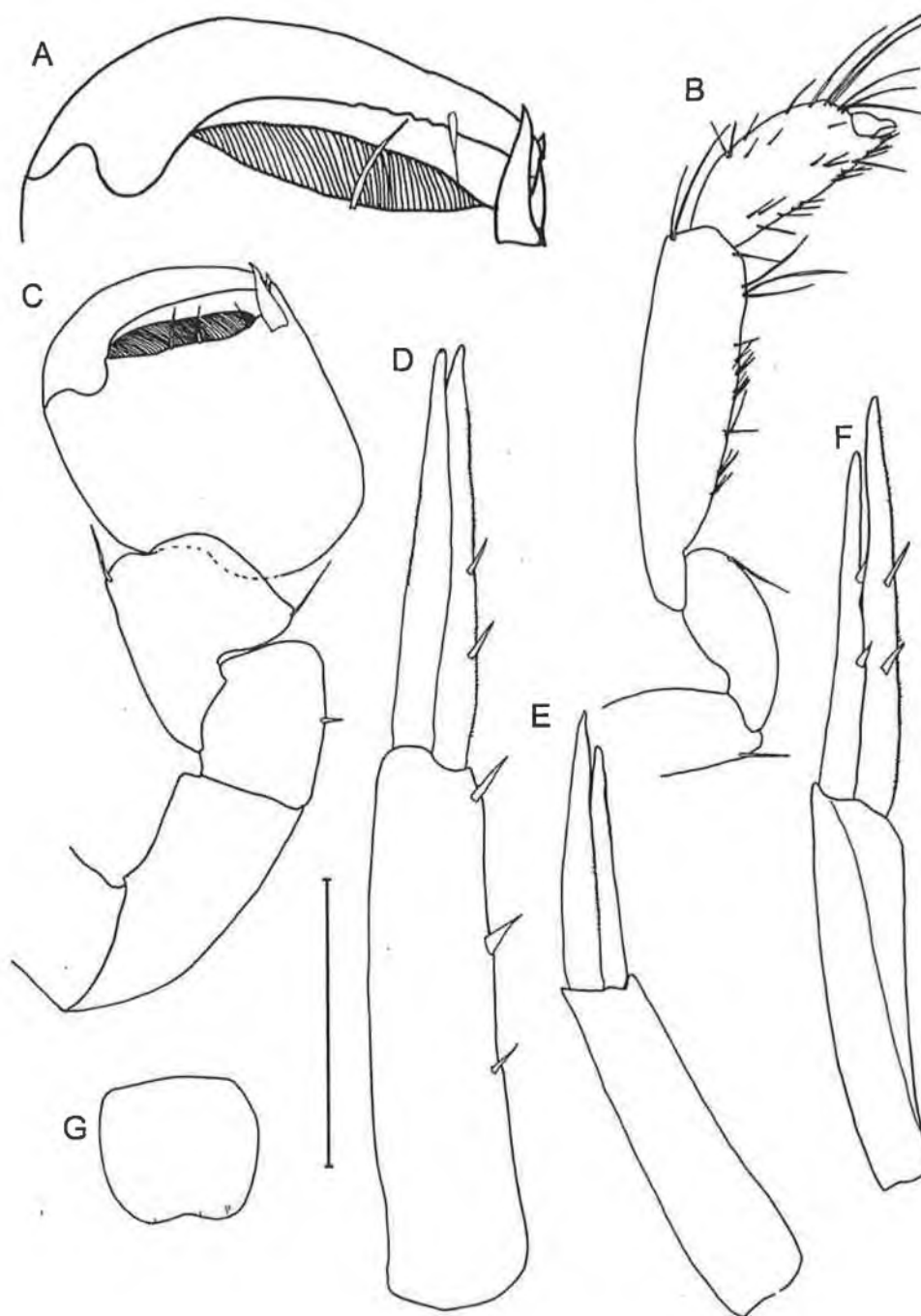


FIGURE 8. *Normanion quadrimanus* (Bate & Westwood, 1868), female, 3.2 mm (holotype): (A) gnathopod 1 dactylus; (B) gnathopod 2; (C) gnathopod 1; (D) uropod 1; (E) uropod 2; (F) uropod 3; (G) telson (non-type—NHML 1911. 11. 8. 1267). Scale bar = 0.1 mm (A); 0.2 mm (B–G).

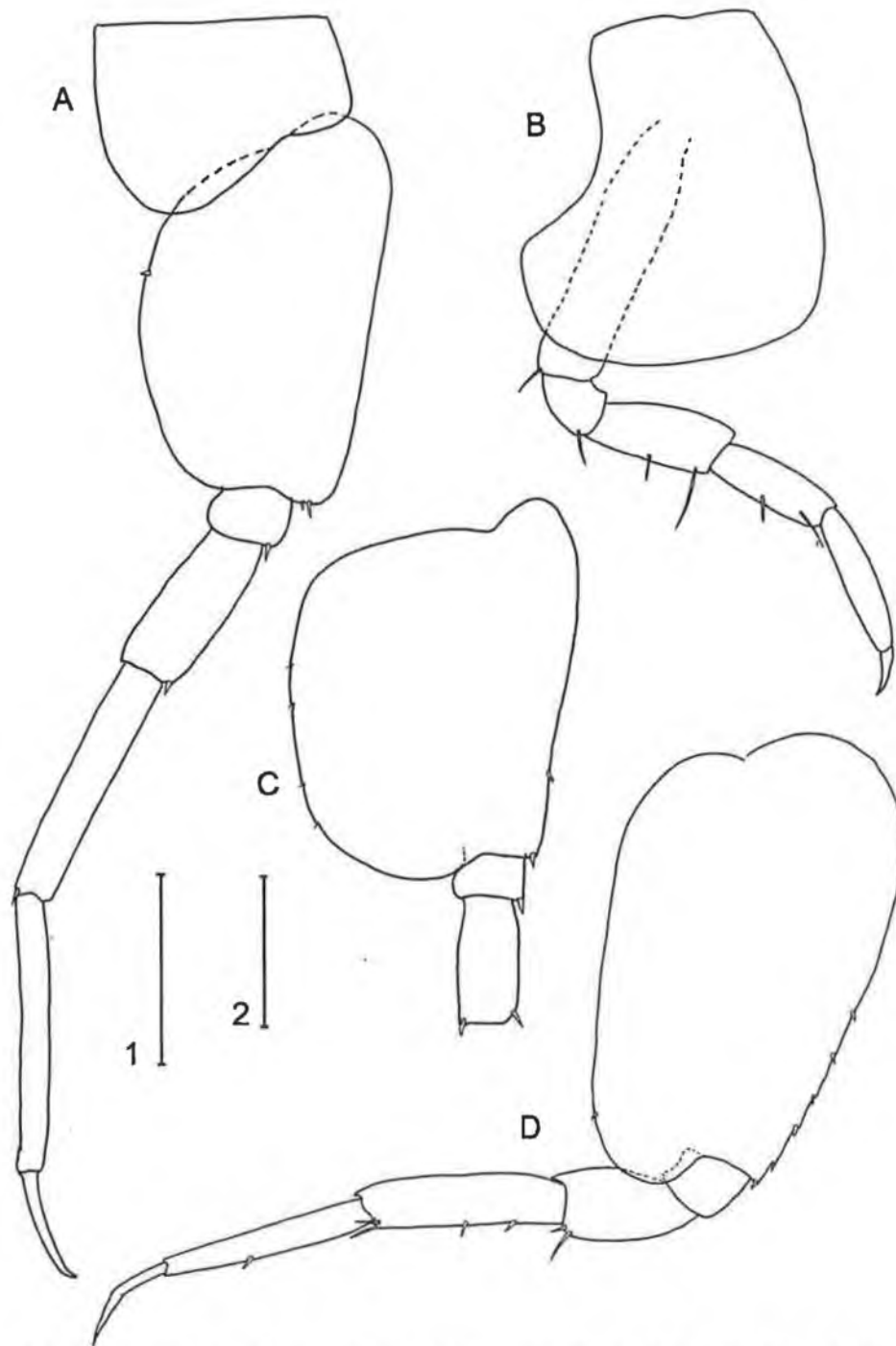


FIGURE 9. *Normanion quadrimanus* (Bate & Westwood, 1868), (NHML 1911. 11. 8. 1267): (A) pereopod 6 (B) pereopod 4; (C) pereopod 7; (D) pereopod 5 (holotype). Scale bars: 1= 0.2 mm (A–C); 2=0.2 mm (D).

Epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus much longer than outer ramus; uropod 3 rami distinctly unequal, inner ramus shorter than outer ramus. Telson slightly emarginate.

Distribution. Northeast Atlantic, from the west coast of Scotland and the Norwegian Sea, 20–565 m.

Remarks. *N. quadrimanus*' unique combination of characters are the 3-articulate maxilliped palp, the smooth and striated gnathopod 1 palm, and the relative lengths of the uropod 3 rami, which are unequal.

The examined material showed a variety of form of the inner margin of the gnathopod 1 dactylus. While some specimens exhibit a smooth inner margin, others have an uneven surface with small bumps (including the type specimen), while more still have tiny blunt serrations. This appears to be the only variation, as other characters remain stable.

Normanion ruffoi Diviacco & Vader, 1988

Figures 10–12

Normanion ruffoi Diviacco and Vader, 1988: 122, figs 3–5. — Diviacco and Ruffo, 1989: 514, figs 351–352.

?*Normanion sarsi*. — Ledoyer, 1977: 381, fig 19B.

Normanion quadrimanus. — ?Costello *et al.*, 1989: 34.

Type material. HOLOTYPE: Ovigerous female, 3.5 mm, MSNV No. 766–769.

Type locality. Marseille.

Material examined. Holotype, female, 3.5 mm, from Marseille, 180–360 m, bathyal mud, MSNV No. 766–769; 8 specimens, 2.5–5 mm, from Trondhjemsfjord, ZMO F13172; 2 specimens, 2.5–3 mm, from the west coast of Ireland, 52°49'N 11°40'W, 158.4 m, coarse sand and shells, collected by N.M Kilgallen, 3/10/2004.

Description. Lateral cephalic lobes subquadrate. Eyes present. Antenna 1 slightly shorter than antenna 2, flagellum 5-articulate, article 1 slightly longer than article 2; callynophore present; accessory flagellum 3-articulate. Antenna 2 flagellum 3-articulate; calceoli absent. Mandible palp attached proximal to molar, molar setose. Maxilliped palp 3-articulate, reaching to tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus shorter than propodus; propodus subequal in length and breadth, palm transverse, striated, and posterodistally delimited by 2 robust setae and a central spine; inner margin of dactylus may be smooth or have small, blunt serrations. Gnathopod 2 minutely chelate; carpus almost twice as long as propodus. Pereopods 3–4 dactylus small. Coxa 5 produced into a posterior lobe; pereopod 5 basis twice as long as broad, produced beyond ischium; dactylus extremely long and slender.

Coxa 6 produced into a posterior lobe; pereopod 6 basis twice as long as broad, not produced beyond ischium. Pereopod 7 basis subrectangular, slightly longer than broad, not produced beyond ischium.

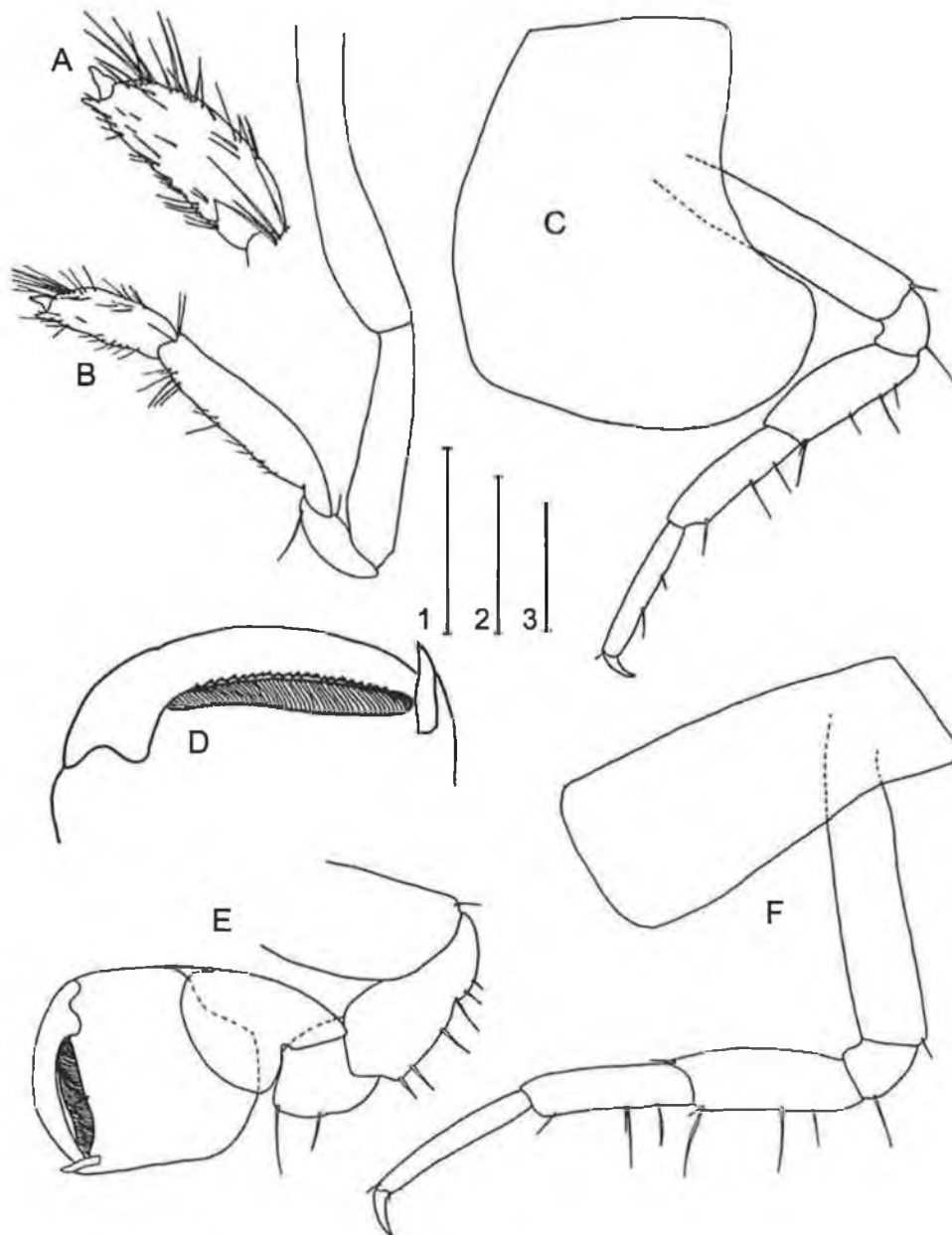


FIGURE 10. *Normanion ruffoi* (Diviacco & Vader, 1988), female, 3.5 mm (holotype): (A) gnathopod 2 propodus; (B) gnathopod 2; (C) pereopod 4; (D) gnathopod 1 dactylus (non-type—ZMO F13172); (E) gnathopod 1; (F) pereopod 3. Scale bars: 1= 0.1 mm (D); 2=0.2 mm (B–C, E–F); 3=0.1 mm (A)

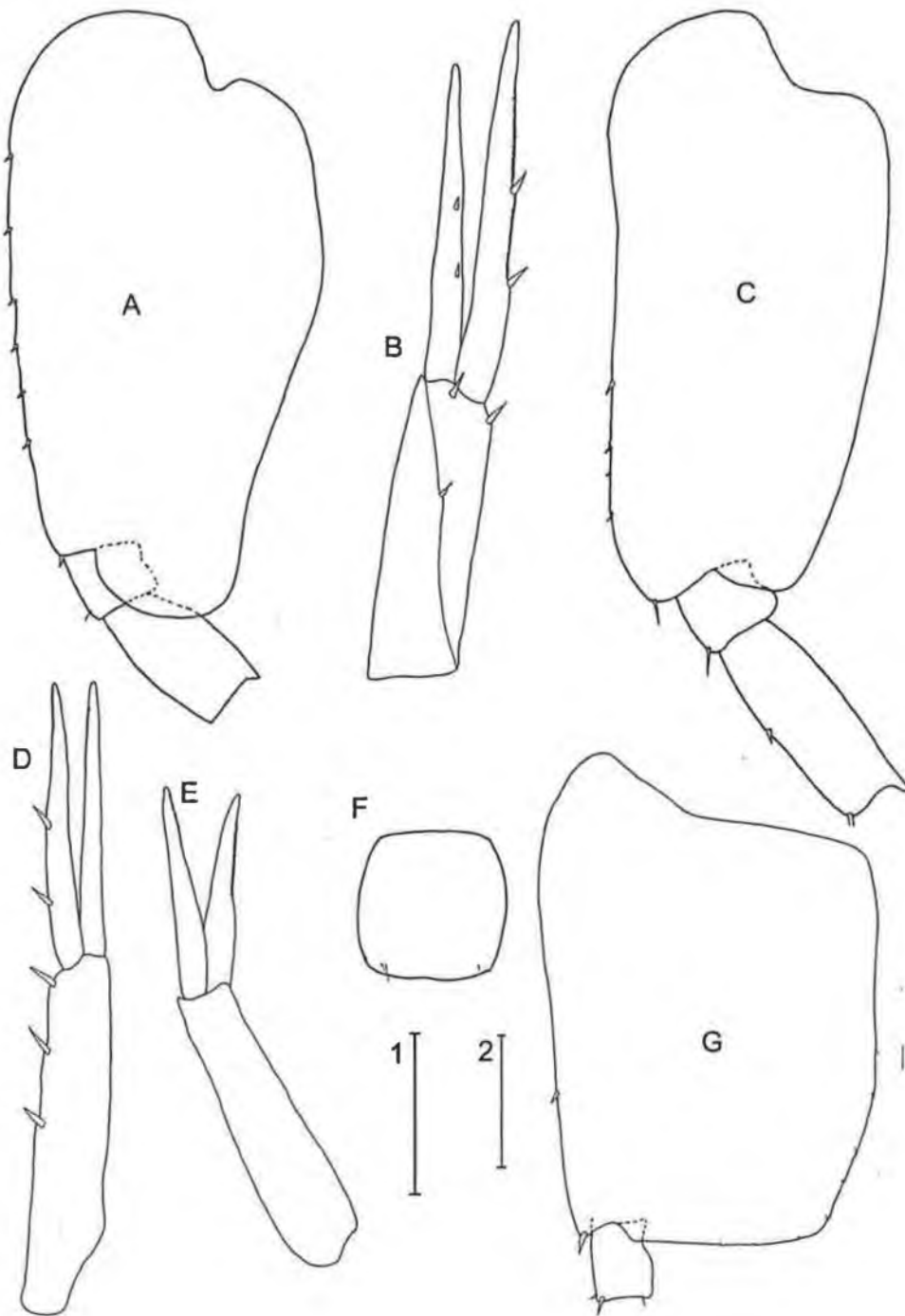


FIGURE 11. *Normanion ruffoi* (Diviacco & Vader, 1988), female, 3.5 mm (holotype): (A) pereopod 5; (B) uropod 2; (C) pereopod 6; (D) uropod 1; (E) uropod 3; (F) telson (non-type—ZMO F13172); (G) pereopod 7. Scale bars: 1= 0.2 mm (A, C, G); 2= 0.1 mm (F); 0.125 mm (B, D–E).

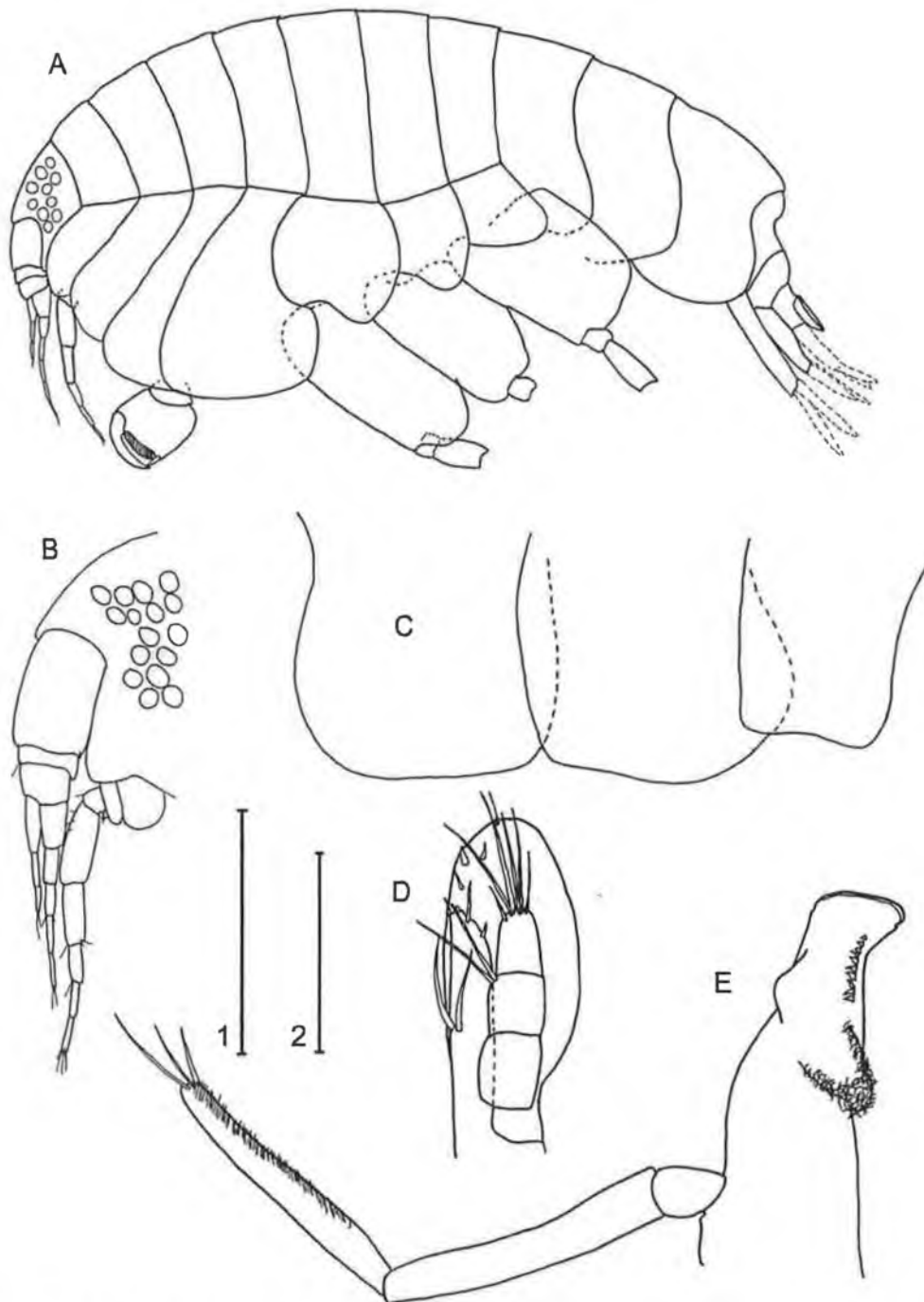


FIGURE 12. *Normanion ruffoi* Diviacco & Vader, 1988, female, 3.5 mm (holotype): (A) habitus (non-type—ZMO F13172); (B) head and antennae; (C) epimera 1–3; (D) right maxilliped; (E) left mandible. Scale bars: 1= 0.8 mm (A–B); 2= 0.4 mm (C); 0.1 mm (D–E).

Epimeron 1 anterodistal corner quadrate; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus much longer than outer ramus; uropod 3 rami subequal. Telson entire.

Distribution. Widespread from the Mediterranean Sea, west coast of Ireland, and to the Norwegian Sea, 120–360 m.

Remarks. *N. ruffoi*'s unique combination of characters are the 3-articulate maxilliped palp, the smooth and striated gnathopod 1 palm, and the subequal uropod 3 rami.

As with *N. quadrimanus* above, the examined material of *N. ruffoi* showed variation in the form of the gnathopod 1 dactylus. While some specimens have a smooth, or slightly uneven inner margin, others have small blunt serrations. Like *N. quadrimanus*, other characters remain stable, and this is the only variation.

Discussion

Stebbing (1906) designated the nom. nov., *N. sarsi*, to a species previously recorded by both Boeck (1871) and Sars (1890) as *N. quadrimanus*. This decision was based on three gnathopod 1 characters, each of which had states in *N. sarsi* that he considered to be different from those of *N. quadrimanus* (Bate and Westwood). The ischium, according to Stebbing, is relatively longer in *N. quadrimanus* than in *N. sarsi*, the carpal process is acute in *N. sarsi* and obtuse in *N. quadrimanus*, and the inner margin of the dactylus of *N. quadrimanus* is completely smooth, while that of *N. sarsi* is "strongly serrate". As Stebbing based his descriptions on previous descriptions and illustrations by Boeck (1871) and Sars (1890), no type material of *Normanion sarsi* was designated for comparative purposes. In the same publication, Stebbing placed *N. amblyops* in the synonymy of *N. quadrimanus* (Bate & Westwood). Hence, Stebbing may not have actually compared his *N. sarsi* with the true *N. quadrimanus*, but rather with *N. amblyops* (herein considered a valid species). This would account for the difference, noted by Stebbing, in relative length of the ischium between *N. sarsi* and *N. quadrimanus*, as the ischium is slightly longer in *N. amblyops* than in any of its congeners. In the material examined by us, no differences were found in the form of the gnathopod 1 carpus between any of the species. The 'serrate' dactylus is found in both *N. quadrimanus* and *N. ruffoi*, and to a lesser degree, in *N. chevreuxi*. Thus, it appears to be a variable character within species. It seems then, that *Normanion sarsi* Stebbing is not a valid species, but is a junior synonym of *N. quadrimanus* (Bate & Westwood).

Thus, there are five valid species of *Normanion* Bonnier. These are *N. quadrimanus* (Bate & Westwood), *N. amblyops* Sars, *N. abyssi* Chevreux, *N. chevreuxi* Diviacco and Vader, and *N. ruffoi* Diviacco and Vader.

Key to the genus *Normanion*

1. Maxilliped palp 4-articulate, article 4 rudimentary; palp reaching well beyond tip of inner plate. Gnathopod 1 propodus broader than long 2
- Maxilliped palp 3-articulate, reaching only to tip of inner plate. Gnathopod 1 propodus subequal in length and breadth, or slightly longer than broad 3
2. Eyes present..... *N. amblyops*
- Eyes absent..... *N. abyssi*
3. Gnathopod 1 propodus palm smooth and striated, not denticulate 4
- Gnathopod 1 propodus palm distinctly denticulate..... *N. chevreuxi*
4. Uropod 3 rami subequal. Telson entire *N. ruffoi*
- Uropod 3 rami distinctly unequal. Telson slightly emarginate *N. quadrimanus*

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**The genus *Sophrosyne* (Crustacea, Amphipoda) in the North Atlantic, a
determination of the status of *S. robertsoni* and a first record of its occurrence
outside Scotland**

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ABSTRACT

Sophrosyne robertsoni was recorded from the west coast of Ireland. This is the first record of the species from outside Scottish waters. Previous authors have commented on the similarity of this species to *Sophrosyne hispana* and suggested that they may be conspecific. Here both species are re-described and their status determined.

INTRODUCTION

The lysianassoid amphipod *Sophrosyne robertsoni* Stebbing & Robertson was collected from the west coast of Ireland in June 2000. This is the first record of this amphipod from outside Scotland since its description in 1891. It is a rarely recorded amphipod and only single specimens have been captured. Diviacco & Ruffo (1989) commented on the similarities between this species and *Sophrosyne hispana* Chevreux, 1888, suggesting the possibility that they might be conspecific. *Sophrosyne murrayi* Stebbing, 1888, the only other species in the genus, is the type of the genus. Unlike its congeners, it is a southern

hemisphere species, the type locality being Kerguelen Island. It is markedly different from the two northern species.

Chevreaux (1900) observed the similarity between *S. hispana* and *S. robertsoni*, but stated that there are, nonetheless, several well-defined characters that distinguish the two taxa. He noted differences in the form of the mandible. According to Chevreaux, the molar is absent in *S. robertsoni* but present in the form of a small, angular tooth in *S. hispana*. The palp also shows variation between the two species, the third article being much shorter than the second in *S. robertsoni* but subequal to it in *S. hispana*. Other differences noted by Chevreaux were the posterior margin of pereopod 6, smooth in *S. hispana* but denticulate in *S. robertsoni*, and the posterodistal corner of epimeron 3, which bends abruptly (*S. hispana*) or is evenly rounded (*S. robertsoni*). He also noted a difference in the degree of cleftness of the telson, remarking that the telson of *S. hispana* was more deeply cleft than that of *S. robertsoni*.

According to Stebbing (1906), *S. hispana* and *S. robertsoni* may be differentiated by the posterior margin of the basis of pereopod 7, which is produced downward in *S. hispana* but not in *S. robertsoni*, and the telson, which is longer than broad and cleft to less than half in *S. robertsoni* and as broad as long, and cleft to the centre in *S. hispana*.

We have examined a number of specimens of both species, including the holotype of *S. hispana*, in order to determine their status.

MATERIALS AND METHODS

Material was examined from the collections of the Musée Océanographique, Monaco (MOM) and the Natural History Museum, London (NHML). New material was sampled from the northwest coast of Ireland in June 2000. Both species are re-described and compared. Illustrations were made using a compound microscope with a drawing

attachment. Descriptions were generated from a DELTA (DEscriptive Language for TAXonomy) database (Dallwitz et al., 1999).

SYSTEMATICS

Order AMPHIPODA Latreille, 1816

Suborder GAMMARIDEA Latreille, 1802

Superfamily LYSIANASSOIDEA Dana, 1849

Genus *Sophrosyne* Stebbing, 1888

Sophrosyne robertsoni Stebbing & Robertson, 1891

(Figure 1)

Sophrosyne robertsoni Stebbing & Robertson, 1891: 31. – Stebbing, 1906: 21. – Lincoln, 1979: 52, fig. 17. – Moore, 1983: 103, figs 1-3. – Barnard & Karaman, 1991: 533, fig. 92L.

Type material. Unknown.

Type locality. Firth of Clyde.

Material examined

Female, NHML 1911.11.8.12549, from Inveraray, Scotland, 1874, dissected and mounted on 3 slides; male, 4 mm, NHML 1982.249.1, from the stomach of a whiting, *Merlangius merlangus* (L.), captured at 22-31 m, Lynn of Lorne, Scotland (56°28.5'N, 5°27'W), by Dr R. Gibson, August 1976, partially dissected and mounted on 12 slides; female, 5 mm, from Co. Mayo, Ireland (54°34'N, 11°06'W), 347.9 m, collected by Aquafact International Services Ltd, June 2000; female, 4.5 mm, from Co. Mayo, Ireland (54°33'N, 11°06'W), 342.6 m, collected by Aquafact International Services Ltd, June, 2000; female, 6 mm, from Co. Mayo, Ireland (54°35'N, 11°04'W), collected by Aquafact International Services Ltd, June 2000.

Description of adult female

Antenna 1 peduncle article 1 not inflated, distinctly longer than broad; flagellum article 1 only slightly longer than article 2, calynophore absent, calceoli absent. Eyes not apparent in preserved material. Lateral cephalic lobes subacute. Mandible molar absent, palp elongate; article 2 subequal to or slightly longer than article 3, with 1-2 setae at anterodistal margin; article 3 slender weakly falcate with setae at distal margin. Maxilliped palp 4-articulate; outer plate poorly developed, not reaching half length of article 2 of palp; inner plate poorly developed, not reaching article 1 of palp.

Gnathopod 1 slightly chelate; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus compressed, distinctly shorter than propodus; propodus margins diverging distally, palm slightly obtuse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad and heavily armed with robust setae along anterior margin; merus slightly longer than carpus; dactylus slender and elongate, subequal in length to propodus. Pereopod 6 coxa produced into a posterior lobe; basis much longer than broad, merus distinctly longer than carpus, dactylus slender and elongate, subequal in length to propodus. Pereopod 7 basis broadly expanded posteriorly, not produced posterodistally, not reaching beyond ischium, and heavily armed with robust setae along anterior margin; merus slender, subequal in length to carpus; propodus subequal in length to dactylus, dactylus slender and elongate.

Epimeron 1 anterodistal corner broadly rounded; epimeron 3 posteriorly produced into large upturned spine. Urosomite 1 with slight dorsal depression. Uropod 1 peduncle longer than rami and armed with a row of robust setae, rami subequal; uropod 2 peduncle more or less subequal to rami, inner ramus without marginal constriction, outer ramus slightly longer than inner; uropod 3 peduncle only

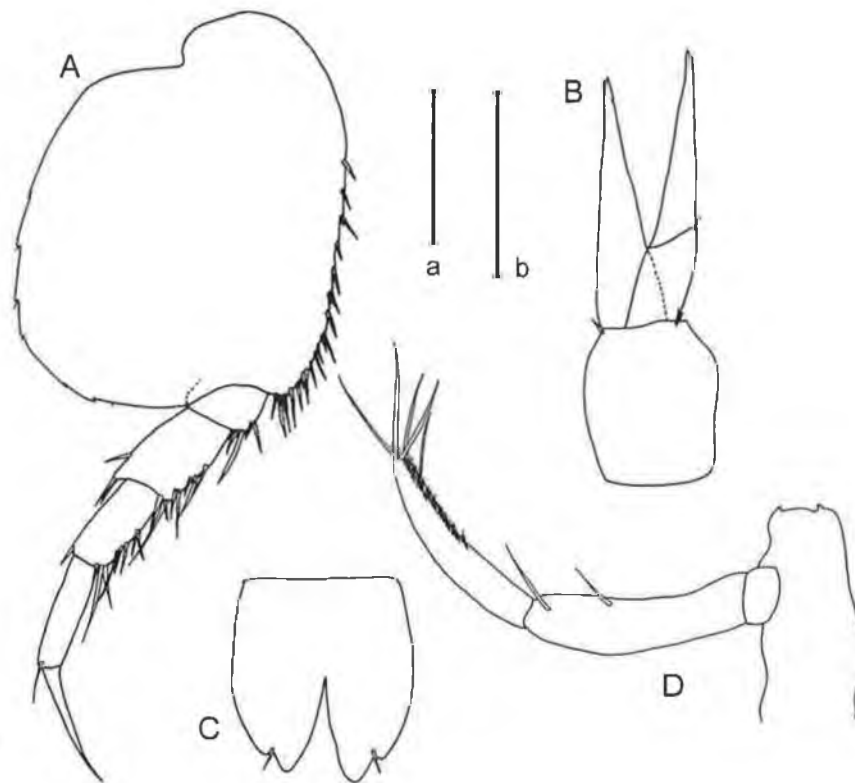


Figure 1: *Sophrosyne robertsoni* female, NHML 1911.11.8.12549, from Inveraray, Scotland; (A) pereopod 7, (B) uropod 3, (C) telson, (D) left mandible. Scale bars: (a) 0.4 mm (Figure 1A); (b) 0.2 mm (Figures 1B-D).

slightly longer than broad, much shorter than rami, outer ramus only slightly longer than inner ramus and 2-articulate, article 2 as long as or slightly longer than article 1. Telson cleft, variable between one-third to one-half length.

Length. 6 mm.

Description of adult male (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; peduncle article 1 massively inflated, subequal in length and breadth; flagellum article 1 elongate, almost as long as remainder of flagellum, callynophore present. Mandible, article 3 of palp with setae along anterior margin; article 2 also with setae along anterodistal margin.

Distribution

North-East Atlantic, recorded only from the west coasts of Scotland and Ireland.

Depth. 22–348 m.

Sophrosyne hispana (Chevreux, 1888)

(Figure 2)

Opis hispana Chevreux, 1888: 567.

Sophrosyne hispana. – Chevreux, 1900: 13, pl. 3, fig. 1. – Stebbing, 1906: 22. – Ruffo, 1975: 446. – Ledoyer, 1977: 389, fig. 23. – Diviacco & Ruffo, 1989: 550 figs 376–377. – Barnard & Karaman, 1991: 533. – Dauvin & Sorbe, 1995: 456.

Type material. MOM 37 0090, on 6 slides.

Type locality. Cape Finisterre (Atlantic Ocean).

Material examined

Holotype, female, 2 mm, MOM 37 0090 from Cape Finisterre. Female, 3 mm, from Banyuls-sur-Mer (42°31.10'N, 03°03.50'E), 12/09/1975; Female, 3 mm, from the Adriatic Sea (43°56.30'N, 15°15.10'E), 09/09/1974.

Description of adult female

Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2; callynophore absent; calceoli absent. Eyes not apparent in preserved material. Lateral cephalic lobes subacute. Mandible molar absent, palp robust, rod-shaped, elongate with article 2 slightly longer than article 3 and lacking setae at anterodistal margin; article 3 with 4–5 setae at distal margin. Maxilliped palp 4-articulate; outer plate poorly developed, not reaching half length of article 2 of palp; inner plate poorly developed, not reaching article 1 of palp.

Gnathopod 1 chelate; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus compressed, distinctly shorter than propodus; propodus margins diverging distally, palm slightly obtuse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad and sparsely armed anteriorly with robust setae, posterodistally produced beyond ischium; merus more or less subequal to carpus; carpus distinctly shorter than propodus; dactylus elongate and slender, subequal in length to propodus. Pereopod 6 basis much longer than broad, sparsely armed anteriorly with robust setae and posterodistally produced beyond ischium; merus subequal in length to carpus; carpus shorter than propodus; dactylus slender and elongate, subequal in length to propodus. Pereopod 7 basis expanded posteriorly, posterodistally produced, reaching to less than half of merus length, anterior margin sparsely armed with robust setae; merus short, barely longer than broad and subequal in length to carpus; carpus much shorter than propodus; dactylus long and slender, subequal in length to propodus.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with weak dorsal depression. Uropod 1 peduncle longer than rami, outer ramus slightly longer than inner ramus; uropod 2 peduncle slightly shorter than rami, inner ramus without marginal constriction, rami subequal; uropod 3 peduncle much shorter than rami, outer ramus slightly longer than inner ramus and 2-articulate, article 2 as long as or slightly longer than article 1. Telson cleft to about half length.

Length. Up to about 4 mm.

Description of adult male (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; flagellum article 1 as long as remaining articles combined; calynophore present. Mandible, article 3 of palp with setae along anterior

margin; article 2 also with setae along anterodistal margin. Urosomite 1 with dorsal depression.

Distribution. Atlantic Ocean (coasts of Europe), Mediterranean Sea.

Depth. 100–510 m.

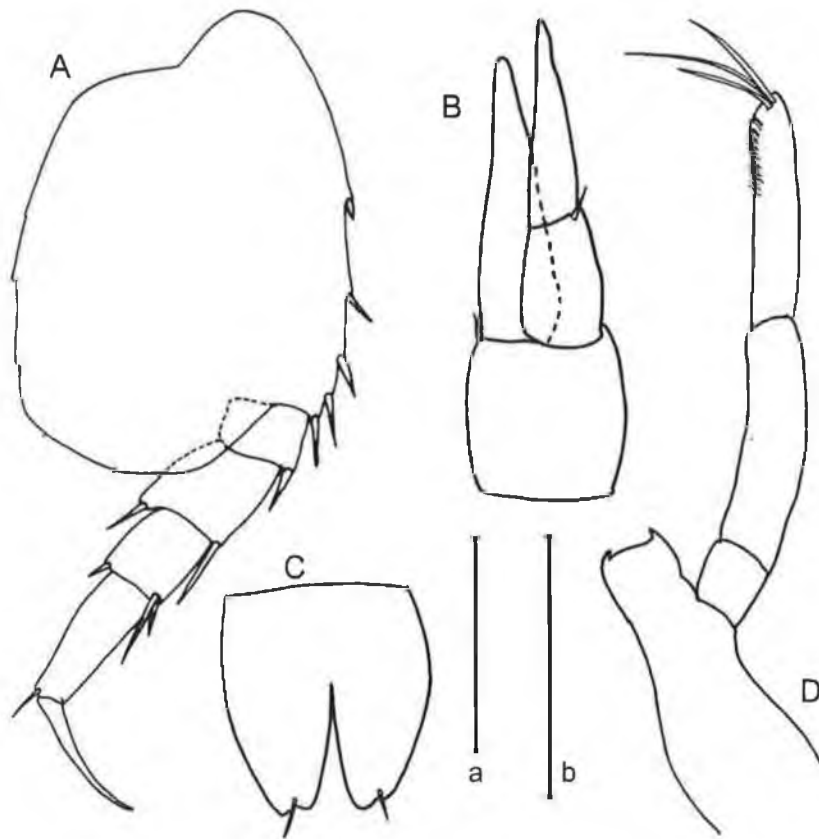


Figure 2: *Sophrosyne hispana* female; (A) pereopod 5, holotype (B) uropod 3, female, Adriatic Sea (C) telson, female, Adriatic Sea; (D) right mandible, holotype.

Remarks

After a detailed comparison of the examined material, it is concluded that these are two separate, albeit morphologically very similar, species. Contrary to the findings of Chevreux (1900), the molar is lacking in both species, and not present in the form of a small tooth in *S. hispana*, as stated by him. We also failed to find any difference in the degree of denticulation of the pereopod 6 basis, and the difference in the form of the posterodistal corner of the 3rd epimeron is negligible. There is a difference in the relative cleftness of the telson between the two species, however, this appears to be quite variable within the species, and is not reliable as a diagnostic character. There is also a difference

in the shape of article 3 of the mandibular palp which is slender and weakly falcate in *S. robertsoni*, and robust and rod-shaped in *S. hispana*. The pereopods offer the most reliable characters. These are much more strongly armed with robust setae in *S. robertsoni*, as well as having differences in the relative lengths of the articles between the two species. This difference is most pronounced in pereopod 7, and this appendage also provides the most consistent character which may be used to discriminate between these species. There is a definite production of the posterodistal corner of the basis to just under half the merus length in *S. hispana*, that is not present in *S. robertsoni*. The basis is not produced beyond the ischium in this species. Both species have a 2-articulate outer ramus of the 3rd uropod, and not 1-articulate as previously stated (although Ledoyer (1977) also illustrates a 2-articulate ramus).

Key to the genus *Sophrosyne*

1. Gnathopod 2 propodus palm excavate, dactylus strongly curved; pleonite 3 with pair of dorsal humps..... *S. murrayi*
 - Gnathopod 2 propodus palm not excavate, dactylus not strongly curved; pleonite 3 smooth..... 2
2. Pereopod 7 basis posterodistally produced beyond ischium, almost reaching half length of merus.....*S. hispana*
 - Pereopod 7 basis not produced posterodistally, not reaching beyond ischium..... *S. robertsoni*

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**3 AN INTERACTIVE KEY TO THE
LYSIANASSOIDEA OF THE
NORTHEAST ATLANTIC AND
MEDITERRANEAN**

3.1 Introduction to INTKEY

Species identification is an integral part of ecological investigations. However, this routine process is often remarkably troublesome. Conventionally, the identification of animals and plants has been carried out using printed dichotomous keys. These are, at present, the most frequently used tools in species identification (Edwards & Morse, 1995). A dichotomous key is a taxonomic tool in which the user simply starts at step one and, by answering a series of two-choice questions, follows the key as directed until identification is reached. There are, unfortunately, numerous problems associated with such keys. Because of the stepwise nature of the keys, all (or most) characters described within the key must be present on the specimen to be identified. If they are not (for example specimens may often be missing appendages due to damage while sampling) then the identification process cannot be continued. Even if all characters are present, the ability to distinguish between two choices may not be easy. In this case, the identification is either brought to a halt, or a single error sends the user down the incorrect pathway. In addition, keys are often constrained by the amount of information they can optimally handle and are consequently limited to narrow geographic areas, or relatively small taxonomic groups. It would be a difficult task to create a dichotomous key to all the species in a large taxon, and the resulting key would be unwieldy.

Such shortcomings are widely documented (e.g. Tilling, 1987; Edwards & Morse, 1995; Wright *et al.*, 1995; King *et al.*, 2002; Dallwitz *et al.*, 2003) and thus by the 1970's, many taxonomists had already begun to investigate the use of alternative methods — specifically the use of computer-based techniques.

The application of computers to identification began in the early 1960's, some ten to fifteen years after the emergence of computers themselves, but quite soon after the introduction of general-purpose high-level computer languages (Pankhurst, 1995).

Presently, there are four main computer-aided identification techniques — multi-access keys, expert systems, hypertext, and neural networks (Edwards & Morse, 1995). Multi-access keys are the most common tool. They were originally based on punched cards (polyclaves) but are now computerised and are referred to as on-line identification programs (Edwards & Morse, 1995) or *interactive* identification programs (Pankhurst, 1995). An interactive key may be defined as an 'interactive computer program into which the user enters attributes (character-state values) of the specimen. The program then

eliminates those taxa whose attributes do not match those of the specimen. This process is continued until only one taxon remains' (Dallwitz *et al.*, 2003) (fig. 3.1).

Interactive keys can store large quantities of taxon information with ease. Although the effort involved in collecting these data is still considerable, once this is done, the production of computerised keys is significantly easier than that of conventional printed keys (Dallwitz, 1974), and minimal revision of the key is necessary if errors are found or new taxa added. Possibly the greatest advantage of interactive keys over the conventional dichotomous types is that they have unrestricted character use, and the user can proceed with characters in any order. This is especially advantageous when the specimen being examined is missing appendages, or if the user is uncertain as to the state of a character. The user may also express uncertainty by entering more than one state. For example, if presented with five choices the user can select four and this simply eliminates those taxa characterised by one (i.e. the fifth) character state. The character state choices may also be changed at any stage during the identification (Dallwitz *et al.*, 2003).

Interactive keys also have an error tolerance function, so that correct identifications can be made in spite of errors made by the user. Taxa are normally eliminated if they differ from the specimen in any way. However, if it is suspected that an error was made, the program can be instructed to retrieve all the eliminated taxa that differed from the specimen by one (or more) attribute. The 'reliability' of a character may also be supplied to the program by the author, making the more reliable characters appear near the start of the key. In these ways, interactive keys have an element of quality control unavailable to printed dichotomous keys.

There are numerous interactive keys available, however, in a comparison of these by Dallwitz (1996) the program INTKEY (INTERactive KEY) outperformed all other available interactive keys, having almost double the weighted count of features as the next best performing program. INTKEY is a program of the DELTA (DEscriptive Language for TAXonomy) system. DELTA is a 'flexible data-coding format for taxonomic descriptions, and an associated set of programs for producing and typesetting natural language descriptions and keys, for interactive identification and information retrieval, and for conversion of the data to formats required for phylogenetic and phenetic analysis' (Dallwitz *et al.*, 2000). Since its first appearance in the early 1980's, DELTA has become an international standard, and its use is strongly recommended (Pankhurst, 1995).

One of the primary aims of this thesis was, therefore, to use DELTA to create an interactive key to the Lysianassoidea of the northeast Atlantic and Mediterranean. This is the only contemporary identification key in existence to this taxon in the region concerned. The key is presented on the CD accompanying this thesis. An associated descriptive monograph is also presented for each species on the CD, as well as in a supplemental volume. Instructions for downloading and using INTKEY can be found in Appendices A–B.

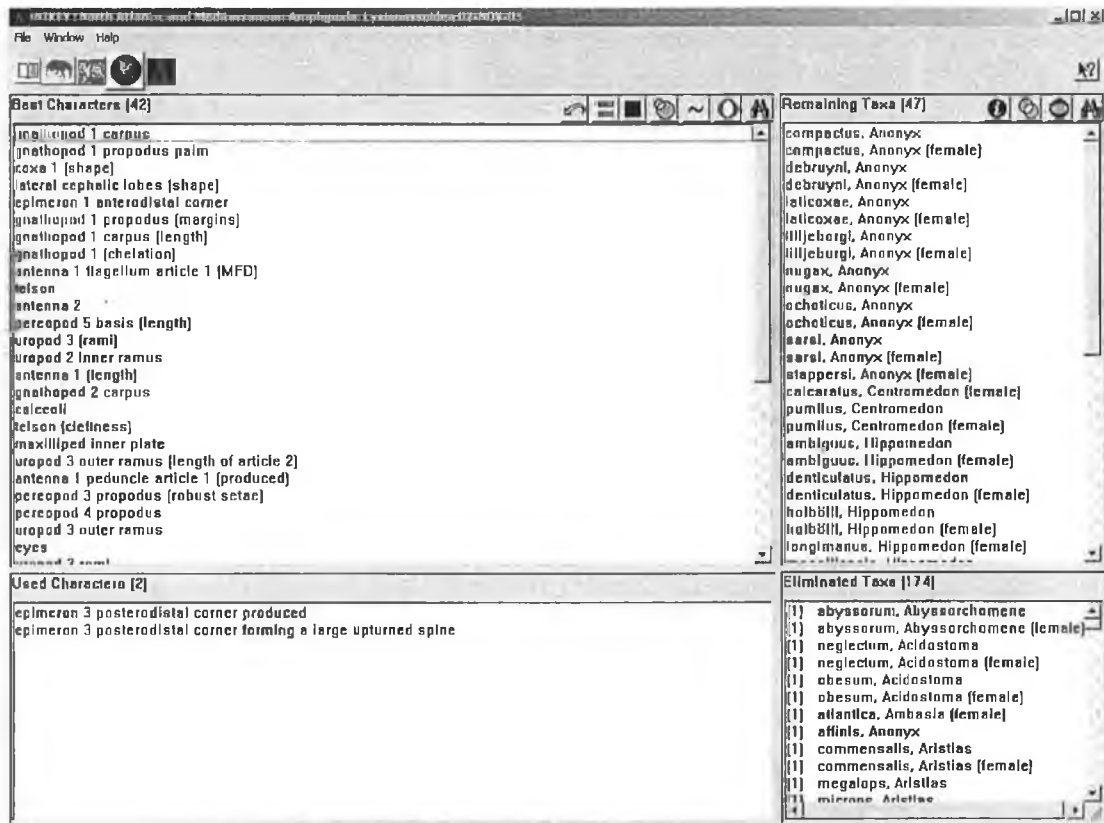


Figure 3.1: An example of an interactive key from the present study. Characters are listed on the top left corner with remaining taxa and eliminated taxa on the top and bottom right corners respectively.

3.2 Materials & Methods

3.2.1 Study area

The area covered by this key comprises all of the Mediterranean Sea and much of the North East Atlantic, including the North Sea, Irish Sea, Celtic Sea and the Bay of Biscay (fig. 3.2). The 30°N and 60°N lines of latitude set the southern and northern limits respectively, while the western limits follow the 600m isobath of the continental slope. The reasons for choosing these are simple. The 30°N line of latitude approximates the most southerly margin of the Mediterranean Sea and is, therefore, also a convenient boundary to use for the North Atlantic. The latitude 60°N approximates the demarcation between a boreal and an arctic-boreal fauna, while the 600 m isobath represents a boundary between those species of shallow and littoral/sub-littoral depths and those that occur in the deeper bathyal to abyssal and hadal zones. Due to the definite, enclosed nature of the Mediterranean Sea, this area was considered to represent a natural biological boundary. Thus, although abyssal depths do occur in the Mediterranean, no depth limits were set for this area. The same may be said for areas to the east of the North Sea, that is Skagerrak and the Kattegat. These regions are also fully included in the key.

Every effort was made to ensure that all known lysianassoid species occurring within the chosen geographic and bathymetric limits were included in the key. Some species occurring outside of these limits were also included. For example, although the regions around the Shetland and Faeroe Islands occur just north of the 60°N boundary, species from here are included. Fauna from such regions were taken into consideration for a number of reasons. Firstly, the area is regularly sampled and their inclusion in an interactive key may be useful for investigators. But more importantly, although these species may not yet have been found below 60°N (or above 600m in some cases), this fact alone is not proof as to their absence from the area.

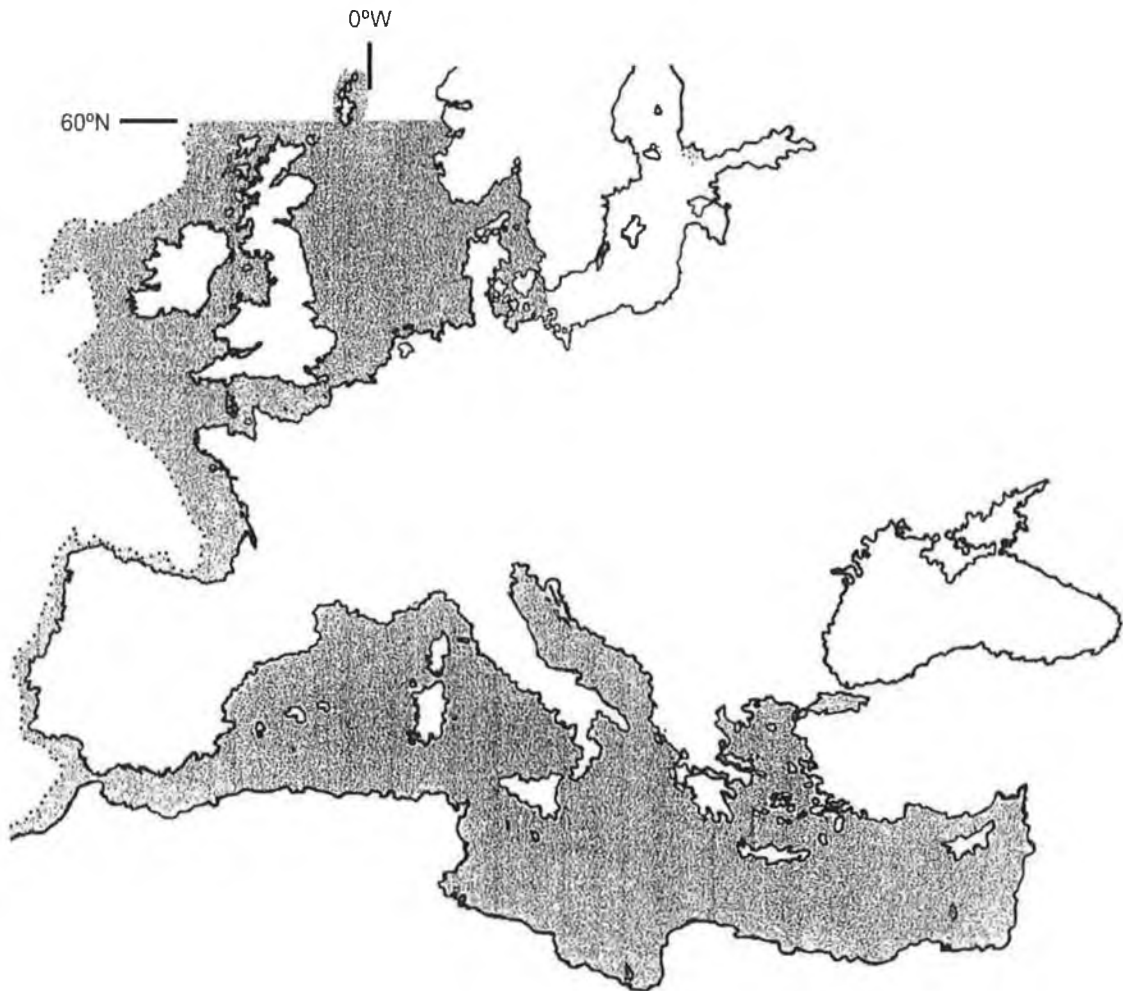


Figure 3.2: Northeast Atlantic and Mediterranean. Shading indicates study area, dotted line in Atlantic represents 600 m isobath while no depth limits were set for the Mediterranean.

3.2.2 Material examined

Amphipod material described in the key and monographs came from a wide range of sources. Some were sampled during a research cruise on the R.V. *Celtic Explorer* during October 2004. Other specimens belong to the private collection of Dr David McGrath (GMIT), or samples collected by the consultancy company AQUAFACT during July, 2000 and November, 2004. A number of the species collected are newly recorded for the coast of Ireland. Details of these are given in section 2.3.3. Material was collected by Van Veen grab, box core and epi-benthic sled. Included also is material from the Zoological Museum of the University of Copenhagen, le Muséum National d'Histoire Naturelle, Paris, the Zoological Museum of the University of Oslo, the Musée Océanographique, Monaco, the Museo Civico di Storia Naturale di Verona, and the Natural History

Museum, London (formerly British Museum (Natural History)). Type specimens were examined where available. Where actual specimens were unavailable for study, descriptions were taken from a wide range of literature sources – using original descriptions wherever possible. The source of the examined material (whether literature, actual specimens, or both) for each species is noted under the ‘Material examined’ headings in the systematic section. As much information as possible regarding type material and type locality is also included, where known. This information was gathered from museum catalogues, and from various other publications including Belloc (1960) and Thurston & Allen (1969), as well as many of the original species descriptions. Where these details could not be found, they are listed as ‘unknown’. Finally, as G.O. Sars seldom labelled his samples with "type" or "n. sp.", the Zoological Museum, University of Oslo (where this author would have deposited most of his material) may have amphipod material which are types, but are not labelled as such (Åse Wilhelmsen, pers. comm.). Thus, in the monographic descriptive section, the type material is tentatively labelled as ‘?ZMO’ for these species.

3.2.3 Descriptions and images

A checklist of species occurring in the chosen the study area was provided by A.A. Myers. This list was cross-checked with a number of other sources, namely Lincoln, (1979), Diviacco and Ruffo (1989), Barnard & Karaman (1991), as well as the North East Atlantic Taxa (Hansson, 1998) and the European Register of Marine Species (MarBEF, 2004) (see also Bellan-Santini & Costello, 2001). A collection of the relevant literature was compiled, including original species descriptions when they could be obtained. In many cases the original descriptions were no longer adequate to distinguish between species and so the most thorough and detailed descriptions available were used. This literature was reviewed and from it, a list of morphological characters considered useful for the identification of species was chosen. The reliability of such characters were assessed mainly on 3 factors. Firstly, characters were chosen based on how well they could separate the taxon. That is, characters which could separate the taxon into 2 large groups were deemed to be extremely useful, while those which only applied to 1-2 species were considered to be less useful and only used where necessary. Secondly, the number of variations of the character was considered, i.e. how many character-states. Characters with between 2-4 states were considered most useful, as less user choice results in less error. For example, a user presented with 8 character-state choices is more

likely to make a mistake than a user presented with just 3 choices. Finally, characters were chosen based on their ease of user access. That is, characters requiring dissection (e.g. maxillae, mandibles) were avoided if possible. Problematic characters, e.g. those that were vague or subjective were noted, and attempts were made to rectify these wherever necessary. This was done by making the character relative to another, or else by assigning it a quantitative value. For example, instead of 'character X elongate', definite values such as 'character X longer than character Y' or 'character X twice as long as broad', etc, were used.

All characters were then entered into a DELTA database (Dallwitz *et al.*, 1999). In total 97 characters were used of which 11 were text characters, and 86 were multi-state characters. From the database, the interactive key and taxonomic descriptions for all species were generated through the 'toint' and 'tonatr/tonatsr' outputs, respectively.

Illustrations in the key were, in some cases, drawn by hand. The appendages of the required taxa were dissected from the animal and mounting in Faure's solution to make permanent slides. Illustrations were then made using a Nikon compound microscope with a standard drawing attachment. The remaining images were taken from various literature sources. In some instances[†], it was necessary to request formal permission from the respective publishers in order to reproduce these images. All images were scanned in greyscale at 300dpi using a Hewlett Packard ScanJet 6300C Scanner. These illustrations were then manipulated as required and saved as GIF files in Indexed colour. The files were then imported into the DELTA dataset, labelled, and finally exported to the interactive key (INTKEY).

Scanning Electron Microscope images of some material were taken in Galway-Mayo Institute of Technology, the Zoological Museum of the University of Copenhagen and le Muséum National d'Histoire Naturelle, Paris. Samples were taken from 70% alcohol and, depending on location, were prepared for SEM by either one of two methods. In GMIT and the ZMUC, specimens were washed in increasing concentrations of 80, 90 and 100% alcohol followed by 3:1 alcohol:acetone, 1:1 alcohol:acetone, and 1:3 alcohol:acetone. Specimens were washed twice in each concentration and for ten minutes each. Finally specimens were transferred to pure acetone. In the MNHN specimens were simply taken from 70% alcohol and washed in 100% alcohol three times. Samples were then either air-dried (GMIT, MNHN), or dried in a BAL-TEC CPD 030 Critical Point

[†] According to Irish law, copyright in a literary, dramatic or musical work, artistic work or an original database, lasts for 70 years from the death of the author.

Dryer as standard (ZMUC). The dried material were placed on aluminium stubs and coated with platinum (ZMUC) or gold (GMIT, NMHN). Finally, material was examined in a JOEL JSM-840 (ZMUC, MNHN), or Stereoscan 430 (GMIT) Scanning Electron Microscope. The resulting micrographs are used throughout the interactive key.

3.2.4 Terminology used

The morphological terms employed throughout the taxon descriptions follows that found on the amphipod website (www.amphipoda.com). A list of this terminology is defined in table 3.1, below.

Abbreviations used in the electronic figures are: A – antenna; Ep – epimeron; G – gnathopod; Hd – head; IP – inner plate; Md – mandible; Mp – maxilliped; OP – outer plate; P – pereopod; T – telson; Up – uropod; Us – urosome.

In addition, the following museum abbreviations are used in the text: AM – Australian Museum, Sydney; LMN – Leyden Museum, Leyden, The Netherlands; MOM – Musée Océanographique, Monaco; MNHN – Muséum National d’Histoire Naturelle; MSNV - Museo Civico di Storia Naturale, Verona; NHML – Natural History Museum, London; NMCO – National Museum of Canada, Ottawa; NMI – National Museum of Ireland, Dublin; SMNH – Swedish Museum of Natural History (Stockholm); USNM – National Museum of Natural History, Smithsonian Institution, Washington DC, U.S.A.; UUZM – Uppsala University Zoological Museum, Sweden; ZIL – Zoological Institute, Leningrad; ZMB – Museum für Naturkunde, Berlin; ZMH – Zoological Museum Hamburg; ZML – Zoological Museum of Lund, Sweden; ZMO – Zoological Museum, Oslo; ZMUB – Zoolgisk Museum, Universitetet i Bergen; ZMUC – Zoological Museum University of Copenhagen.

Table 3.1: List of morphological terminology used throughout the descriptions. Unless otherwise referenced, this is modified from the glossary found on the amphipod webpage (www.amphipoda.com).

Acute	Forming an angle of less than 90°.
Antenna 1	The first, or anterior pair of antennae on the head.
Antenna 2	The second, or posterior pair of antennae on the head.
Basis	Second leg article from the body.
Biramous	An appendage composed of two rami or appendages.

Calceoli	Microscopic external surface structure, presumed to have a sensory function, found on the antennae of some groups of gammaridean amphipods.
Callynophore	The completely or partially fused proximal articles of the flagellum of the first antenna which bear transverse rows of aesthetascs forming a 'brush' (Lowry, 1986).
Carina	A keel-like or ridge structure, often found on the urosome of some amphipods.
Carpus	Fifth leg article from the body.
Chelate	Formed when the propodus and dactylus form a pincer-like structure , due to the obtuse angle of the propodus palm .
Cleft	Descriptive of a split telson.
Coxa (s); coxae (pl.)	First or proximal article of the leg, attached to the main body.
Dactylus	Seventh or terminal article of the leg.
Distal	Position of the appendages in relation to the body; refers to the part of the appendage furthest from the body.
Dorsal	The topside, or upper surface of the body.
Emarginate	Descriptive of the concave posterior end of an unleft telson (Barnard & Karaman, 1991).
Entire	Descriptive of an unleft telson (Barnard & Karaman, 1991).
Epimeron (s); epimera (pl.)	The lateral projection of the pleonites.
Flagellum	The distal part of either antenna 1 or antenna 2, following the peduncle.
Ischium	Third leg article from the body.
Lateral	Position to the side of the body.
Mandible	The third cephalic appendage, and first mouthpart appendage of amphipods, used to masticate food.
Maxilla 1	Small pair of mouthparts situated posterior to the lower lip. Used often as a character in Lysianassoid systematics to distinguish between families.
Maxilla 2	Paired mouthparts located immediately posterior to maxilla 1; used to filter food particles from water.
Maxilliped	Pair of appendages situated posterior to the maxillae and derived from the first pair of thoracic appendages.
Merus	Fourth leg article from the body.
Palm	Expansion of the distal edge of an article to form a chelate or sub-chelate articulation with the next article. Commonly found on the propodus of gnathopods 1-2.
Peduncle	The basal articles of a fundamentally biramous appendage; in Amphipoda applied to the antennae, pleopods and uropods; antenna 1

	with 3 peduncular articles, antenna 2 with 5 (but not a biramous appendage), pleopods with one definitive peduncular article but remnants of others occurring proximally, uropods each with one peduncular article (Barnard & Karaman, 1991).
Pereon	Thoracic segments 2-8, bearing the walking limbs (thoracic segment 1 is part of the cephalon and bears the maxilliped) (Wilson, 1989).
Pereonite	Individual thoracic segment of the pereon, numbered 1-7 from anterior to posterior.
Pereopod	Walking limb of the pereon; in amphipods these consist of the modified (chelate) gnathopods 1-2, and pereopods 3-7.
Pleon	The first 3 segments of the abdomen, bearing the swimming limbs.
Pleonite	Individual segment of the pleon.
Pleopods	Paired, biramous swimming appendages of the pleonites.
Propodus	Sixth or penultimate article of the leg.
Quadrangle	Of a 90° angle.
Ramus (s), rami (pl.)	Branch of a limb or other appendage (commonly used for pleopods and uropods).
Rostrum	Anterior projection of the frontal margin of the head.
Serrate	Edged with toothlike projections like a saw.
Seta (s), setae (pl.)	Hair-like process of the cuticle that is clearly articulated with the basal cuticle. Robust setae are modified setae that have become extremely stout and spine-like; Slender setae are more hair-like; plumose setae have small setules giving a feather-like appearance (Wilson, 1989); pectinate setae have small spines so as to give a comb-like appearance.
Simple	Descriptive of the absence of a palm on a gnathopod or pereopod.
Spine	A pointed outpocketing of the cuticle that is not articulated with the cuticle at its base (Wilson, 1989)
Subchelate	Intermediate between simple and chelate; article 6 of a gnathopod or pereopod having a distal palm which may be either transverse or acute, but is not obtuse so as to form a finger (Barnard & Karaman, 1991).
Subequal	Approximately equal to; within 10% of.
Telson	The plate attached to the sixth abdominal segment (urosome 3) and covering the anus. The morphology of the telson is an important taxonomic character.
Uropods	Paired (usually biramous) appendages of the urosome.
Urosome	The last 3 segments of the abdomen (Barnard & Karaman, 1991).
Uniramous	Composed of a single branch.

3.3 Systematics and Results

3.3.1 Species identification and descriptions

The interactive identification key to the Lysianassoidea of the Northeast Atlantic and Mediterranean supplied with the thesis is intended for use in association with this chapter.

The species description given below is that of *Lysianassa costa*, the type species of *Lysianassa*. A full description and set of illustrations for the remaining species is contained in the supplemental volume for the thesis and on the accompanying CD. For instructions on how to access this, see Appendix B.

Lysianassa costa Milne-Edwards, 1830

Fig. 3.3

Lysianassa costa Milne-Edwards, 1830: 35, pl. 10, fig. 17. – Lowry & Ruffo, 1986: 206, figs 1-5. – Diviacco & Ruffo, 1989: 500, figs 339-340. – Barnard & Karaman, 1991: 498.

Lysianassa ceratina. – (*non* Walker, 1889) Chevreux, 1911: 158, pl. 6, fig. 10. – Cecchini & Parenzan, 1935: 158, fig. 3. – Ruffo, 1969: 6, figs 1-3.

Type material. NEOTYPE: MSNV reg. no. MVR-Cr 203, ovigerous female, 7.2 mm
Type locality. Napoli.

Material examined. Lowry & Ruffo, 1986: 206, figs 1-5; Diviacco & Ruffo, 1989: 500, figs 339-340.

Description based on mature male

Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus at

least twice as long as propodus. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 without dorsal depression. Uropod 1 rami distinctly unequal; uropod 2 rami subequal, inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami subequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Length. 8.5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral to circalittoral.

Ecology. This species lives amongst algae in shallow water, in *Posidonia* beds and on corraline bottoms to 90m.

Remarks. According to Diviacco & Ruffo (1989), it is probable that records of *L. ceratina* from the Mediterranean probably refer to *L. costae*.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Uropod 3 rami lacking plumose setae.

Length. 6 – 7 mm.

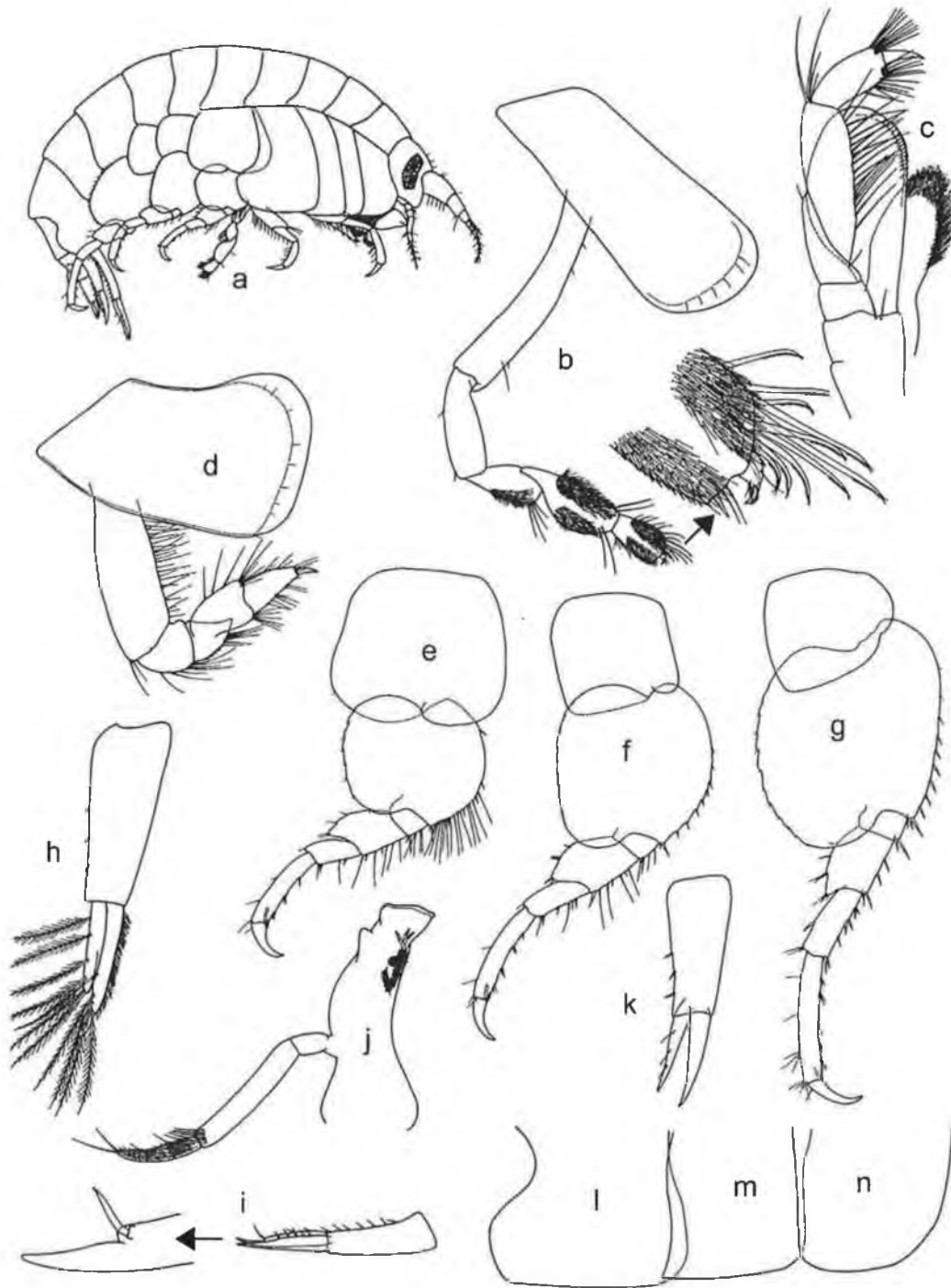


Figure 3.3: *Lysianassa costae* Milne-Edwards, 1830. (a) entire, female; (b) gnathopod 2; (c) maxilliped; (d) gnathopod 1; (e) pereopod 5; (f) pereopod 6; (g) pereopod 7; (h) uropod 3, male; (i) uropod 2; (j) mandible; (k) uropod 3, female; (l) epimeron 3, (m) epimeron 2; (n) epimeron 1.

[After: Diviacco & Ruffo, 1989]

3.3.2 New records of species from Irish waters

During the course of this study, six lysianassoid species were discovered that comprise new records for the area around the coast of Ireland within the 600 m isobath. Details for these species are given in table 3.2.

Table 3.2: Lysianassoid species newly recorded from Irish waters

SPECIES	LOCALITY	DEPTH	DATE
<i>Lepidepecreum typhlops</i> Bonnier	<ul style="list-style-type: none"> Atlantic Ocean (52°49.97'N, 12°39.83'W) 	441.5 m	3-10-2004
<i>Normanion ruffoi</i> Stebbing	<ul style="list-style-type: none"> Atlantic Ocean (52°49'N, 11°40'W) 	158.4 m	3-10-2004
<i>Orchomenella crenata</i> Chevreux & Fage	<ul style="list-style-type: none"> Irish Sea (52°37.78'N, 06° 04.70' W) 	23 m	Nov. 2004
	<ul style="list-style-type: none"> Irish Sea (52°37.5'N, 06° 06.31' W) 	22 m	Nov. 2004
<i>Sophrrosyne robertsoni</i>	<ul style="list-style-type: none"> Atlantic Ocean off Co. Mayo, Ireland (54°34'N, 11°06'W) 	347.9 m	June 2000
	<ul style="list-style-type: none"> Atlantic Ocean, off Co. Mayo, Ireland (54°33'N, 11°06'W) 	342.6 m	June 2000
	<ul style="list-style-type: none"> Atlantic Ocean, off Co. Mayo, Ireland (54°35'N, 11°04'W) 	? m	June 2000
<i>Tryphosella minima</i> Chevreux	<ul style="list-style-type: none"> Clew Bay, Co. Mayo, Ireland (53°50.87'N, 09°38.12'W) 	7.3 m	July 2000
	<ul style="list-style-type: none"> Clew Bay, Co. Mayo, Ireland (53°49.09'N, 09°39.54'W) 	7.6 m	July 2000
	<ul style="list-style-type: none"> Roaringwater Bay, Co. Cork, Ireland (51°31.30'N, 09°24.92'W) 	?	July 2000
<i>Tryphosella lowryi</i> Kilgallen, Myers and McGrath	<ul style="list-style-type: none"> Clew Bay, Co. Mayo, Ireland (53°49.09'N, 09°39.54'W) 	7.6 m	July 2000
	<ul style="list-style-type: none"> Mulroy Bay, Co. Donegal, Ireland 	?	Summer, 1980

3.4 Discussion

Presented here in electronic format is an interactive, species-level identification key to the Lysianassoidea of the Northeast Atlantic and Mediterranean. It will be published on the amphipod website (www.amphipoda.com) and the crustacean website (www.crustacea.net). This is the only contemporary identification key in existence to this taxon for the geographic area concerned. This interactive key is seen as advantageous over the traditional dichotomous-type keys, for reasons discussed below. Taxa were generally limited to those occurring at depths of less than 600 m (although no depth limits were set for the Mediterranean) and between the latitudes of 30°N–60°N, thus including 135 species — almost 20% of the total estimated number of amphipod species from this region. During the course of the work, a total of six species were identified as new records for Irish waters within the 600 m isobath. The significance of these records are also discussed below. Finally, it was also recognised that there were a number of problematic groups within the taxon. While some of these are dealt with in chapter 3, others remain that are, to an extent, an unresolved mess. These, too, are discussed.

3.4.1 INTKEY as a taxonomic identification tool

The interactive key presented as part of this thesis is intended for use by both experts who are familiar with the Amphipoda, but also by parataxonomists, or those who may have little or no experience in amphipod identification. A quality control check of the key was, therefore, carried out by six people of various taxonomic abilities and familiarity with the Amphipoda. All users agreed that the key was much more user-friendly than the traditional-type dichotomous key.

Users of the key have a choice of using either the ‘Best order’ or the ‘Natural order’, chosen simply by pressing the corresponding button on the toolbar at the top of the screen. In the ‘best order’ mode (which is the default), characters are weighted according to their reliability, allowing those characters most useful for distinguishing between species to appear at or near the top of the key. Less useful characters, for example those which require dissection (e.g. mouthparts), or those which are useful only for separating males and females (e.g. calceoli), are then placed further down the key. In this way, the user is provided with some guidance in which characters to choose. This is most helpful to inexperienced users, or those who are unfamiliar with the Lysianassoidea. Alternatively, when in the ‘natural order’, characters appear in order from the anterior to

the posterior of the animal so the user can easily find any characters of their own choosing. This is more suitable for experienced users. However, regardless of whether the character list is in the best or natural order, characters may be chosen completely at random. This independence of character choice is a feature completely unknown to dichotomous keys.

Such limitations of dichotomous keys as taxonomic tools are outlined in detail in section 2.1. However, it must be further noted that mis-identification of species either new to a geographic area or new to science is common with dichotomous keys. This has happened on at least two occasions which have come to my attention. For example, a re-examination of a specimen previously identified as *Tryphosella horingii* in the NMI collection resulted in the description of a new species, *Tryphosella lowryi*. Other specimens identified as *Tryphosella nanoides* from Clew Bay in the west of Ireland were also re-examined and are here re-described as *Tryphosella minima*, new to the British Isles. Therein lies the most important advantage of interactive keys, i.e. these can easily be modified to include new species as they are found, whereas a dichotomous key must usually be almost entirely re-written in order to include new taxa.

3.4.2 New records for Irish waters

Lepidepcreum typhlops was formerly known only from the Bay of Biscay and the Faeroes Islands to southern Iceland. The discovery of *L. typhlops* from Irish waters is significant, firstly, as it serves to fill this distributional gap somewhat, but also, at 441.5 m, this appears to be the shallowest recorded depth for this species. It is an interesting find, as the species does not appear to be very common. It has only been infrequently recorded since first described by Bonnier at the end of the 19th century. It was previously rather poorly described and illustrated.

The discovery of *Orchomenella crenata* and *Tryphosella minima* is also significant as it expands the known range of both species from the Mediterranean and Atlantic coasts of France to Irish coasts. These new records are the most northerly, to date, for both taxa.

Normanion ruffoi was previously considered to be a Mediterranean endemic. This species is extremely similar to, and may have been misidentified in the past as *N. quadrimanus* (see chapter 3). Thus, previous records of *N. quadrimanus* from the area around the coast of Ireland require confirmation.

The discovery of *Sophrrosyne robertsoni* from off the Co. Mayo coast is the first record of the occurrence of this species from outside of Scotland since it was first described in 1891. Since this time, this species has only been recorded infrequently and as single specimens. It has been suggested that *S. robertsoni* may be a junior synonym of *S. hispana*, due to the striking similarity between the two species (Diviacco & Ruffo, 1989). However, there are a number of subtle, yet distinct, differences between these two species. This matter is discussed further in chapter 3.

3.4.3 Taxonomic problems within the Northeast Atlantic and Mediterranean Lysianassoidea

A number of taxonomic problems were identified during the process of constructing the DELTA database. As some of these problems affected the accuracy of the interactive key, they needed to be addressed immediately. These issues are outlined in detail and resolved in chapter 3. The issues discussed below were not considered urgent, but should, however, be examined at some stage in the near future.

3.4.3.1 *Tmetonyx*, *Tryphosella* and *Caeconyx*

The *Tryphosella*-*Tmetonyx* complex is one that has long caused problems. Presently, the length of the ischium of the first gnathopod, and the shape of the first coxa are used to separate these genera. Yet, there are a small number of species that fall between these criteria, e.g. *Tryphosella dilatata*, which has the short ischium of *Tryphosella*, but its first coxa is more similar to that of *Tmetonyx*.

Barnard & Karaman (1991) established the new genus *Caeconyx*, of which *Caeconyx caecula* is the monotype. This species had previously been moved back and forth between *Tmetonyx* and *Tryphosella*, but, as Oleröd (1987) remarks 'even though this species shows a close relationship to true members of the *Tmetonyx*-*Tryphosella* group, its combination of characters does not fit either (of the above diagnoses)'. In their diagnosis of this new genus, Barnard & Karaman state that the mouthparts are unknown. Oleröd, however, had noted that the mouthparts of this species are different from both *Tryphosella* and *Tmetonyx*, the maxillipeds, in particular, being more similar to those of *Centromedon*. It is recommended that this genus be re-described and a more complete diagnosis made to include the mouthparts.

Removal of *Tryphosella dilatata* from the genus *Tryphosella* would validate using the ischium length and coxa shape as diagnostic characters to separate the *Tryphosella*-

Tmetonyx group. Superficially, at least, this species is more similar to *Caeconyx* than to either *Tryphosella* or *Tmetonyx*. However, an examination of the mouthparts of *T. dilatata* does not support placement of this species within the genus *Caeconyx*. It may be the case that this aberrant species does not belong to either genera. Likewise, there may be other anomalous species from the *Tryphosella-Tmetonyx* group, from outside the range of the present study (i.e. from deep-water or outside the NE Atlantic), which require re-examination and perhaps removal from the group. Nonetheless, this cannot be determined with any certainty until a review of the entire *Tryphosella-Tmetonyx-Caecula* complex is accomplished.

3.4.3.2 The genus *Acidostoma*

The genus *Acidostoma* poses yet further problems. The differences between species of this group are minor, and consequently they have been synonymised numerous times. Lowry & Stoddart (in prep.) are currently reviewing this genus in the North Atlantic and their study, when published, will resolve much of this confusion. The descriptions of the *Acidostoma* species given in this thesis are therefore strongly based on the work of these authors.

SUMMARY

The aim of this thesis was to create DELTA database, to provide as an output an illustrated, interactive identification key to the Northeast Atlantic and Mediterranean Lysianassoidea, which would be added to other family keys already available on the worldwide web. This task was completed, and the resulting key contains 135 species, mostly from above 600 m (Mediterranean excepted), and between 30°N – 60°N. All species are fully illustrated and described.

During the process of constructing this key, a number of taxonomic issues were encountered that affected its quality and accuracy. The genus *Normanion* has long caused problems due to the inaccurate description and illustration of *Normanion quadrimanus*, the type of the genus, by the original authors. In the paper presented here, the genus is examined and all species (apart from *Normanion abyssii* which is known only from one specimen) are re-described. As a result of this study, *Normanion sarsi* is considered to be a junior synonym of *N. quadrimanus*.

A new species, *Tryphosella lowryi*, was also found and described, along with five other species which were newly recorded for the Irish coast. One of these, *Orchomenella crenata*, had previously been synonymised with another species, *O. nana*. Both species are re-described and *O. crenata* is re-established.

Sophrrosyne robertsoni had not been recorded from outside Scotland before, and it had been suggested that this species is synonymous with *S. hispana*. Here, *S. robertsoni* is recorded from the Atlantic coast of Ireland, representing the first record of this species from outside Scotland. This new material, along with topotypic Scottish material was re-described and compared to the holotype and other material of *S. hispana*. The conclusion is that these are, in fact, separate species, albeit morphologically very similar to each other.

A suggested future direction for lysianassoid taxonomy in the North Atlantic concerns the *Tryphosella-Tmetonyx-Caeconyx* complex. This group requires revision and a more complete diagnosis to distinguish each genus. However, this is a major undertaking in itself, as the genus *Tryphosella* alone contains more than 60 described species.

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APPENDIX A: INSTRUCTIONS TO USERS

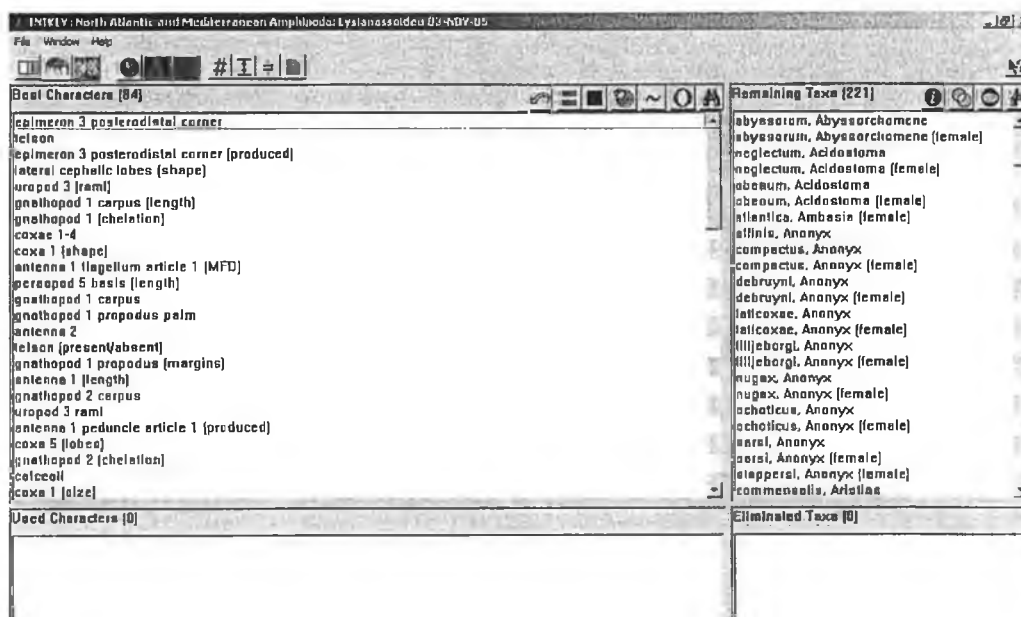
The following instructions are primarily intended for first-time users of the key. It is highly recommended that inexperienced users experiment with the various modes and functions before attempting to carry out species identifications. Note that all toolbar buttons are active, i.e. a short explanatory statement regarding the function of the button will appear as the cursor is moved over it. The INTKEY program must be either copied from the CD or downloaded from the following URL in order to run the interactive key:

<http://delta-intkey.com/www/programs.htm>

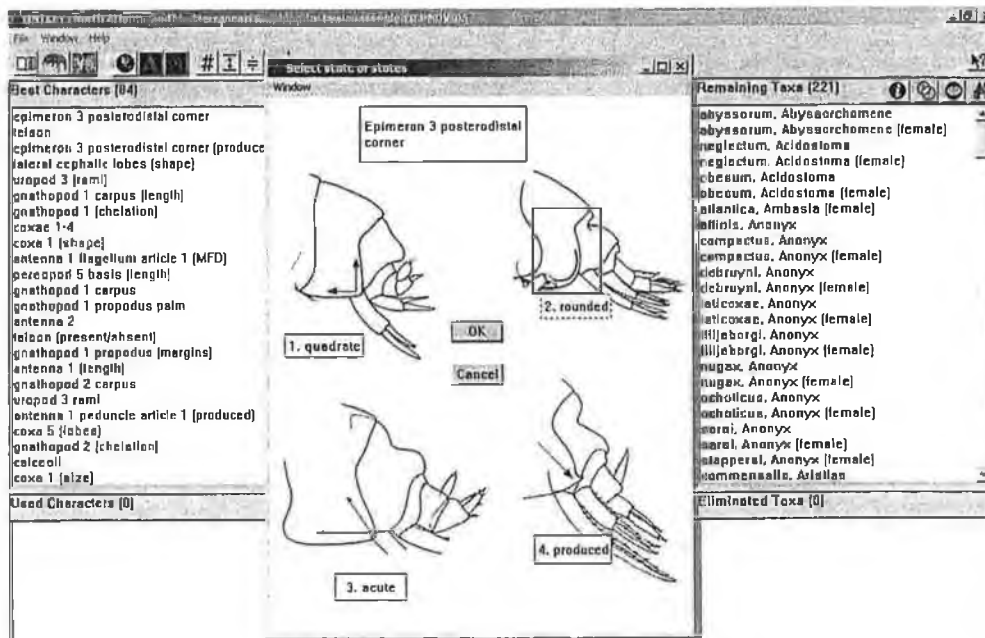
1. Place the CD in the appropriate drive. Open the 'Northeast Atlantic and Mediterranean Lysianassoida' folder and double-click on the Intkey icon:



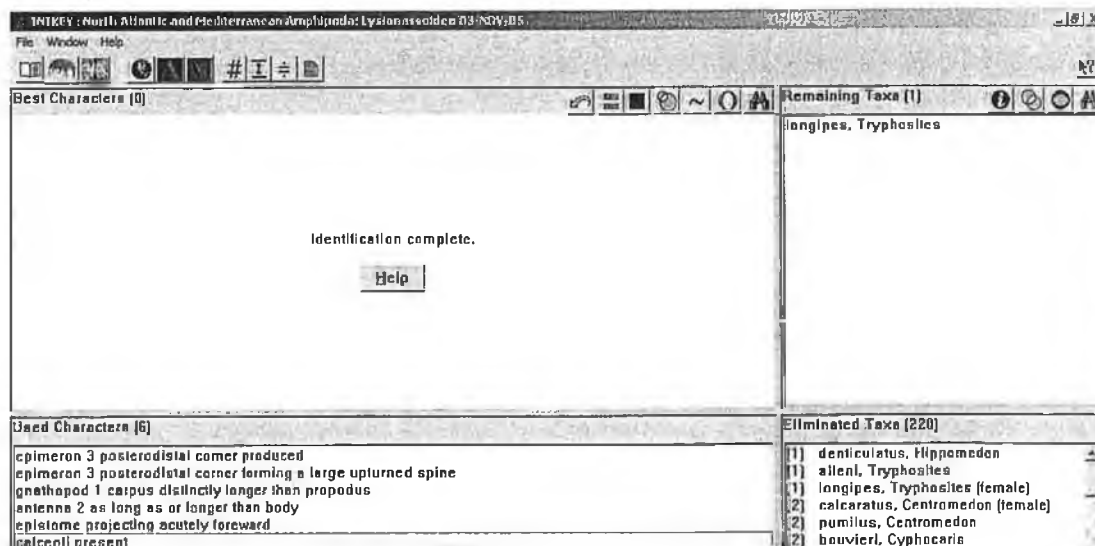
2. Once open, the window should look something like this:



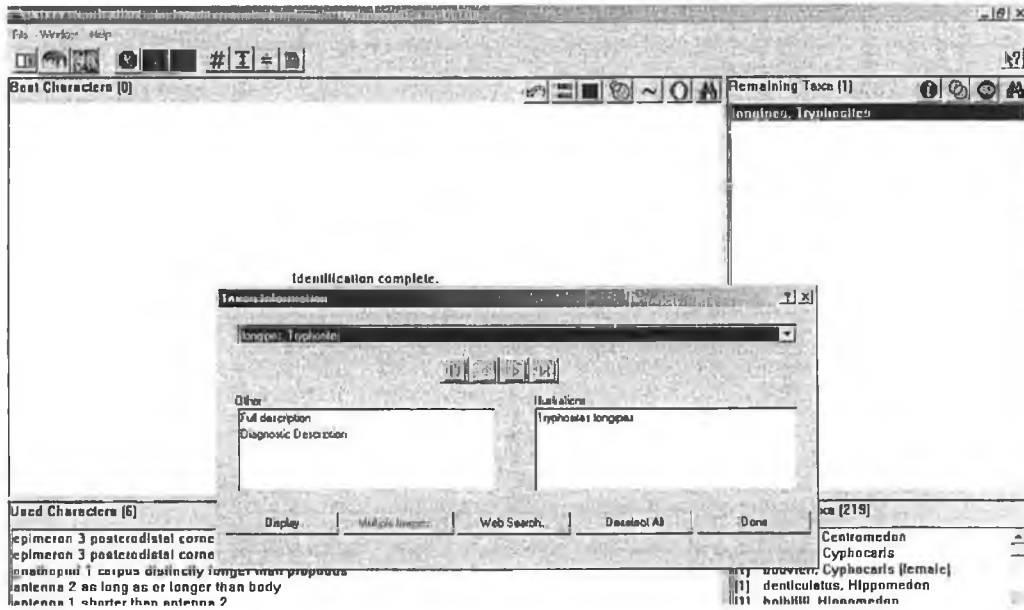
3. Characters are listed along the upper left column, and taxa (separated into males and females) on the upper right. Simply single-click on the character you wish to choose and a further window will appear with a number of character-state choices:



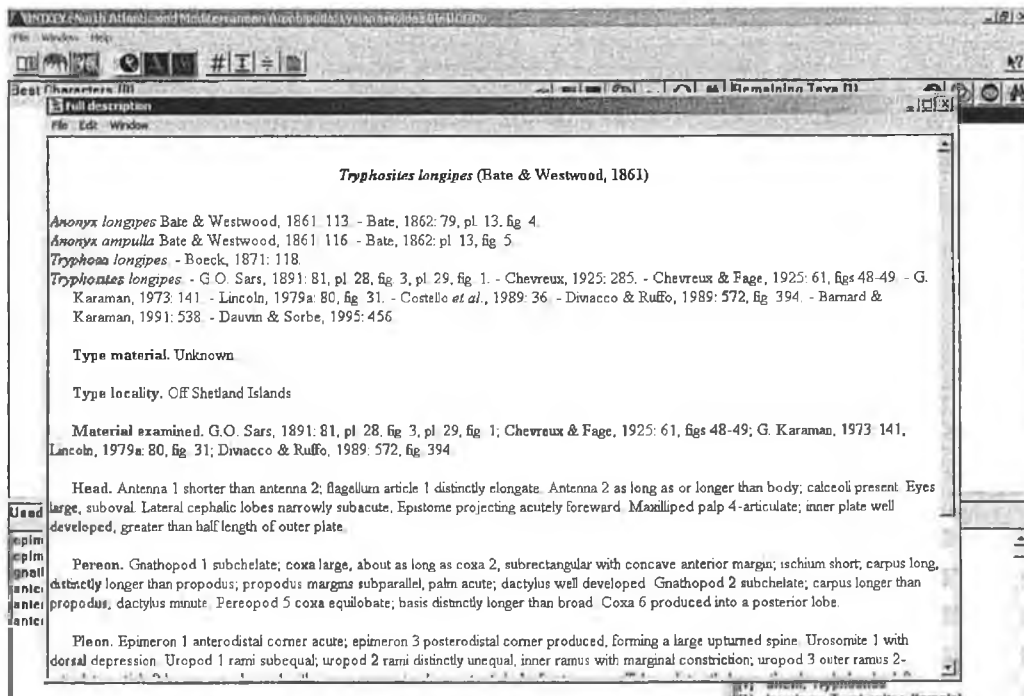
4. Choose whichever state corresponds most closely with the specimen being identified by single-clicking on the state and then choose 'OK'. Uncertainty between which character-state to choose may be remedied by choosing more than one state. For example, if presented with five choices the user can select four and this simply eliminates those taxa characterised by one (i.e. the fifth) character state.
5. Each time a character state is chosen, taxa which do not correspond to that state are eliminated from the key. This process continues until only one taxa remains and the identification is complete:



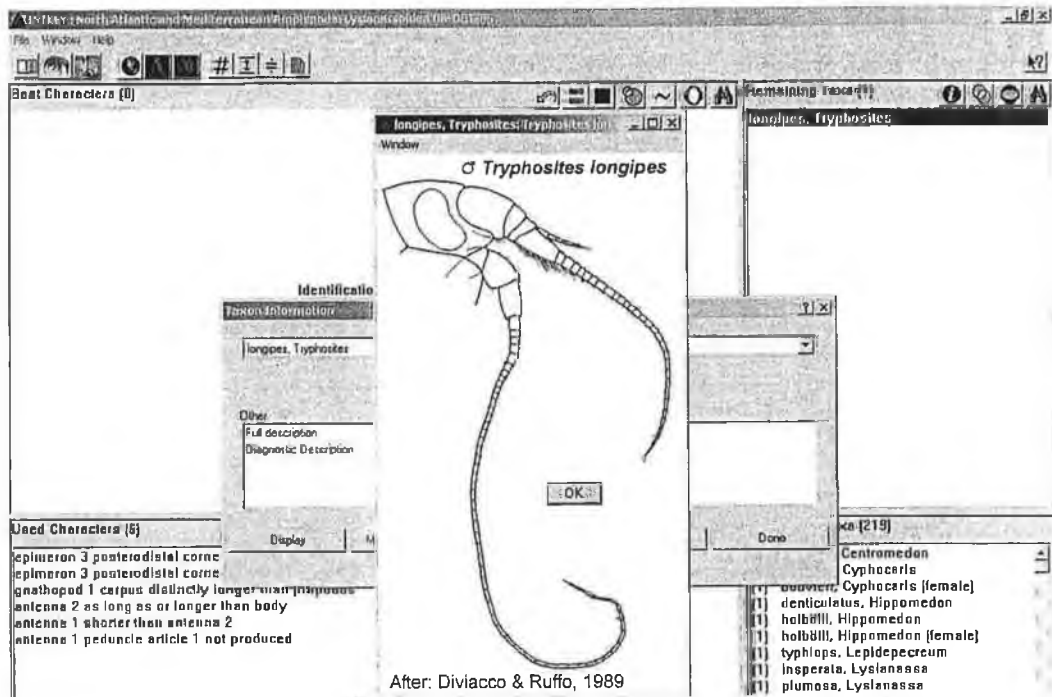
6. At this point the user may view the description and illustrations of the identified species. In order to do this, double-click on the species name and the following window will appear:



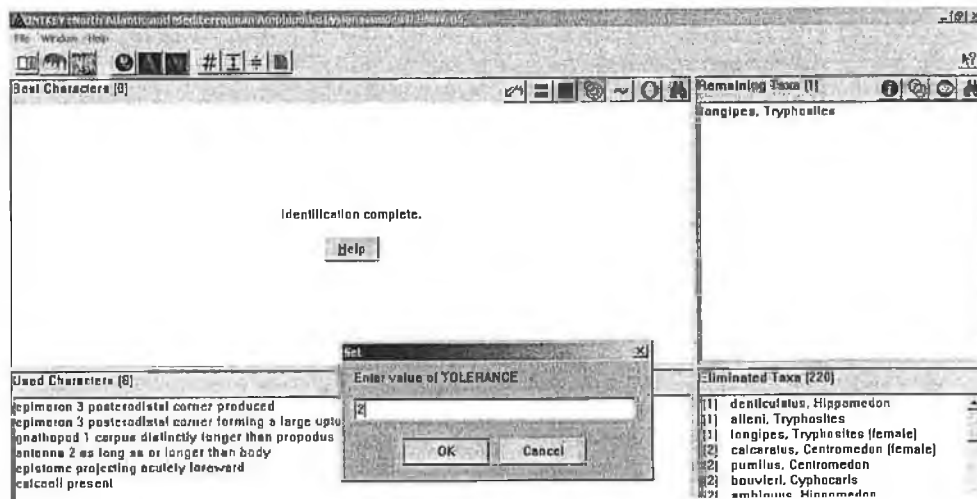
7. The left hand window contains an option for full description or diagnostic description, while the right hand window contains the illustration options. Double-click on the item you wish to choose and it will appear, i.e.:



or:



8. Correct identifications can be made in spite of user-error. This is done by clicking on the 'error-tolerance' button on the toolbar (this is the [~] button):



9. At this point the user may enter a value which (s)he feels is appropriate. If this value is 2, for example, then the program will allow the user to make up to 2 errors before eliminating those taxa which do not correspond to the selected character states.
10. To restart an identification simply click on the 'restart' button (i.e. the green arrow).

ACKNOWLEDGEMENTS

There are a number of people without whose help, patience, and guidance, I would not have been able to complete this project. First and foremost I wish to thank my supervisors, Dr David McGrath and Prof. Alan Myers for their expertise and great enthusiasm over the last two years. Particular thanks go to Dr Jim Lowry (Australian Museum) and also to Dr Terry MacFarlane (Western Australian Herbarium) for their help in ironing out the kinks in my DELTA database. Thanks also to Dr Tammy Horton and Dr Rachael King for their input and advice. I am greatly indebted to Alison McCarthy and Fiona Kavanagh (NUIG) for all the countless favours they have done for me over the course of the work. To Marie Barrett of the Inter-library loans section in the GMIT library, who never failed to find any obscure paper or book that I requested. Thanks to Jesse O'Mahony (GMIT) for her help and endless patience with SEM images. I must especially acknowledge all the staff and students of the ZMUC, in particular Dr Jørgen Olesen and Ole Sten Møller, for their help and friendship during and after my time there. Thanks also to Dr Danielle Defaye and the staff of the MNHN, as well as Ms Michèle Bruni and the staff of the MOM, for all their help. To all the curators and staff of various museums who answered all of my queries, in particular Miranda Lowe (NHML) and Åse Wilhelmsen (ZMO), whose help was very much appreciated. Thanks to NRC Research Press, the Musée Océanographique, Monaco; the Bolletino del Museo civico di storia naturale di Verona; and the NHML for granting permission to reproduce illustrations and figures from their publications. My appreciation goes to all the staff and students of the Department of ZEPS, UCC, especially members of the marine lab, past and present. My utmost gratitude to all my family, in particular my parents for their support, financial and otherwise, throughout my education. Finally, thank you to all my friends for their support during the course of the project, in particular Gearóid, Yvette, Diane, Richie, Louise, Brian, John, Guillaume, Luca, Mark J, Rob, and Aurelie.

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**TAXONOMY OF THE LYSIANASSOIDEA OF THE NORTHEAST
ATLANTIC AND MEDITERRANEAN**

MONOGRAPHIC SPECIES DESCRIPTIONS

Niamh M. Kilgallen, BSc

PhD Thesis (Supplementary Volume)



Supervised by: Dr D. McGrath (GMIT)

Prof. A.A. Myers (UCC)

Submitted to Galway-Mayo Institute of Technology, November 2006



GMIT

GALWAY - MAYO INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA NA GAILLIMHE-MAIGH EO

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Thesis Title: Taxonomy of the Lysianassoidea (Crustacea, Amphipoda) of the Northeast Atlantic and Mediterranean: An interactive identification key and studies on problematic groups

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Date:

15/12/06

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10/1/07

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20/12/06

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INTRODUCTION

This volume contains a dichotomous key to the genera of the Northeast Atlantic and Mediterranean Lysianassoidea, and a description and illustration of each species. A species-level interactive key is found on the accompanying CD. A total of 135 species were described and illustrated from within the 600 m isobath (Mediterranean excepted, as no depth limits were set for this area) and between the latitudes of 30°N – 60°N. Descriptions were generated from a DELTA database using the ‘tonatr’ output file, and contain as much detail about the animal as possible, including information regarding synonymies, distribution, depth range, type locality and the deposition of type material, where known. Illustrations were taken from a number of literature sources, which are cited in the figure headings. On occasion specimens were illustrated by the author, as no adequate illustrations could be found in the literature. These, too, are noted in the figure headings.

**Dichotomous key to the genera of the superfamily Lysianassoidea within the
Northeast Atlantic and Mediterranean¹**

1. Epimeron 3 posterodistal corner produced (fig. 6k) 2
Epimeron 3 posterodistal corner not produced (fig. 2i) 29

2. Epimeron 3 posterodistal corner producing small spine(s) only (fig. 27g) ... 3
Epimeron 3 posterodistal corner producing at least 1 large spine (fig. 6k)... 19

3. Gnathopod 1 dactylus rudimentary; eyes absent; lateral cephalic lobes acutely produced **Paracallisoma**
These characters not combined 4

4. Gnathopod 1 chelate (fig. 27d)... .. 5
Gnathopod 1 simple or subchelate (figs 4d, 2d) 8

5. Gnathopod 1 carpus short, length less than twice breadth; maxilliped palp 3-articulate **Podoprionella**
Gnathopod 1 carpus long, length greater than twice breadth 6

6. Antenna 1 producing disteroventral spine; gnathopod 2 chelate; pereopod 5 basis posterior margin strongly serrate **Podoprion**
These characters not combined 7

7. Antenna 1 peduncle article 1 not producing lobe; coxa 5 produced into a posterior lobe; uropod 3 rami subequal **Stephonyx**
Antenna 1 peduncle article 1 producing strong anterodistal lobe; coxa 5 equilobate; uropod 3 rami distinctly unequal **Euonyx**

8. Gnathopod 1 simple, or minutely subchelate 9
Gnathopod 1 subchelate or weakly subchelate 12

9. Coxa 1 large, about as large as coxa 2 10
Coxa 1 reduced, shorter than coxa 2 **Ambasia**

10. Gnathopod 1 ischium elongate, greater than twice as long as broad **Ichnopus**
Gnathopod 1 ischium short (fig. 7e) 11

11. Gnathopod 1 carpus distinctly shorter than propodus; gnathopod 2 subchelate **Menigrates**
Gnathopod 1 carpus distinctly longer propodus; gnathopod 2 chelate **Menigratopsis**

12. Coxa 1 strongly shortened (fig. 15i) 13
Coxa 1 not strongly shortened (fig. 7e) 14

¹ Only the lysianassoid genera are treated in this identification key. Because a species-level identification key is supplied in the compact disk accompanying this thesis, it was considered unnecessary to include a species-level dichotomous key.

13.	Rostrum not pronounced; mouthparts forming a quadrate bundle... ..	
	<i>Schisturella</i>
	Rostrum pronounced; mouthparts forming a styliform bundle	
	<i>Trischizostoma</i>
14.	Coxa 1 tapering distally; gnathopod 1 ischium short (fig. 126j)... ..	<i>Tryphosella</i>
	These characters not combined	15
15.	Gnathopod 1 ischium elongate, more than twice as long as broad... ..	<i>Tmetonyx</i>
	Gnathopod 1 ischium short	16
16.	Eyes apparently absent; lateral cephalic lobes acute; gnathopod 2 carpus about twice as long as propodus; urosomite 1 carinate dorsally	<i>Caeconyx</i>
	These not combined	17
17.	Lateral cephalic lobes acute; gnathopod 2 minutely chelate; coxa 5 produced into a posterior lobe... ..	<i>Orchomenella</i>
	These not combined	18
18.	Epimeron 3 posterodistal corner forming 1 single small spine	<i>Anonyx</i>
	Epimeron 3 posterodistal corner forming 2 small, subequal spines	
	<i>Orchomene</i>
19.	Uropod 2 inner ramus with marginal constriction(s) (fig. 6i)... ..	20
	Uropod 2 inner ramus without marginal constriction (s) (fig. 2f)	24
20.	Gnathopod 1 subchelate or weakly subchelate	21
	Gnathopod 1 simple or minutely subchelate... ..	23
21.	Epistome projecting acutely forward; uropod 2 rami distinctly unequal	
	<i>Tryphosites</i>
	Epistome not strongly projectly; uropod 2 rami subequal	22
22.	Telson deeply cleft; mandible with teeth on the incisor process	<i>Anonyx</i>
	Telson slightly cleft; mandible without teeth on incisor process	<i>Onisimus</i>
23.	Urosomite 1 with dorsal depression; uropod 2 rami distinctly unequal; uropod 3 outer ramus 2-articulate	<i>Socarnes</i>
	Urosomite 1 without dorsal depression; uropod 2 rami subequal; uropod 3 outer ramus 1-articulate	<i>Lysianassa</i>
24.	Gnathopod 1 chelate	<i>Sophrosyne</i>
	Gnathopod 1 simple or subchelate	25
25.	Lateral cephalic lobes broadly rounded; antenna 1 peduncle article 1 not produced	<i>Anonyx</i>
	These not combined	26

26. Antenna 1 peduncle article 1 producing a strong anterior lobe or spine; or urosomite 1 carinate dorsally *Hippomedon*
Antenna 1 not produced anteriorly; urosomite 1 not carinate dorsally ... 27
27. Pereopod 7 basis posterior margin strongly serrated *Paracentromedon*
Pereopod 7 basis posterior margin not serrated 28
28. Eyes apparently absent; Pereopod 5 basis distinctly longer than broad; telson deeply cleft *Centromedon*
Eyes present; Pereopod 5 basis subequal in length and breadth; telson slightly cleft *Menigrates*
29. Gnathopod 1 propodus slender, palm shrouded in setae; dactylus rudimentary or absent (fig. 24g)... .. 30
These characters not combined 31
30. Coxae 1-4 with dense setal fringe on distal margins; coxa 5 produced into a slight anterior lobe; uropod 3 rami distinctly unequal *Aroui*
Coxae 1-4 without setal fringe; coxa 5 equilobate; uropod 3 rami subequal *Scopelocheirus*
31. Maxilliped palp 1-articulate, forming a sort of 'helmet' around the mouthparts; uropods 1 and 2 uniramous; uropod 3 and telson absent ... *Parachevreuxiella*
Maxilliped palp 3- or 4-articulate; uropods 1-3 present, biramous; telson present32
32. Gnathopod 1 chelate 33
Gnathopod 1 not chelate 36
33. Antenna 1 peduncle article 1 producing distoventral spine; Pereopod 5 basis strongly serrated *Podoprion*
Antenna 1 peduncle article 1 not producing spine; Pereopod 5 basis not strongly serrated34
34. Eyes apparently absent; antenna 1 peduncle article 1 producing dorsal and ventral lobes; maxilliped palp article 4 rudimentary; gnathopod 2 chelate... .. *Prachynella*
Eyes present; antenna 1 peduncle article 1 not produced; maxilliped palp article 4 well developed; gnathopod 2 subchelate... ..35
35. Coxa 1 reduced, gnathopod 1 ischium elongate, more than twice as long as broad; carpus very long *Stephonyx*
Coxa 1 subequal to coxa 2; gnathopod 1 ischium short; carpus compressed *Opisa*
36. Gnathopod 1 simple or minutely subchelate 37
Gnathopod 1 weakly subchelate or subchelate 49
37. Maxilliped palp article 4 rudimentary (fig. 2a) 38
Maxilliped palp article 4 well developed (fig. 5a) 39

38.	Eyes small and rounded; telson slightly cleft or emarginate	<i>Acidostoma</i>	
	Eyes large, suboval; telson entire... ..	<i>Nannonyx</i>	
39.	Coxa 1 strongly shortened		40
	Coxa 1 large, about as large as coxa 2		44
40.	Coxa 2 strongly shortened		41
	Coxa 2 not strongly shortened		43
41.	Rostrum pronounced (fig. 62a)... ..	<i>Metacyphocaris</i>	
	Rostrum not pronounced (fig. 6a)		42
42.	Pereopod 5 propodus slender; uropod 3 rami subequal; telson entire	<i>Crybeiocephalus</i>	
	Pereopod 5 propodus robust, with convexed margins (fig. 93j); uropod 3 rami unequal; telson cleft	<i>Paracyphocaris</i>	
43.	Accessory flagellum partially forming cap covering calynophore; eyes apparently absent; gnathopod 1 carpus distinctly longer than propodus; gnathopod 2 subchelate; telson moderately cleft	<i>Metambasia</i>	
	Accessory flagellum not forming cap; eyes present; gnathopod 1 carpus subequal in length to propodus; gnathopod 2 chelate; telson deeply cleft	<i>Aristias</i>	
44.	Antenna 1 peduncle article 1 producing strong distal spine; uropod 2 inner ramus with marginal constriction; uropod 1 outer ramus 1-articulate... ..	<i>Lysianassa</i>	
	These characters not combined		45
45.	Gnathopod 1 ischium elongate; uropod 3 extremely reduced	<i>Kerguelenia</i>	
	Gnathopod 1 ischium short; uropod 3 rami not reduced		46
46.	Pereopod 3 propodus expanded, strongly chelate	<i>Ensayara</i>	
	Pereopod 3 propodus slender, simple		47
47.	Coxa 5 equilobate; Pereopod 5 basis about as long as broad; uropod 3 outer ramus 2-articulate; telson cleft	<i>Socarnes</i>	
	These characters not combined		48
48.	Gnathopod 2 subchelate; uropod 3 outer ramus 1-articulate	<i>Pardia</i>	
	Gnathopod 2 chelate; uropod 3 outer ramus 2-articulate	<i>Rhinolabia</i>	
49.	Coxa 1 strongly shortened		50
	Coxa 1 not strongly shortened		55
50.	Coxa 2 strongly shortened	<i>Cyphocaris</i>	
	Coxa 2 not strongly shortened		51

51. Maxilliped palp 3-articulate *Perrierella*
 Maxilliped palp 4-articulate 52
52. Pleonite 3 with dorsal depression; epimeron 3 posterodistal corner rounded ...
 *Eurythenes*
 Pleonite 3 smooth; epimeron 3 posterodistal corner acute... .. 53
53. Lateral cephalic lobes broadly rounded; uropod 2 inner ramus with large
 constriction; uropod 3 rami subequal; telson cleft to half *Hirondellea*
 These characters not combined 54
54. Gnathopod 1 carpus subequal in length to propodus; gnathopod 2 minutely
 chelate; Pereopod 5 basis distinctly longer than broad; uropod 2 inner ramus
 with strong constriction *Aristias*
 Gnathopod 1 carpus distinctly shorter than propodus; gnathopod 2 minutely
 subchelate; Pereopod 5 basis about as long as broad; uropod 2 inner ramus not
 constricted... .. *Uristes*
55. Coxa 1 tapering distally; gnathopod 1 ischium short *Tryphosella*
 These characters not combined 56
56. Gnathopod 1 ischium elongate, more than twice as long as broad 57
 Gnathopod 1 ischium short 58
57. Gnathopod 1 carpus short; propodus very broad; palm transverse
 *Normanion*
 Gnathopod 1 carpus long; propodus slender; palm acute *Tmetonyx*
58. Antenna 1 peduncle article 1 producing strong anterodistal lobe or spine;
 pleonite 3 dorsally produced *Lepidepcreum*
 Antenna 1 peduncle article 1 not produced; pleonite 3 not dorsally produced
 59
59. Antenna 2 peduncle article 4 inflated; gnathopod 1 carpus subequal in length
 to propodus; uropod 2 inner ramus with large constriction... .. *Lysianella*
 These characters not combined 60
60. Telson entire or emarginate (fig. 53g, 2h) 61
 Telson cleft (fig. 5e) 63
61. Accessory flagellum forming cap, partially covering callynophore (fig. 81a);
 eyes apparently absent *Onesimoides*
 Accessory flagellum basic, not forming cap; eyes present... .. 62

62. Lateral cephalic lobes acutely produced; gnathopod 1 weakly subchelate; Pereopod 5 basis distinctly longer than broad; epimeron 3 posterodistal corner rounded; uropod 3 outer ramus article 2 very elongate — as long as article 1
 **Rhinolabia**
 Lateral cephalic lobes apically rounded; gnathopod 1 subchelate; Pereopod 5 basis subequal in length and breadth; epimeron 3 posterodistal corner acute; uropod 3 outer ramus article 2 short... .. **Orchomene**
63. Gnathopod 1 weakly subchelate, almost simple; telson cleft to half length; gnathopod 1 carpus long, subequal in length to propodus... .. **Socarnes**
 These characters not combined 64
64. Coxa 1 subquadrate with straight anterior margin; gnathopod 1 ischium short; carpus long; uropod 3 rami distinctly unequal; telson deeply cleft... **Caeconyx**
 These characters not combined; gnathopod 1 carpus short to compressed... 65
65. Eyes apparently absent; uropod 2 rami distinctly unequal ... **Abyssorchomene**
 Eyes present; uropod 2 rami subequal 66
66. Mandibular molar large, subcylindrical and strongly tritulative, without setulose crest, palp attached medially; telson deeply cleft **Orchomenella**
 Mandibular molar formed by a setulose crest with a poorly ridged tritulative area, palp attached proximal to molar; telson may be entire to moderately cleft
 **Orchomene**

North East Atlantic Amphipoda: Lysianassoidea

Monographic Species Descriptions

For the most part, the species descriptions given here are based on mature males, followed by a brief description of the sexually dimorphic characters of the female. In cases where one of the sexes remains undescribed or is unknown, this is stated, and the description is then based on the available material of the other sex.

Implicit Attributes

Unless indicated otherwise, the following attributes are implicit throughout the descriptions, except where the characters concerned are inapplicable.

Head. Rostrum not pronounced. Antenna 1 peduncle article 1 not produced; article 2 short, not produced. Accessory flagellum present, not forming cap. Antenna 2 peduncle article 3 short, article 4 not inflated. Lateral cephalic lobes without up-turned projection on end. Epistome not strongly projecting. Mouthparts forming a quadrate bundle.

Pereon. Pereon segment 1 not produced. Coxae 1–4 without setal fringe. Gnathopod 1 basis slender; merus and carpus not rotated; propodus longer than broad, palmar margin sparsely setose; dactylus well developed. Coxa 2 not strongly shortened; gnathopod 2 palm not deeply excavate. Coxa 3 not strongly shortened; pereopod 3 propodus slender; without locking robust seta(e) at posterodistal corner. Coxa 4 without distinct lateral ridge; propodus without locking robust seta(e) at posterodistal corner. Coxa 5 without circular depression or distinct lateral ridge; pereopod 5 basis posterior margin not strongly serrated; posterodistal corner not produced; propodus slender. Pereopod 6 basis posterior margin not strongly serrated. Pereopod 7 basis posterodistally produced less than halfway along merus, posterodistal corner not produced, posterior margin not strongly serrated.

Pleon. Pleonite 1 dorsal margin not produced dorsodistally, without mid-dorsal carina; pleonite 2 dorsal margin not produced dorsodistally, without mid-dorsal carina; pleonite 3 without dorsal depression; dorsal margin without mid-dorsal carina. Epimeron 3 lacking distinct notch above posterodistal spine, posterior margin smooth. Urosomite 1 not produced dorsodistally, not dorsally carinate. Uropods 1 and 2 biramous; uropod 3 present. Telson present.

Abyssorhomene abyssorum (Stebbing, 1888)

Fig. 1

Orchomene abyssorum Stebbing, 1888: 676, pl. 21. – Barnard & Karaman, 1991: 508.
Orchomenopsis abyssorum. – Chevreux, 1900: 23. – Chevreux, 1903: 92.
Orchomenella abyssorum. – Dahl, 1959: 225.
? *Orchomene (Abyssorhomene) abyssorum*. – J.L. Barnard & Ingram, 1990: 26, figs 15–17.

Type material. HOLOTYPE: NHML Reg. No. 1889: 5: 15: 23

Type locality. Western South Atlantic Ocean, east of Buenos Aires, Argentina; (35°39'S 50°47'W).

Material examined. Stebbing, 1888: 676, pl. 21. Barnard & Ingram, 1990: 26, figs 15–17.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 as long as remaining articles combined. Antenna 2 less than 40% of body length; calceoli present. Eyes present, colourless in alcohol. Lateral cephalic lobes broadly rounded. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus compressed, distinctly shorter than propodus; propodus margins subparallel, palm transverse. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner rounded to slightly acute. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus without marginal constriction(s); uropod 3 rami distinctly unequal, outer ramus 2-articulate, article 2 short. Telson almost twice as long as broad, moderately to deeply cleft.

Length. 10 mm.

Distribution. Cosmopolitan.

Depth. Bathyal to abyssal.

Female (sexually dimorphic characters)

Calceoli absent from antennae.

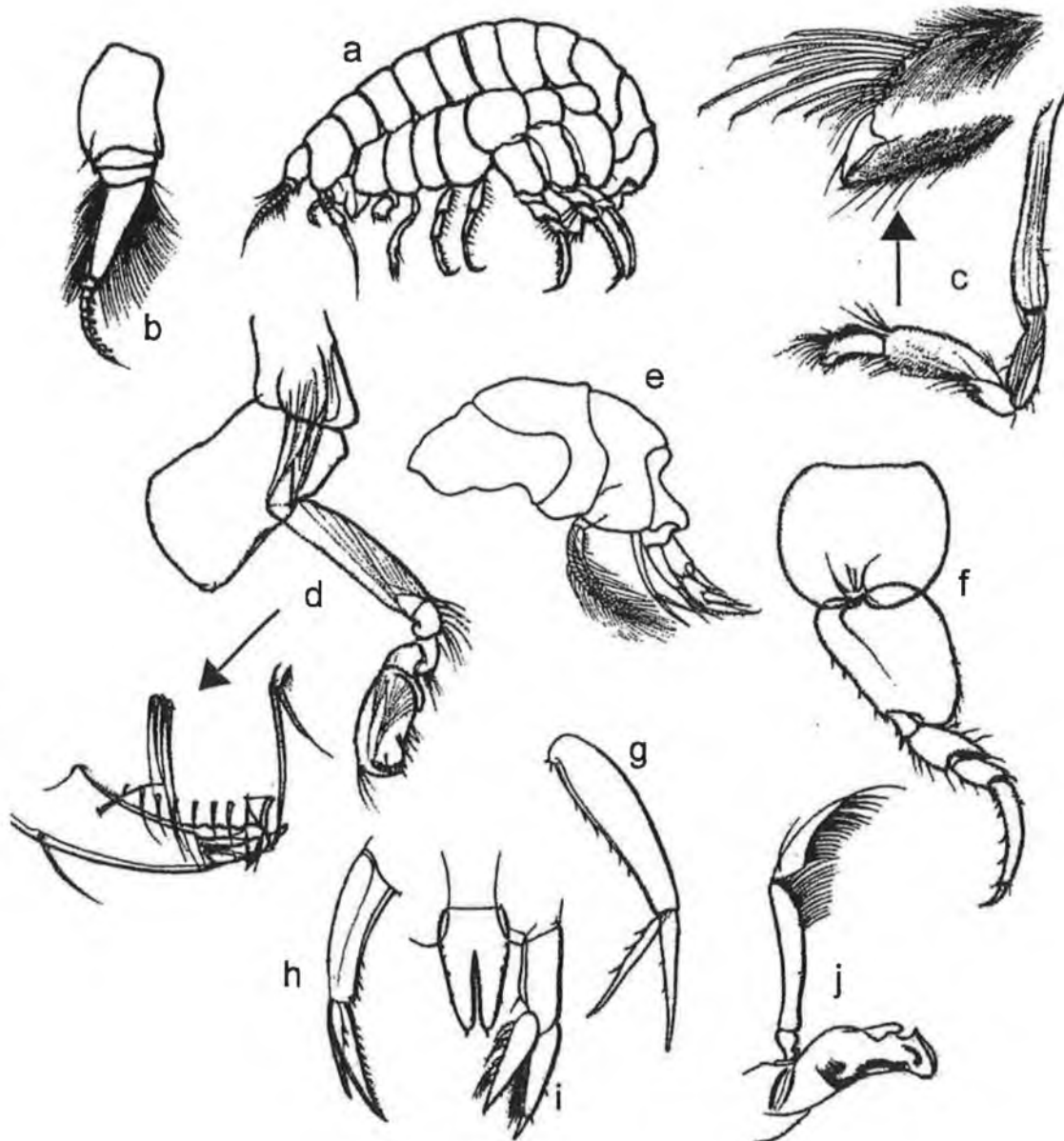


Figure 1: *Abyssorchomene abyssorum* (Stebbing, 1888), (a) entire, male; (b) antenna 1; (c) gnathopod 2; (d) gnathopod 1; (e) epimeron 1-3, urosome; (f) pereopod 5; (g) uropod 1; (h) uropod 2; (i) uropod 3 & telson; (j) mandible. [After: Stebbing, 1888].

Acidostoma neglectum Dahl, 1964

Fig. 2

Acidostoma neglectum Dahl, 1964: 50 (key), 53, figs 12–18. – Ansell, 1969: 345.

Acidostoma laticorne. – Della Valle, 1893: 782, pl. 6, fig. 12, pl. 28, figs 1–21. – Chevreux & Fage, 1925: 30, figs 7–8.

Acidostoma obesum. – Lincoln, 1979a: 56 (key), 58, figs 19e-g, 20a-f. – Diviacco & Ruffo, 1989: 471, fig. 318. – Palerud & Vader, 1991: 32.

? *Acidostoma obesum*. – Meinert, 1890: 157 (in part). – Costello *et al.*, 1989: 32. – Dauvin & Gentil, 1990: 127 (table 2).

? *Acisostoma laticorne*. – Stephensen, 1923a: 10.

Type material. HOLOTYPE: ZML (Accession no. unknown), ovigerous female.

Type locality. North Sea, Dogger Bank, Danish Biological Station Stn 7034, 55°46.5'N, 4°20'E, 38 m.

Material examined. Dahl, 1964: 53, figs 12-18. Lowry & Stoddart (in prep.). Lincoln, 1979a: 58, fig. 19e-g, fig. 20a-f. Diviacco & Ruffo, 1989: 471, fig. 318.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate; calceoli absent. Eyes small, rounded. Lateral cephalic lobes broadly rounded. Mouthparts forming a conical bundle. Maxilliped palp 3-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 carpus longer than propodus; dactylus absent. Pereopod 5 coxa produced into a slight posterior lobe; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute, rounded at tip. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly broader than long, emarginate.

Length. 4 mm.

Distribution. Northeast Atlantic coasts; North Sea; Mediterranean.

Depth. Infralittoral to circalittoral (1–200m).

Ecology. Ectoparasitic on sea-anemones.

Remarks. The synonymies given above are the work of Lowry & Stoddart (in prep.) These authors are currently revising the genus *Acidostoma* in the Northeast Atlantic

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Urosomite 1 without dorsal depression.

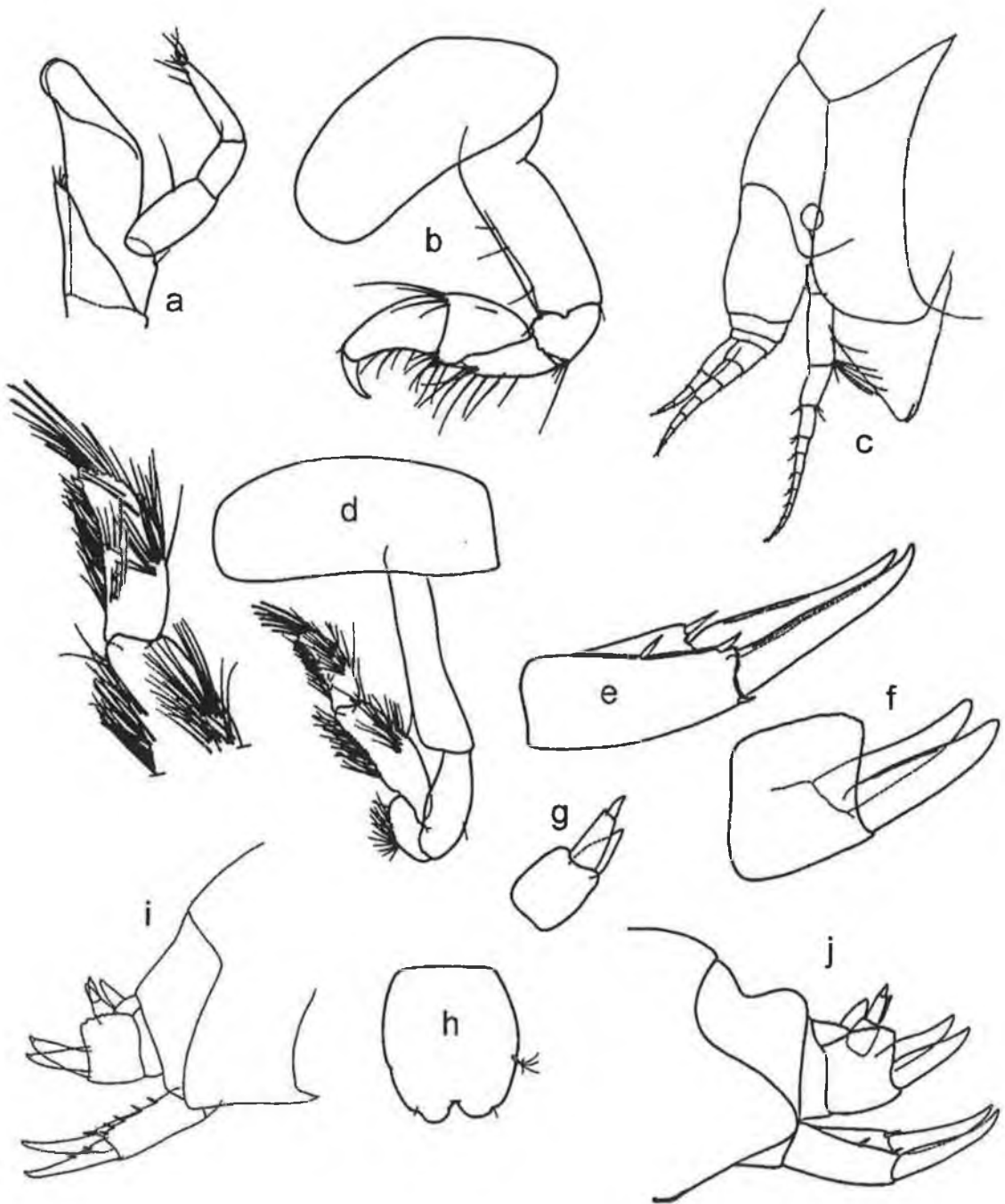


Figure 2: *Acidostoma neglectum* Dahl, 1964. (a) maxilliped; (b) gnathopod 1; (c) head (female); (d) gnathopod 2; (e) uropod 1; (f) uropod 2; (g) uropod 3; (h) telson; (i) urosome (female); (j) urosome (male).

[Figs c, i, after: Lincoln, 1979a, figs a-b, d-h, j after: Diviacco & Ruffo, 1989].

Acidostoma obesum (Bate & Westwood, 1861)

Fig. 3

- Anonyx obesus* Bate & Westwood, 1861: 98. – Bate, 1862: 74, pl. 12, fig. 1. – Robertson, 1888: 21. – Walker, 1892: 136.
- Acidostoma obesum*. – Lilljeborg, 1865a: 34, pl. 5. – Lilljeborg, 1865b, 24. – Bate, 1866: 333. – Norman, 1869: 276. – Boeck, 1871: 121. – M'Intosh, 1874: 266. – Metzger, 1875: 283. – Boeck, 1876: 193. – Stebbing, 1876: 75. – Meinert, 1890: 157 (in part, part = *A. neglectum*). – G.O. Sars, 1890: 38, pl. 14, fig 2. – Della Valle, 1893: 784. – Norman, 1895: 479. – G.O. Sars, 1895: 675. – Norman, 1900a: 141. – Scott, 1901: 258. – Scott, 1904: 257. – Reibisch, 1905: 151. – Stebbing, 1906: 14. – Stephensen, 1923a: 9. – Chevreux & Fage, 1925: 32, fig. 9. – Molander, 1930: 82. – Stephensen, 1932: 353. – Raitt, 1937: 249, 251. – Stephensen, 1942: 470. – Dahl, 1946: 4. – Jones, 1948: 404. – Enquist, 1949: 387, 400. – Gurjanova, 1951: 158, fig. 32. – Reid, 1951: 195. – Oldevig, 1959: 5. – Gurjanova, 1962: 55 (key). – Dahl, 1964: 50, figs 1–3.
- Acidostoma laticorne*. – Meinert, 1890: 157.
- Acidostoma nodiferum* Stephensen, 1923b: 40, fig. 1. – Dahl, 1946: 4. – Enequist, 1949: 387, 400. – Gurjanova, 1951: 158 (key). – Oldevig, 1959: 5. – Gurjanova, 1962: 55 (key). – Dahl, 1964: 50 (key), 51, figs 4–7. – Vader, 1967: 283, fig. 1 (map). – Ledoyer, 1977: 372. – Bellan-Santini, 1985: 274. – Costello *et al.*, 1989: 32. J.L. Barnard & Karaman, 1991: 457. Palerud & Vader, 1991: 32.
- Acidostoma sarsi*. – Lincoln, 1979a: 56 (key), 58, figs 19a-d, 20g-m. – Diviacco & Ruffo, 1989: 472, fig. 319. – J.L. Barnard & Karaman, 1991: 457. – Buhl-Jensen & Fosså, 1991: 248 (table 2).
- not *Acidostoma obesum*. – G.O. Sars, 1886: 43 (= *A. laticorne*)
- not *Acidostoma obesum*. – K.H. Barnard, 1925: 322. – Griffiths, 1975: 143. (= *A. namibiensis*).
- not *A. obesum*. – Thurston & Allen, 1969: 353. – Lincoln, 1979a: 56 (key), 58, figs 19e-g, 20a-f. – Diviacco & Ruffo, 1989: 471, fig. 318. – J.L. Barnard & Karaman, 1991: 457. – Palerud & Vader, 1991: 32. (= *A. neglectum*).

Type material. A neotype is currently being selected by Lowry & Stoddart (in prep.) from amongst material collected by A. M. Norman in the NHML.

Type locality. Moray Firth (Scotland).

Material examined. Lilljeborg, 1865a: 34, pl. 5. Lowry & Stoddart (in prep.); Lincoln, 1979a: 58, figs 19a-d, 20g-m. Diviacco & Ruffo, 1989: 472, fig. 319

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate; calceoli absent. Eyes small, rounded. Lateral cephalic lobes narrowly rounded. Mouthparts forming a conical bundle. Maxilliped palp 3-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus longer than broad, margins tapering. Gnathopod 2

carpus longer than propodus; dactylus absent. Pereopod 5 coxa produced into a posterior lobe; basis slightly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute, rounded at tip. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson subequal in length and breadth, moderately to deeply cleft.

Length. 5 mm.

Distribution. Norwegian Sea; North Sea; Northeast Atlantic Ocean; Mediterranean Sea.

Depth. Infralittoral to bathyal (1–1200 m).

Ecology. Ectoparasitic.

Remarks. The synonymies given above are the work of Lowry & Stoddart (in prep.) These authors are currently revising the genus *Acidostoma* in the Northeast Atlantic.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Urosomite 1 without dorsal depression.

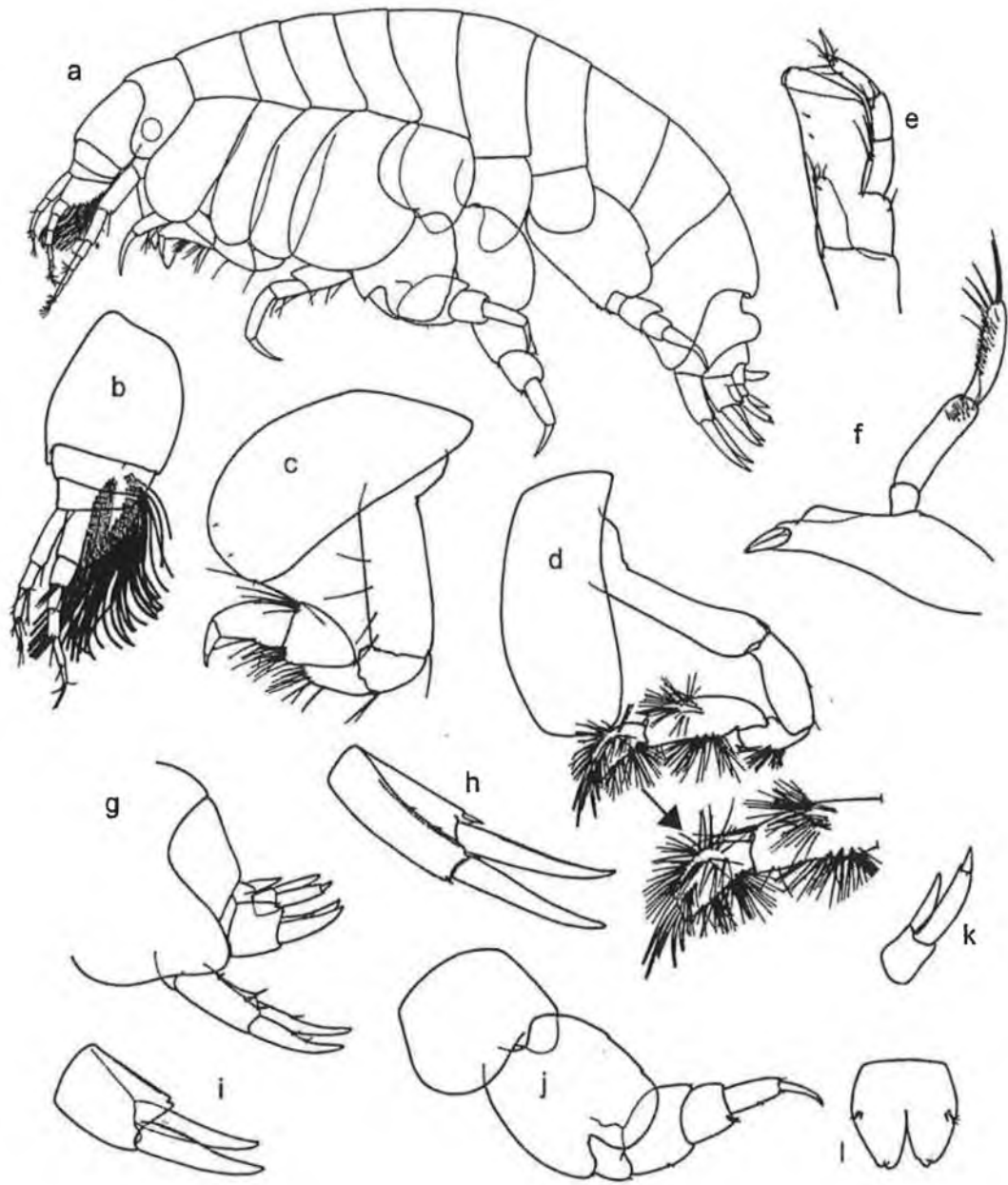


Figure 3: *Acidostoma obesum* (Bate & Westwood, 1861). (a) entire, male; (b) antenna 1; (c) gnathopod 1; (d) gnathopod 2; (e) maxilliped; (f) mandible; (g) urosome, female; (h) uropod 1; (i) uropod 2; (j) pereopod 5 (k) uropod 3; (l) telson.

[After: Diviacco & Ruffo, 1989].

Ambasia atlantica (Milne-Edwards, 1830)

Fig. 4

Gammarus atlanticus Milne-Edwards, 1830: 368

Lysianassa atlantica. – Milne-Edwards, 1840: 22. – Bate & Westwood, 1861: 82. – Bate, 1862: 68.

Lysianassa marina Bate, 1857: 138.

Ambasia danielsseni Boeck, 1871: 97. – Boeck, 1872: 121. – G.O. Sars, 1890: 46, pl. 17. – Walker, 1898: 171. – Norman, 1900a: 144. – Stebbing, 1906: 51.

Ambasia atlantica. – Stebbing, 1906: 719. – Stephensen, 1923b: 74. – Lincoln, 1979a: 62, fig. 22. – Barnard & Karaman, 1991: 461. – Dauvin & Sorbe, 1995: 443, 456.

Type material. Unknown.

Type locality. Unknown.

Material examined. G.O. Sars, 1890: 46, pl. 17. Lincoln, 1979a: 62, fig. 22.

Description based on mature female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 as long as remaining articles combined. Antenna 2 less than 40% of body length. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp article 4 rudimentary; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 simple; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium short; carpus long, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1 and 2 rami subequal, uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson distinctly longer than broad, deeply cleft.

Length. 13 mm.

Distribution. Arctic Ocean; Skagerrak; North and West Norway; Greenland; Iceland; Southwest Ireland.

Depth. Infralittoral to bathyal.

Remarks. This is a widespread and frequently recorded species.

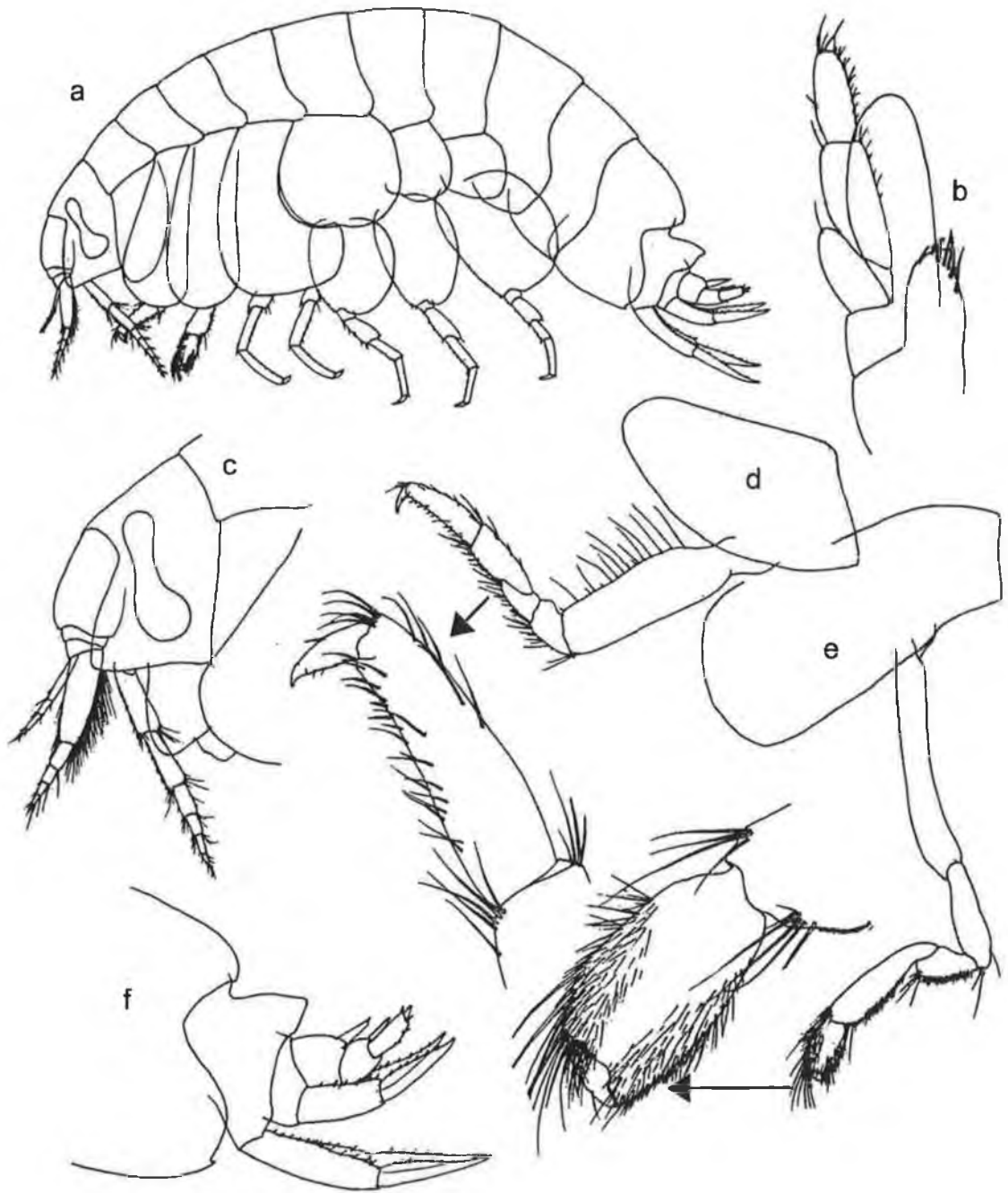


Figure 4: *Ambasia atlantica* (Milne-Edwards, 1830). (a) entire, female; (b) maxilliped; (c) head; (d) gnathopod 1; (e) gnathopod 2; (f) epimeron 3 and urosome.

[After: Linclon, 1979a].

Anonyx affinis Ohlin, 1895

Fig. 5

Anonyx affinis Ohlin, 1895a (non Della Valle, 1893): 24, figs 15–18. – Ohlin, 1895b: 186. – Stebbing, 1906: 55. – Just, 1980: 20, figs 19–20. – Barnard & Karaman, 1991: 465.

Type locality. Cape Dudley Digges, Baffin Bay.

Material examined. Female, 17 mm, Thule exp. Stn 14, ZMUC; Ohlin, 1895a: 24; Stebbing, 1906; Just, 1980: 20, figs 19–20.

Description based on female.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate; calceoli absent. Eyes large, suboval or reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus longer than broad, margins tapering, palm acute to extremely acute; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner quadrate; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropod 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson distinctly longer than broad, deeply cleft.

Length. 13 mm.

Remarks. There is much confusion regarding this species. The original description by Ohlin (1895a) is not detailed enough for individuals of this species to be identified with certainty. The location of the type specimen is unknown and thus it is impossible to accurately redescribe this species. The description by Just (1980) differs from that of Ohlin (1895a) in a number of points including the shape of the lateral lobes, length of the accessory flagellum, length of uropod 1, and length of uropod 3 inner ramus. However, as noted by Just (1980), his description is based on a mature male (10 mm) whereas the original description of Ohlin is based on a mature female of 13 mm. Some of the differences mentioned above, specifically the shape of the lateral lobes and the length of uropod 3 inner ramus, are commonly occurring sexually dimorphic characters among the Lysianassoidea. The description given above is based on a specimen from the ZMUC, labelled as '*Anonyx affinis*' and fitting the description given by Just (1980).

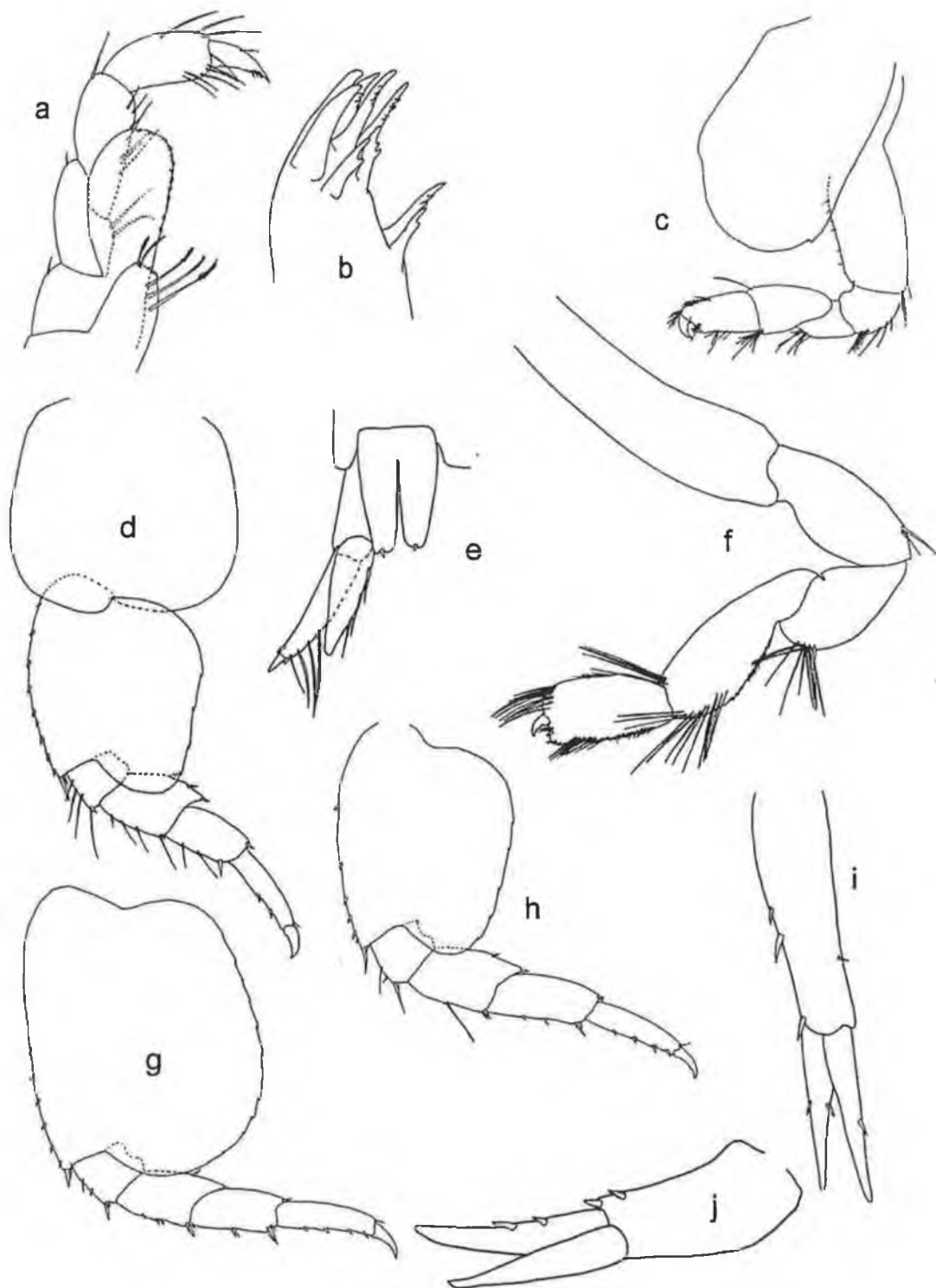


Figure 5: *Anonyx affinis* Ohlin, 1895. Female. (a) maxilliped; (b) maxilla 1, setal teeth; (c) gnathopod 1; (d) pereopod 5; (e) uropod 3 and telson; (f) gnathopod 2; (g) pereopod 7; (h) pereopod 6; (i) uropod 1; (j) uropod 2. [Illustration by author].

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Anonyx compactus Gurjanova, 1962

Fig. 6

Anonyx compactus Gurjanova, 1962: 280, fig. 91A-B. – Steele & Brunel, 1968: 1032, figs 50-52. – Barnard & Karaman, 1991: 465.

Anonyx oculatus Brunel, 1964: 3, figure only (*non A. oculatus* Gurjanova, 1962).

Type material. Unknown (see remarks below).

Type locality. Sea of Okhotsk.

Material examined. Gurjanova, 1962: 280, fig. 91A-B; Steele & Brunel, 1968: 1032, figs 50-52.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute to acute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins tapering, palm transverse to slightly acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine or forming 2 spines, the superior the largest (see remarks below). Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Distribution. Mainly a Pacific species which seems to have spread into the Atlantic. There are few records of this in the Northeast Atlantic, and these are mostly in the Norwegian Sea.

Remarks. The original illustrations of Gurjanova (1962) show slight variations on those of Steele & Brunel (1968). In Gurjanova's illustration the 1st coxa is shown to be somewhat convexed anteriorally, whereas that of Steele & Brunel shows a clearly concaved margin. Also Gurjanova shows a miniscule spine beneath the large spine on the 3rd epimeron posterodistal corner. This is not illustrated in the female by either author, and Steele & Brunel do not illustrate the male epimeron 3 for comparison. It is possible that this character is slightly variable between sexes and/or individuals. It is unknown whether a type specimen was designated for this species.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length. Calceoli absent. Epimeron 3 posterodistal corner forming a large upturned spine.

Length. 12–17 mm.

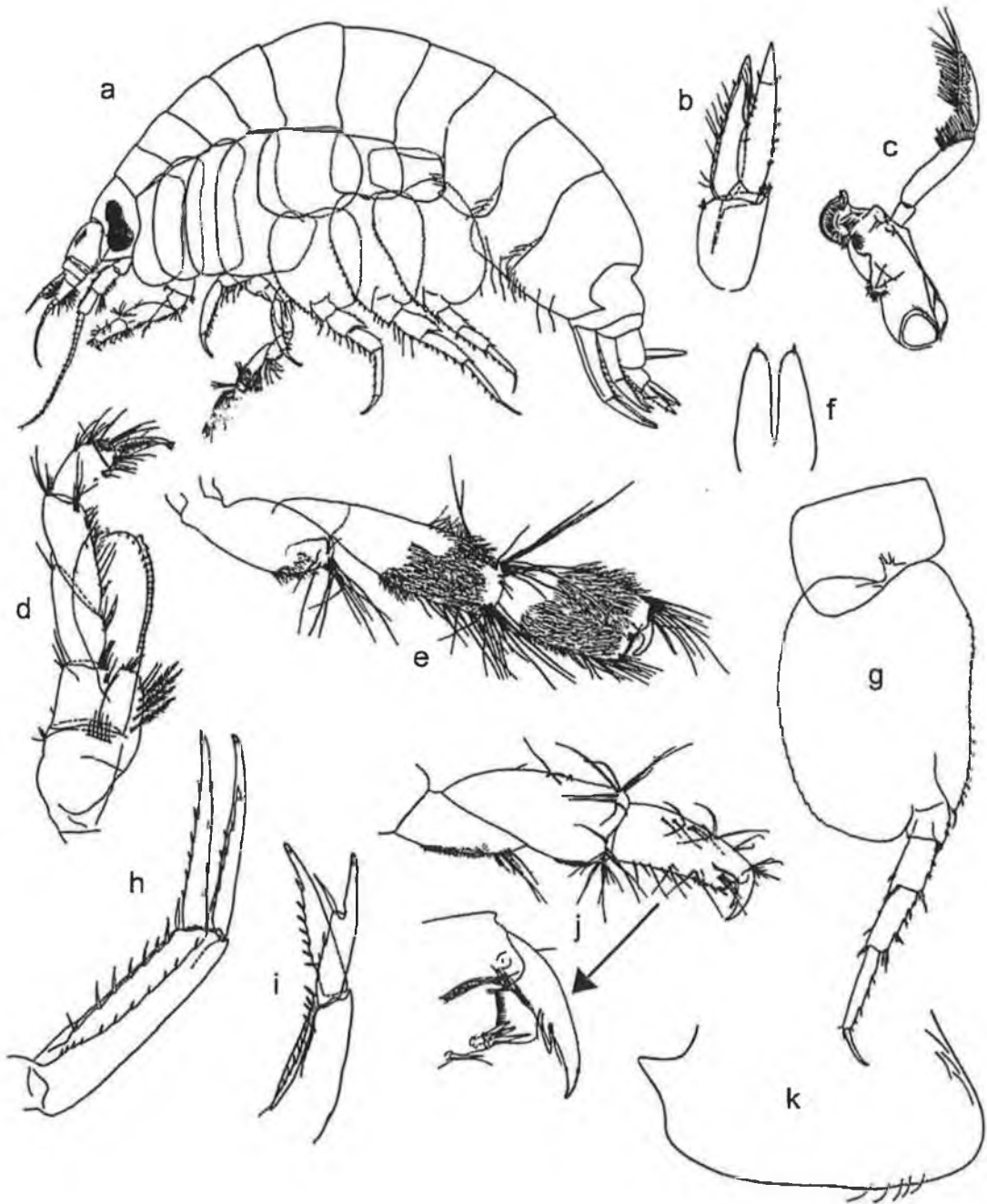


Figure 6: *Anonyx compactus* Gurjanova, 1962. (a) entire, female; (b) uropod 3; (c) mandible; (d) maxilliped; (e) gnathopod 2; (f) telson; (g) pereopod 7; (h) uropod 1; (i) uropod 2; (j) gnathopod 1; (k) epimeron 3. [After: Steele & Brunel, 1968].

Anonyx debruyni Hoek, 1882

Fig. 7

Anonyx debruynii Hoek, 1882: 44, pl. 3, figs 30–30x.

Chironesimus debruyni. – G.O. Sars, 1891: 109, pl. 37, fig. 2. – Stebbing, 1894: 13. –

Stebbing, 1906: 72. – Stappers, 1911: 18 (in part) (not pl. 1, figs 6–8). –

Stephensen, 1935: 96. -- Gurjanova, 1951: 262, fig. 132.

Chironesimus debruynii. – Shoemaker, 1930b: 4.

Anonyx debruyni debruyni Gurjanova, 1962: 255, fig. 38a- b (in part).

Anonyx debruyni. – Steele & Brunel, 1968: 1022, figs 43–49. – Barnard & Karaman, 1991: 465.

Type material. HOLOTYPE: mature male, 20mm; LM̄N.

Type locality. Barents Sea (72°32'18" N, 36°39'30" W). July 14, 1879. 234 m.

Material examined. G.O. Sars, 1891: 109, pl. 37, fig. 2. Steele & Brunel, 1968: 1022, figs 43-49.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length, calceoli present. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa 1 large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus well developed. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. 21 mm.

Distribution. Norwegian Sea; Arctic Seas.

Depth. Bathyal.

Remarks. There are few records of this species in the literature, and thus the distribution is somewhat uncertain.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length, calceoli absent.

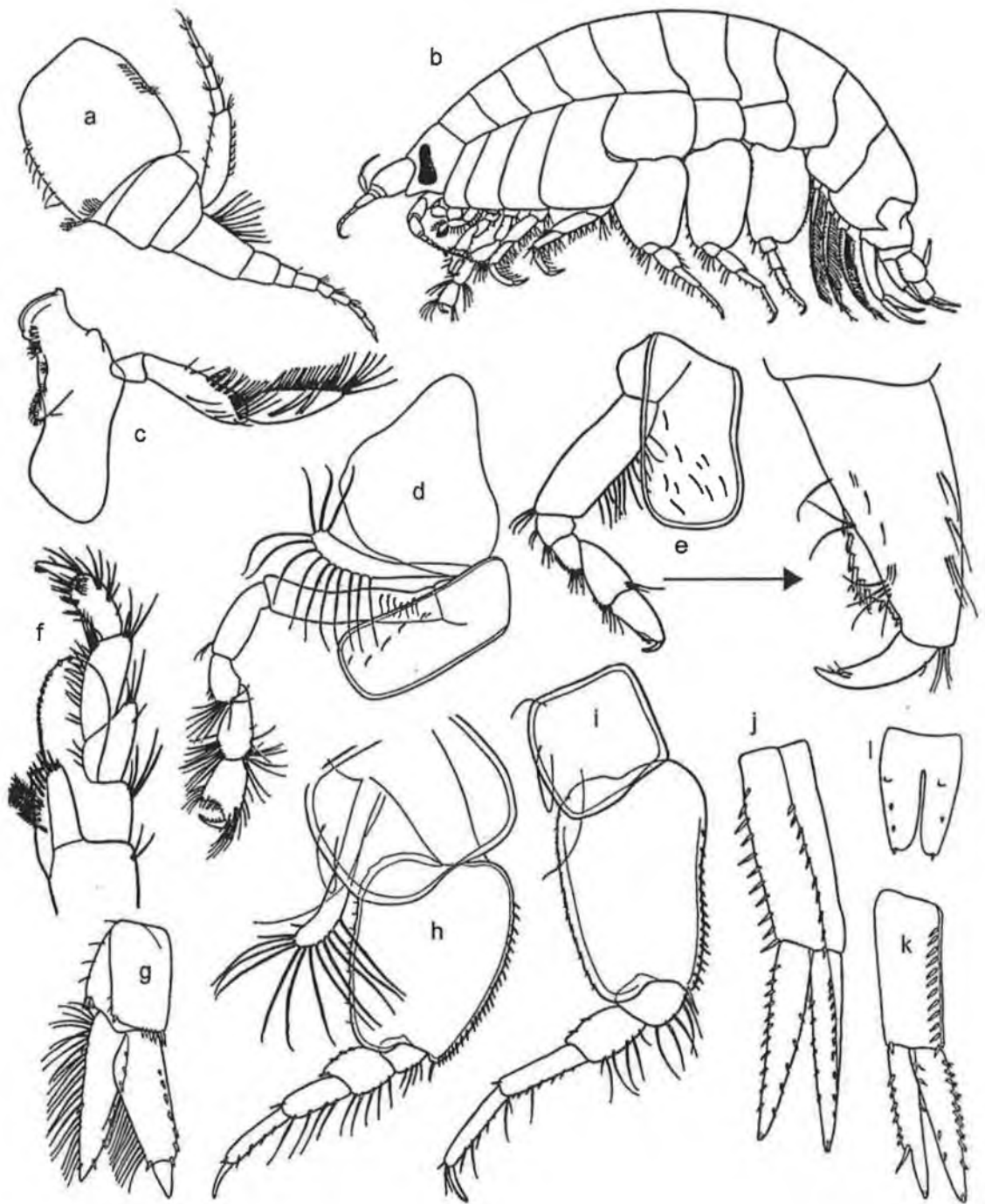


Figure 7: *Anonyx debruyni* Hoek, 1882. (a) antenna 1; (b) entire, female; (c) mandible; (d) gnathopod 2; (e) gnathopod 1; (f) maxilliped; (g) uropod 3; (h) pereopod 5; (i) pereopod 6; (j) uropod 1; (k) uropod 2; (l) uropod 3.

[After: Steele & Brunel, 1968].

Anonyx laticoxae Gurjanova, 1962

Fig. 8

Anonyx laticoxae Gurjanova, 1962: 290, fig. 95. – Steele & Brunel, 1968: 994, figs 24-28. – Barnard & Karaman, 1991: 465.

Type material. Unknown.

Type locality. Paramutchir Island, Kurile Islands, North Pacific. 150 m.

Material examined. Steele & Brunel, 1968: 994, figs 24-28. Gurjanova, 1962: 290, fig. 95.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 between 40 to 60% of body length, calceoli present. Eyes large, reniform. Lateral cephalic lobes broadly rounded. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa 1 large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm transverse. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. 30 mm.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length, calceoli absent.

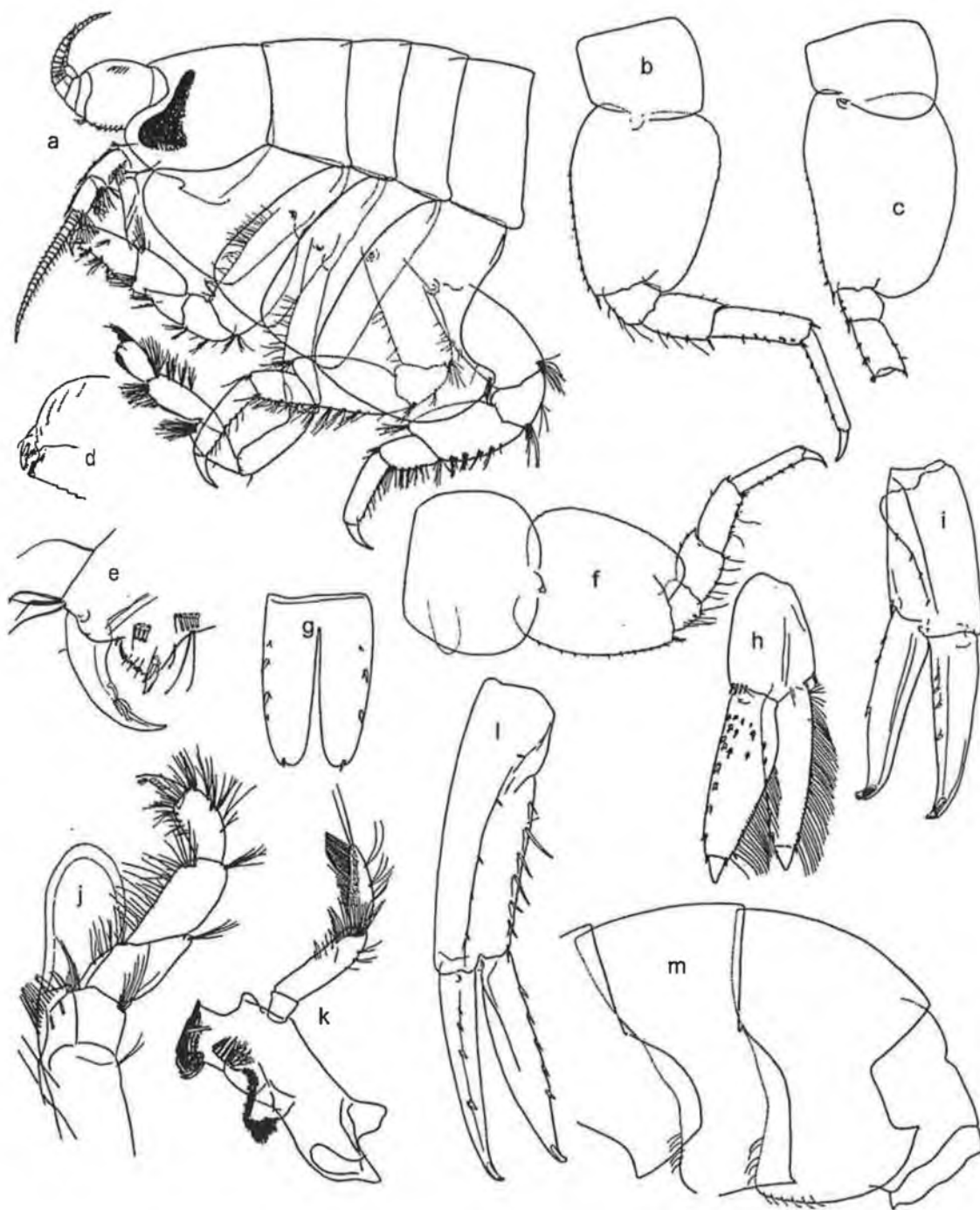


Figure 8: *Anonyx laticoxae* Gurjanova, 1962. (a) entire, female; (b) pereopod 6; (c) pereopod 7; (d) gnathopod 2 dactylus; (e) gnathopod 1 dactylus; (f) pereopod 5; (g) telson; (h) uropod 3; (i) uropod 2; (j) maxilliped; (k) mandible; (l) uropod 1; (m) pleosome.

[After: Steele & Brunel, 1968].

Anonyx lilljeborgi Boeck, 1870

Fig. 9

- Anonyx lilljeborgi* Boeck, 1871: 29. – Boeck, 1871: 154, pl. 4, fig. 3. – G.O. Sars, 1891: 90, pl. 32, fig. 1. – Stebbing, 1894: 8. – Stebbing, 1906: 55. – Gurjanova, 1951: 223, fig. 88. – Gurjanova, 1962: 225, fig. 70A (in part), 70B. – Steele & Brunel, 1968: 1001, figs 29-34. – Bousfield, 1973: 150, pl. XLI, fig. 1. – Lincoln, 1979a: 78, fig. 29g-i, fig. 30a-g. – Barnard & Karaman, 1991: 465.
- Lakota carinata* Holmes, 1908: 498, fig. 9. – Gurjanova, 1962: 302, fig. 100. – Thorsteinson, 1941 (in part): 54, pl. 2, figs 16-17.
- Anonyx nugax*. – Shoemaker, 1930b: fig. 1. – Stephensen, 1923b (in part): 78. – Shoemaker, 1930b: 8 (*non* fig. 1). – Stephensen, 1935: 64.
- Anonyx carinatus*. – Hurley, 1963: 103, figs 32–34.

Type material. PARATYPE: immature male, 9mm; ZMUB Cat. No. 3032.

Type locality. Haugesund, west Norway (59°25'N, 5°16'E); 110–128 m.

Material examined. Steele & Brunel, 1968: 1001, figs 29-34. Lincoln, 1979a: 78, fig. 29g-i.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm transverse. Gnathopod 2 slightly chelate; carpus longer than propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 basis about as long as broad.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Distribution. Norwegian Sea; Bay of Biscay.

Depth. Infralittoral to circalittoral.

Ecology. Typically associated with shallow water and sandy sediments.

Remarks. Tends to have a more southerly distribution than other members of the same genus.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Lateral cephalic lobes subquadrate.

Length. 9–18 mm.

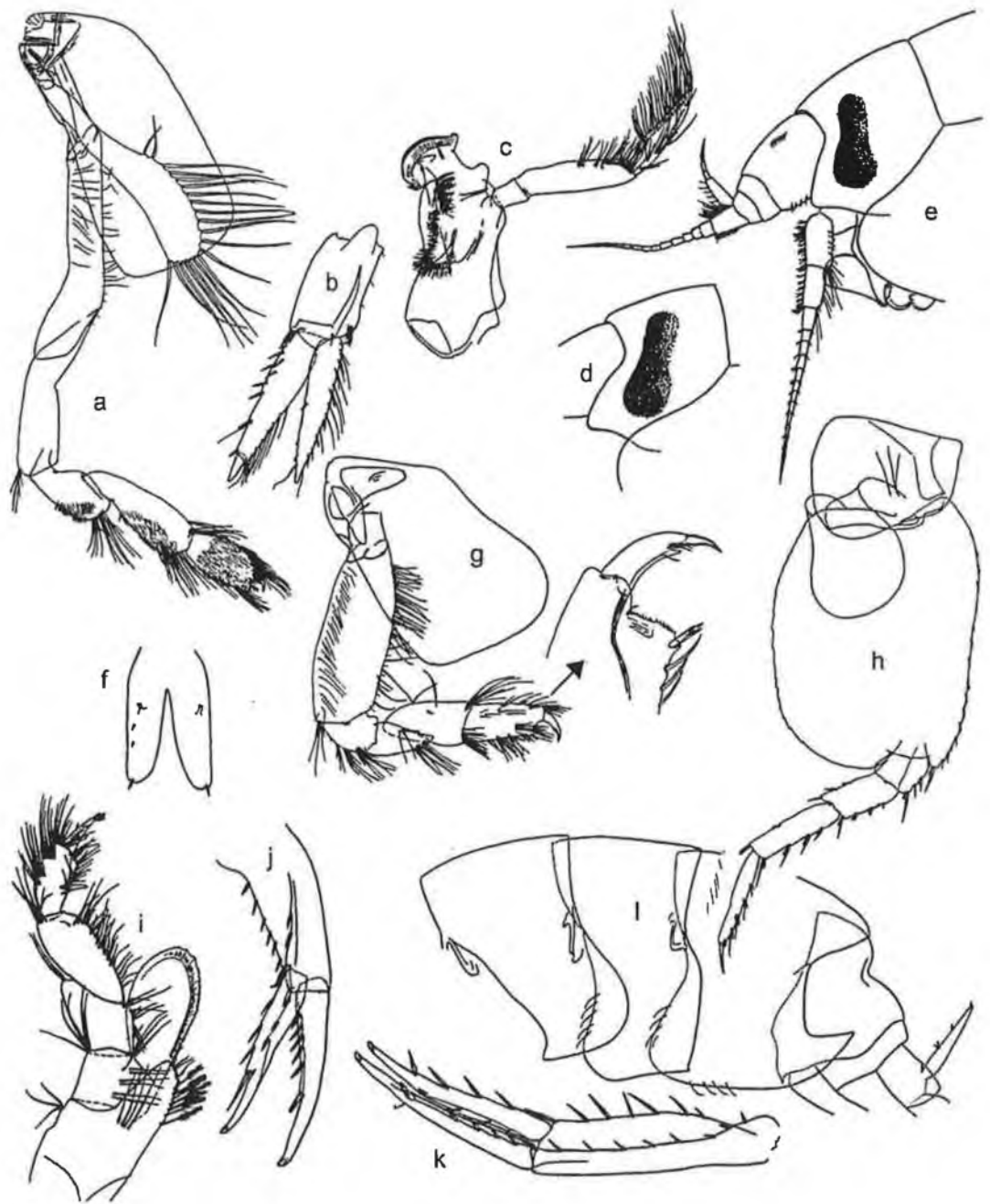


Figure 9: *Anoyx lilljeborgi* Boeck, 1870. (a) gnathopod 2; (b) uropod 3; (c) mandible; (d) head, male; (e) head, female; (f) telson; (g) gnathopod 1; (h) pereopod 6; (i) maxilliped; (j) uropod 2; (k) uropod 1; (l) pleon, female. [After: Steele & Brunel, 1968].

Anonyx nugax (Phipps, 1774)

Fig. 10

- Cancer nugax* Phipps, 1774: 192, pl. 7, fig. 2.
Gammarus nugax. – Fabricius, 1781: 515.
Talitrus nugax. – Ross, 1826: 119.
Atylus nugax. – Latreille, 1829: 120.
Lysianassa Lagena Krøyer, 1838: 237, pl. 1, fig. 1.
Lysianassa appendiculosa Krøyer, 1838: 240, pl. 1, fig. 2.
Anonyx lagena. – Krøyer, 1838: 244 (*non A. lagena* Sars, 1895: 686. – Stebbing, 1906: 54).
Anonyx appendiculosus. – Krøyer, 1838: 244
Lysianassa appendiculate. – Milne-Edwards, 1840: 21. – Bate, 1862: 67, pl. 10, fig. 8
Anonyx ampulla. – Krøyer, 1845: 578. – Krøyer, 1846a?: pl. 13, fig. 2. – Krøyer, 1846a: 43 (*non A. ampulla* Bate, 1862: 79, pl. 13, fig. 5; *non Cancer ampulla* Phipps, 1774: 191, pl. 12, fig. 3).
Lysianassa lagena. – Bell, 1855: 406.
Anonyx lagena. – Bate, 1862: 77, pl. 12, fig. 7 (in part). – Boeck, 1871: 28. – Boeck, 1872: 152. – Heller, 1875: 29, pl. 1, figs 6–15.
Anonyx ampulloides. – Bate, 1862: 78, pl. 12, fig. 8 (*non A. ampulloides* Stebbing, 1888: 608, pl. 3. – Gurjanova, 1951: 225, fig. 90. – Gurjanova, 1962: 271, fig. 88A-B. – Nagata, 1960: 166, pl. 13, figs 1–6).
Lysianassa Fisheri Lockington, 1877: 48.
Anonyx nugax. – Miers, 1877: 135.
Anonyx kukenthali Vosseler, 1889: 154, pl. 8, figs 1–17.
Anonyx nugax. – G.O. Sars, 1891: 88, pl. 31 (in part). – Stebbing, 1894: 7. – Holmes, 1904: 313, pl. 35, figs 17–19, pl. 36, fig. 20. – Stebbing, 1906: 54. – Brüggem, 1907: 216. – Stappers, 1911: 8. – Stephensen, 1923b: 78, fig. 17, table 1–3, chart 13–14 (in part). – Stephensen, 1935: 64. – Gurjanova, 1951: 222, fig. 87. – Gurjanova, 1962: 216, fig. 67A-B. – Steele & Brunel, 1968: 955, figs 1–8. – Barnard & Karaman, 1991: 465 (*non A. nugax* Holmes, 1905: 472, 1 fig., pl. 3, fig. 3. – Shoemaker, 1930a: fig. 1; *non A. pacificus* Gurjanova, 1962: 219, fig. 68A-B, 69A-B).
Lakota chelata Chevreux, 1926: 9, fig. 5. – Stephensen, 1935: 88, fig. 13.
Lakota chelate. – Gurjanova, 1951: 216, fig. 131.

Type material. Probably lost.

Type locality. West of Møffen Island, Spitzbergen (about 80°10' N, 12°30' E).

Material examined. Female, 12mm, ZMUC (no accession no.), West Greenland 68°00' N, 54°22' W; Stebbing, 1906: 54

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes quadrate. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering, palm transverse. Gnathopod 2 subchelate; carpus almost twice as long as propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 31–44 mm. This is one of the largest of the *Anonyx* species.

Distribution. North Norway; Faeroe Islands; Arctic Seas.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length.

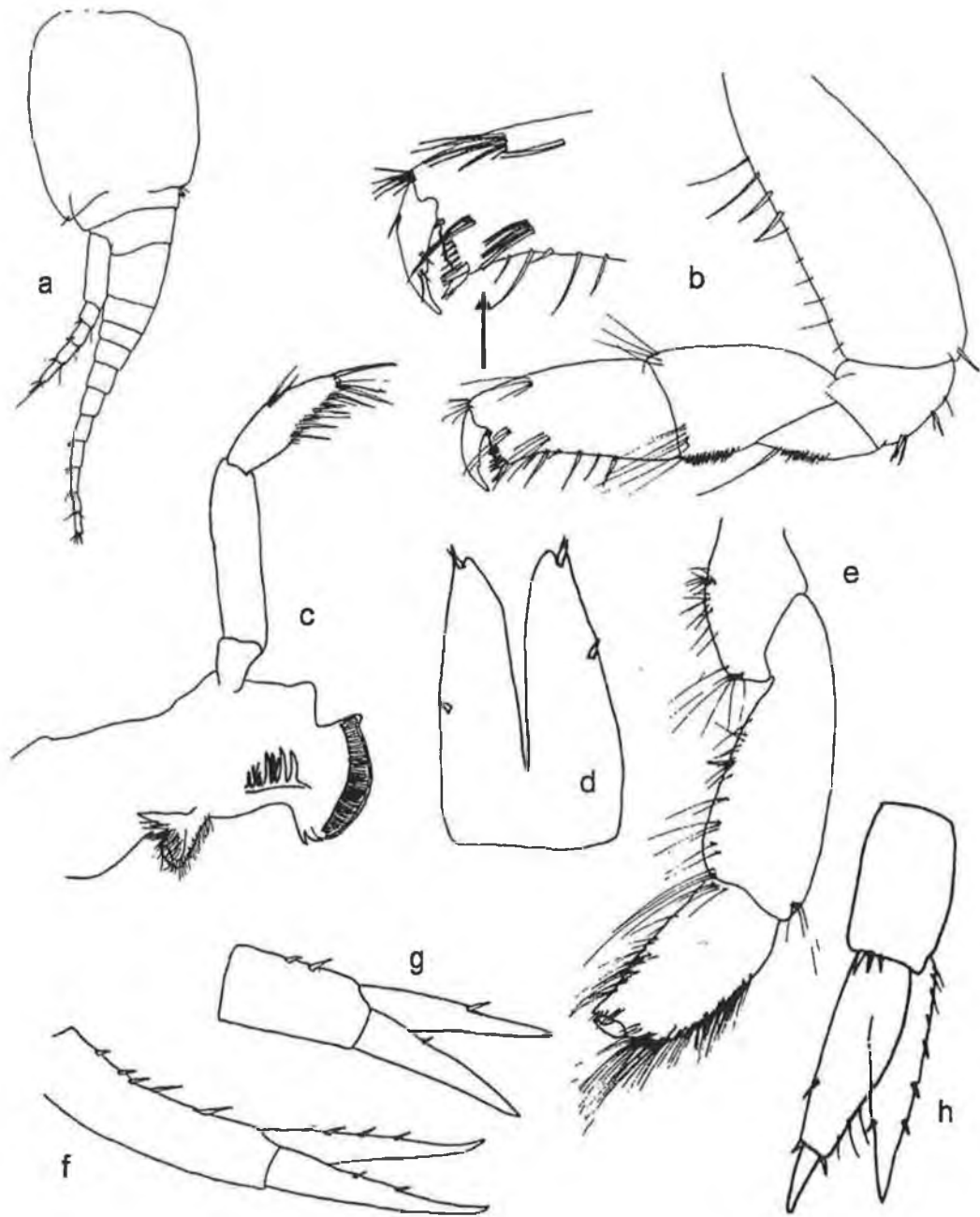


Figure 10: *Anonyx nugax* (Phipps, 1774). Female. (a) antenna 1; (b) gnathopod 1; (c) mandible; (d) telson; (e) gnathopod 2; (f) uropod 1; (g) uropod 2; (h) uropod 3.

[Illustration by author].

Anonyx ochoticus Gurjanova, 1962

Fig. 11

Lakota carinata. – Thorsteinson, 1941: 54, pl. 2, figs 16-17 (in part).

Anonyx ochoticus Gurjanova, 1962: 285, fig. 93A-B. – Steele & Brunel, 1968: 1010, figs 35–42. – Barnard & Karaman, 1991: 465.

Type material. SYNTYPES: ZIL. According to Steele (1989) there are 2 specimens labelled as COTYPES in the collection of the Zoological Institute, Leningrad (see remarks below).

Type locality. Sea of Okhotsk.

Material examined. Steele & Brunel, 1968: 1010, figs 35-38.

Description. Antenna 1 shorter than antenna 2, antenna 2 between 40 to 60% of body length, calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering, palm transverse; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, moderately to deeply cleft.

Length. 9–11 mm. This is one of the smallest known species of *Anonyx*.

Distribution. Mainly a North Pacific Species which seems to have spread eastwards into the North Atlantic. Found in the North and Norwegian Seas within the Northeast Atlantic.

Depth. Infralittoral to bathyal.

Remarks. Steele (1989) remarks that the type collection in the ZIL contains 2 small immature specimens, one of which agrees generally with the descriptions given by Gurjanova (1962) and Steele & Brunel (1968). The other specimen is quite different, however, and probably represents a different species. It is my opinion that the former specimen should probably be designated as a lectotype.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2, calceoli absent.

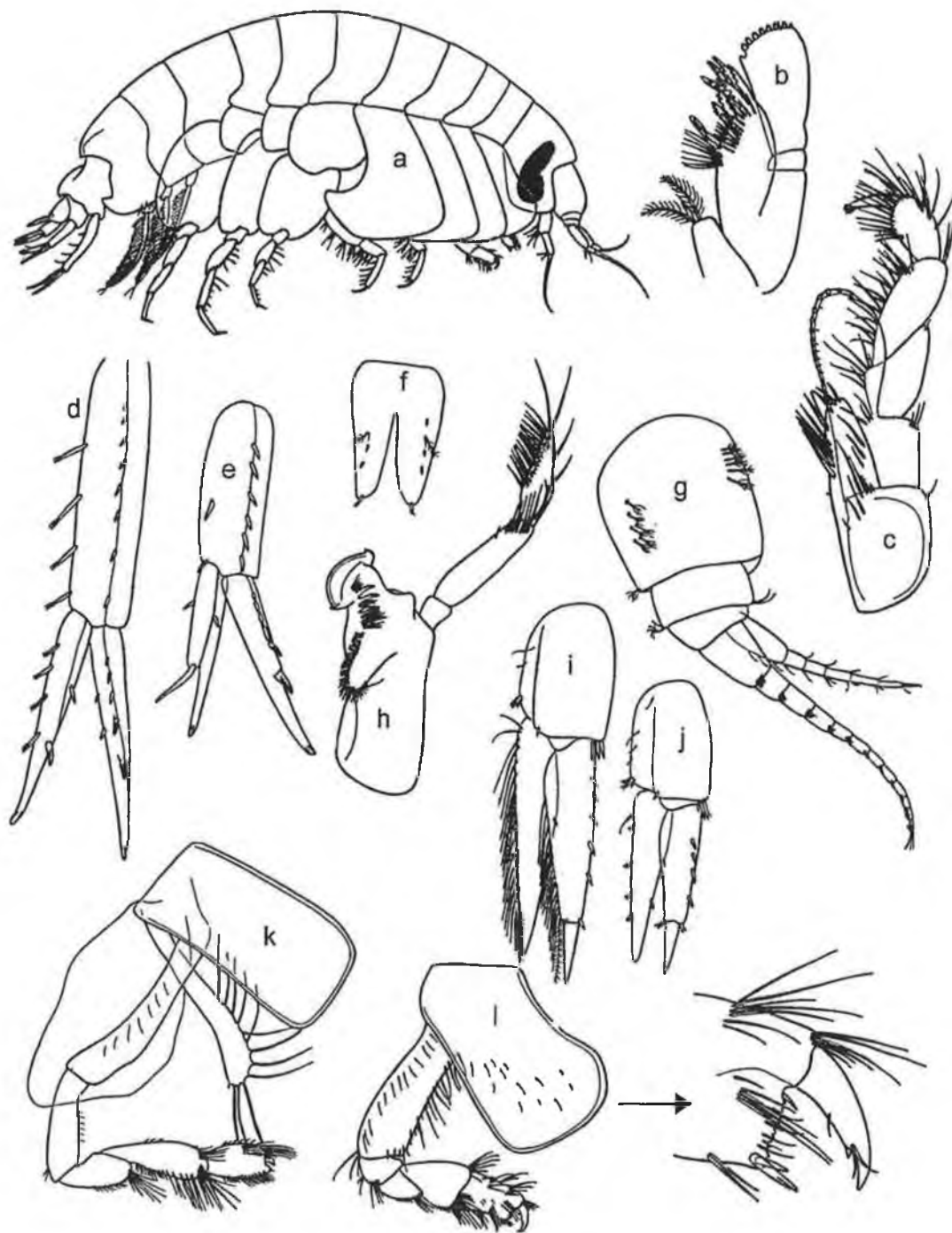


Figure 11: *Anonyx ochoticus* Gurjanova, 1962. (a) entire, female; (b) maxilla 1; (c) maxilliped; (d) uropod 1; (e) uropod 2; (f) telson; (g) antenna 1; (h) mandible; (i) uropod 3, male; (j) uropod 3, female; (k) gnathopod 2; (l) gnathopod 1. [After: Steele & Brunel, 1968].

Anonyx sarsi Steele & Brunel, 1968

Fig. 12

Anonyx pallidus Stimpson, 1853: 50. – Bate, 1862: 81 (*nomen oblitum*)

Anonyx lagena. – Schneider, 1884: 60. – G.O. Sars, 1895: 686. – Stebbing, 1906: 54
(*non A. lagena* Krøyer, 1838).

Anonyx nugax. – G.O. Sars, 1891: 88, pl. 31 (*non A. nugax* Phipps, 1774).

Anonyx sarsi Steele & Brunel, 1968: 984-994, figs 18-23. – Bousfield, 1973: 149, pl.
XLI, fig. 2. – Lincoln, 1979a: 78, fig. 29a- f, fig. 30h- m. – Barnard & Karaman,
1991: 465. – Ingólfsson & Agnarsson, 1999: 1127, fig. 1.

Type material. HOLOTYPE: immature female, 22 mm; USNM accession No. 95922, Cat. No. 103666 (one vial, 1 slide).

ALLOTYPE: mature male, 22 mm. From same sample; USNM accession No. 95922, Cat. No. 103666.

PARATYPES: NMCO, ?ZMUC CRU-8005.

Type locality. Off Mamamek River (50°30'N, 65°59'W).

Material examined. Steele & Brunel, 1968: 984-994, figs 18-23; Lincoln, 1979a: 78, fig. 29a- f, fig. 30h-m.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes broadly rounded. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin or broadly expanded anterodistally; ischium short; carpus short, of subequal length to propodus; propodus margins tapering slightly, palm transverse. Gnathopod 2 subchelate; carpus longer than propodus. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis distinctly longer than broad.

Epimeron 1 anterodistal corner acute, or producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Distribution. North Atlantic, North Pacific and Arctic Oceans.

Depth. Infralittoral to circalittoral.

Ecology. Usually found on sandy sediments in shallow water.

Female (sexually dimorphic characters)

Calceoli absent. Lateral cephalic lobes subacute or narrowly rounded.

Length. 20–31 mm.

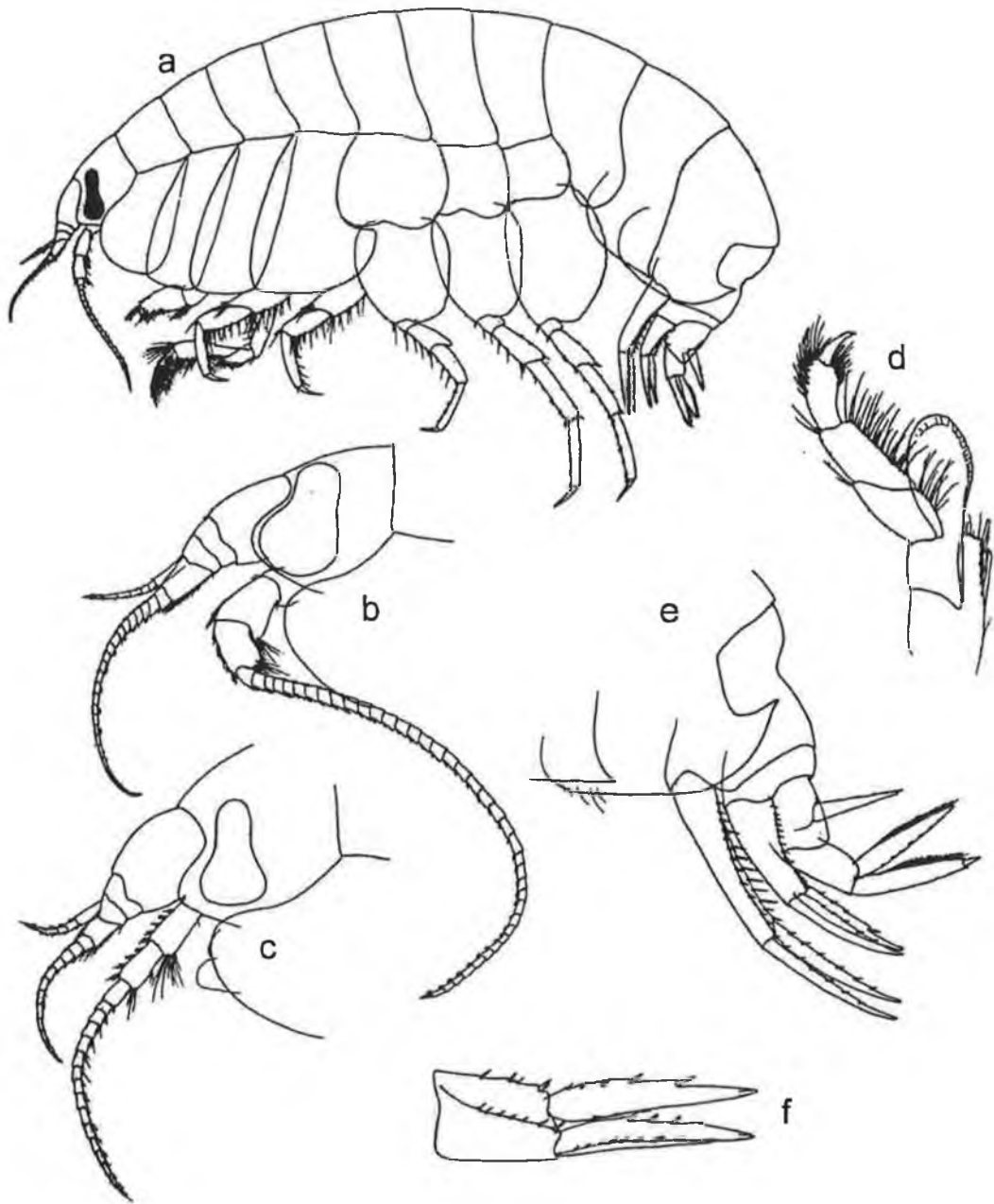


Figure 12: *Anonyx sarsi* Steele & Brunel, 1968. (a) entire, female; (b) head, male; (c) head, female; (d) maxilliped; (e) epimeron 3 and urosome; (f) uropod 2. [After: Lincoln, 1979a].

Anonyx stappersi Steele, 1989

Fig. 13

Chironesimus debruyni. – Stappers, 1911: 18 (in part), pl. 1, fig. 6-8.
Anonyx stappersi Steele, 1989: 1948, fig. 5A-Q, fig. 6A-J.

Type material. HOLOTYPE: Female, 15mm length; USNM.

Type locality. Unknown.

Material examined. Steele, 1989: 1948, fig. 5A-Q, fig. 6A-J.

Description based on mature female, male not described.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm slightly acute. Gnathopod 2 subchelate; carpus longer than propodus; palm deeply excavate, dactylus well developed and strongly curved. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner acute, or producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, moderately to deeply cleft.

Length. 15–17 mm.

Distribution. Norwegian Sea and Arctic Ocean.

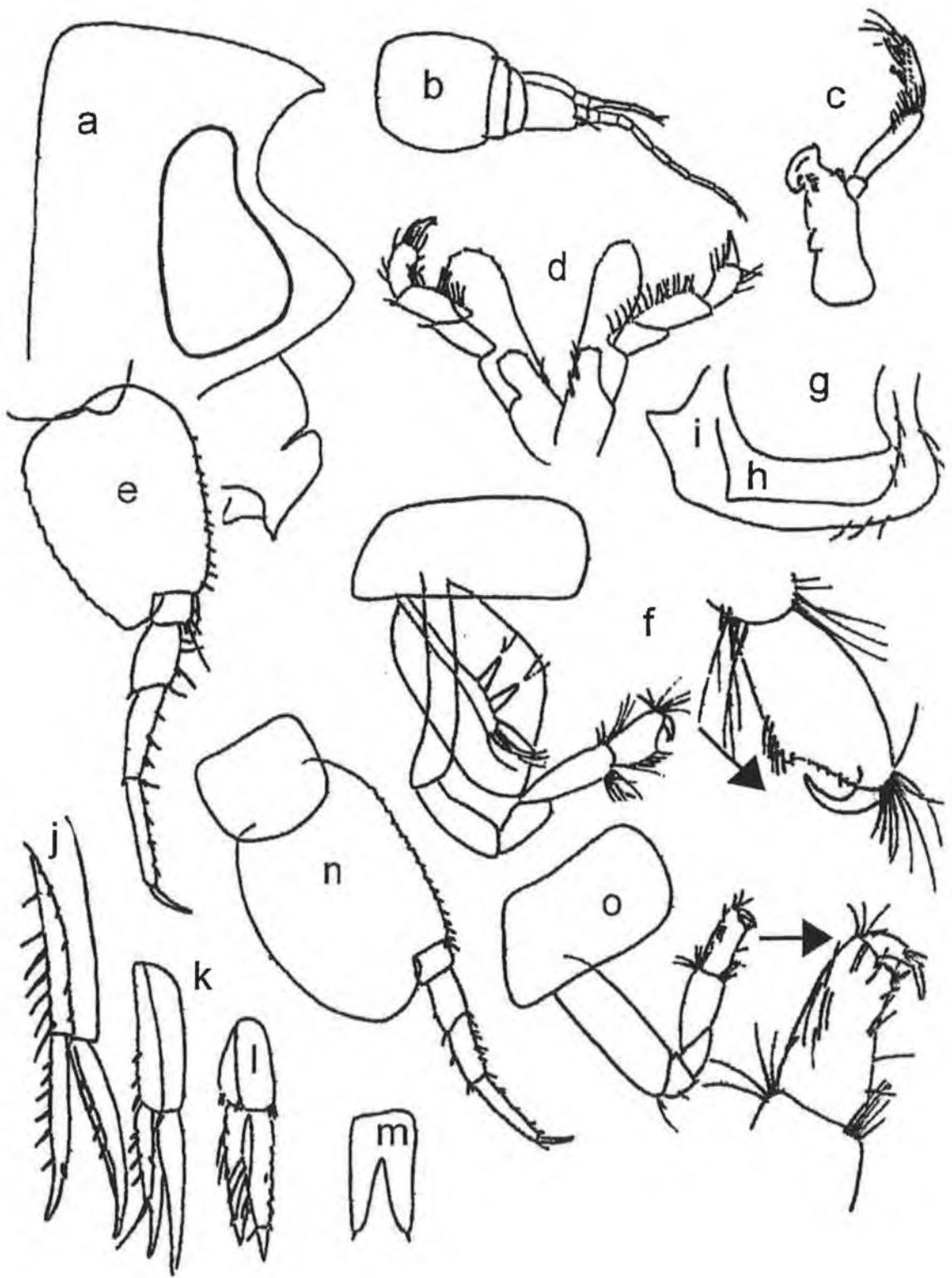


Figure 13: *Anonyx stappersi* Steele, 1989. (a) head, (b) antenna 1; (c) mandible; (d) maxilliped; (e) pereopod 5; (f) gnathopod 2; (g) epimeron 1; (h) epimeron 2; (i) epimeron 3; (j) uropod 1; (k) uropod 2; (l) uropod 3; (m) telson; (n) pereopod 7; (o) gnathopod 1. [After: Steele, 1989].

Aristias commensalis Bonnier, 1896

Fig. 14

Aristias commensalis Bonnier, 1896: 614, pl. 35, fig. 4. – Stebbing, 1906: 50. – Hurley, 1963: 42 (key). – Barnard & Karaman, 1991: 467.

Type material. Unknown.

Type locality. *Caudan* Stn 10, 14; Gulf of Gascony, Bay of Biscay.

Material examined. Bonnier, 1896: 614, pl. 35, fig. 4; Stebbing, 1906: 50.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 as long as remaining articles combined. Antenna 2 less than 40% of body length; calceoli present. Eyes small, rounded. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 simple; coxa 1 reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus long, of subequal length to propodus; propodus margins tapering. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Coxa 5 equilobate.

Epimeron 3 posterodistal corner quadrate. Urosomite 1 without dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson subequal in length and breadth, deeply cleft.

Length. 10mm.

Distribution. Bay of Biscay.

Depth. Bathyal.

Female (sexually dimorphic characters)

Calceoli absent from antennae.

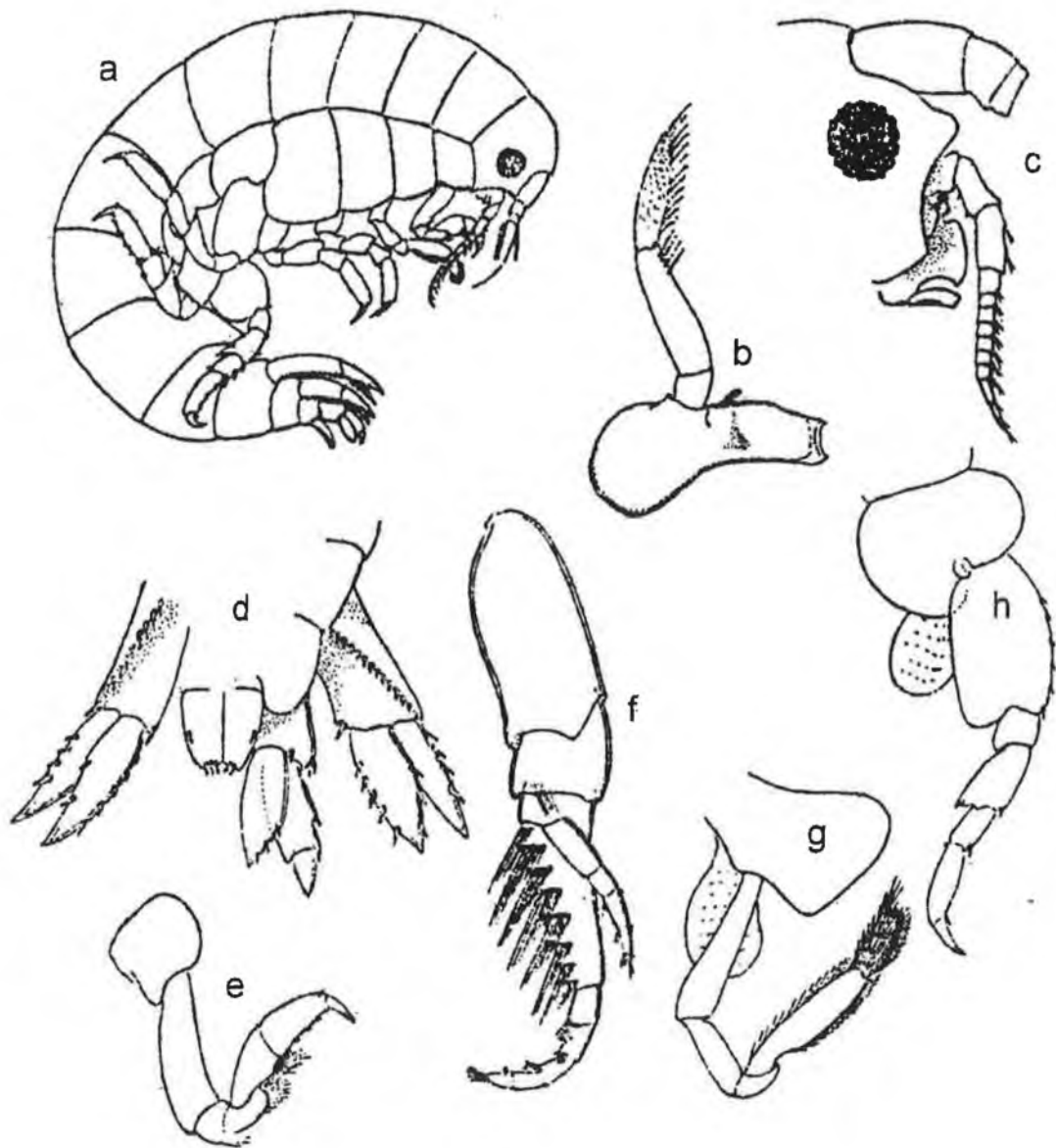


Figure 14: *Aristias commensalis* Bonnier, 1896. (a) entire; (b) mandible; (c) head and antennae; (d) uropods 1-3, telson; (e) gnathopod 1; (f) antenna 1; (g) pereopod 5. [After: Bonnier, 1896].

Aristias megalops G.O. Sars, 1895

Fig. 15

Aristias megalops G.O. Sars, 1895: 676, suppl. pl. 2, fig. 1. – Hurley, 1963: 43 (key).
– Vader, 1985: 1. – Barnard & Karaman, 1991: 467.

Type material. ?ZMO.

Type locality. Trondhjemsfjord.

Material examined. G.O. Sars, 1895: suppl. pl. 2, fig. 1.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Eyes large, reniform. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa 1 reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal. Telson subequal in length and breadth, deeply cleft.

Length. 3 mm.

Distribution. Trondheim; North Norway.

Depth. Bathyal (565–753 m).

Female (sexually dimorphic characters)

Unknown.

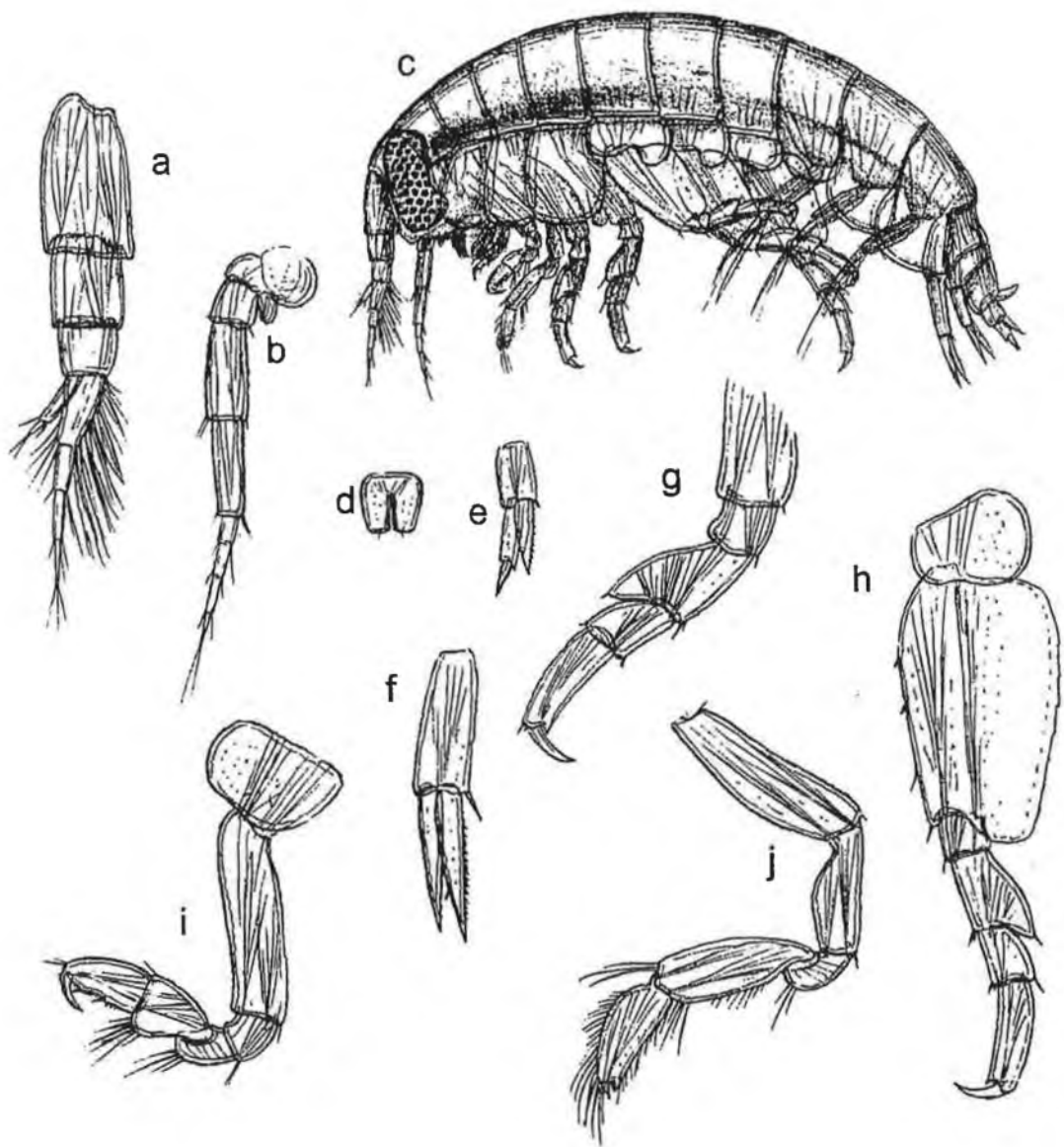


Figure 15: *Aristias megalops* G.O. Sars, 1895. Male. (a) antenna 1; (b) antenna 2; (c) entire; (d) telson; (e) uropod 3; (f) uropod 1; (g) pereopod 3; (h) pereopod 7; (i) gnathopod 1; (j) gnathopod 2.
 [After: G.O. Sars, 1895].

Aristias microps G.O. Sars, 1895

Fig. 16

Aristias microps G.O. Sars, 1895: 675, suppl. pl. 1, fig. 2. – Stebbing, 1906: 49. – Stephensen, 1923b: 72, chart 12. – Shoemaker, 1930b: 4. – Hurley, 1963: 42 (key). – Barnard & Karaman, 1991: 467.

Type material. ?ZMO.

Type locality. Trondhjemsfjord.

Material examined. G.O. Sars, 1895: 675, suppl. pl. 1, fig. 2; Stebbing, 1906: 49; Stephensen, 1923b: 72, chart 12.

Description based on female, male unknown.

Description. Antenna 1 subequal to antenna 2. Eyes small, rounded. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal. Telson subequal in length and breadth, deeply cleft.

Length. 3 mm.

Distribution. North-east Atlantic; North Sea; ?Mediterranean.

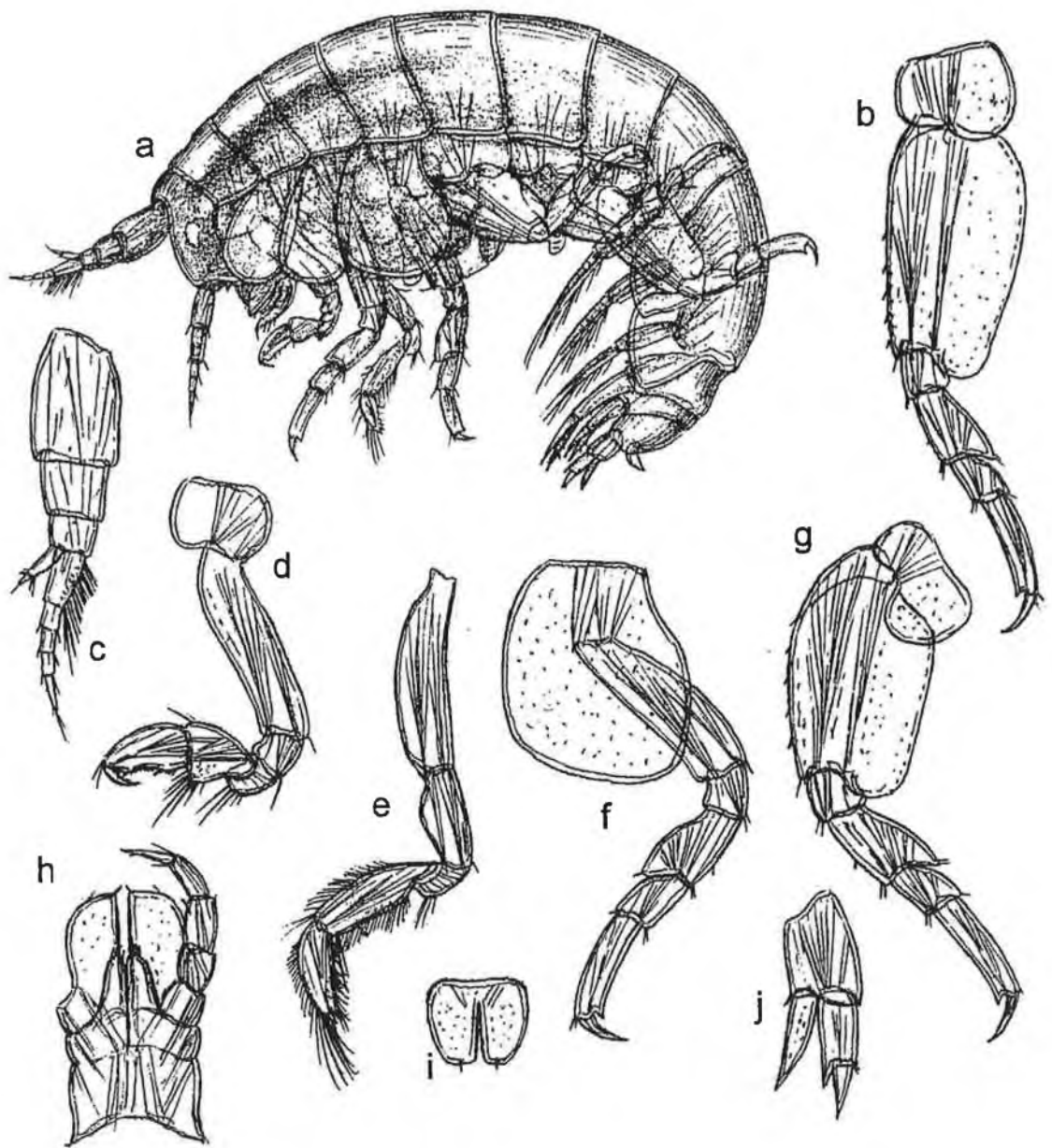


Figure 16: *Aristias microps* G.O. Sars, 1895. Female. (a) entire; (b) pereopod 7; (c) antenna 1; (d) gnathopod 1; (e) gnathopod 2; (f) pereopod 4; (g) pereopod 6; (h) maxilliped; (i) telson; (j) uropod 3. [After: G.O. Sars, 1895].

Aristias neglectus Hansen, 1887

Fig. 17

Aristias neglectus Hansen, 1887: 67. – G.O. Sars, 1895: 675. – Stebbing, 1906: 50. – Chevreux & Fage, 1925: 45, figs 26–27. – Vader, 1969: 5. – G. Karaman, 1973: 125. – Lincoln, 1979a: 60, fig. 21. – Costello *et al.*, 1989: 33. – Diviacco & Ruffo, 1989: 474, fig. 320. – Barnard & Karaman, 1991: 467, fig. 90F.
Aristias audouinianus. – G.O. Sars, 1890: 48, pl. 17, fig. 2.

Type material. SYNTYPES (?): ZMUC CRU-9029/CRU-7512.

Type locality. Greenland.

Material examined. G.O. Sars, 1890: 48, pl. 17, fig. 2; Stebbing, 1906: 50; Chevreux & Fage, 1925: 45, figs 26–27; – Diviacco & Ruffo, 1989: 474, fig. 320.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate. Eyes quite small, rounded to suboval. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 simple; coxa reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson subequal in length and breadth, deeply cleft.

Length. 8–11 mm.

Distribution. Widespread along European coasts from western Norway to the Adriatic.

Depth. Infralittoral to bathyal.

Ecology. Often found in the branchial cavity of ascidians, or in sponges (Chevreux & Fage, 1925; Stephensen, 1942; Lincoln, 1979a; Diviacco & Ruffo, 1989).

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2.

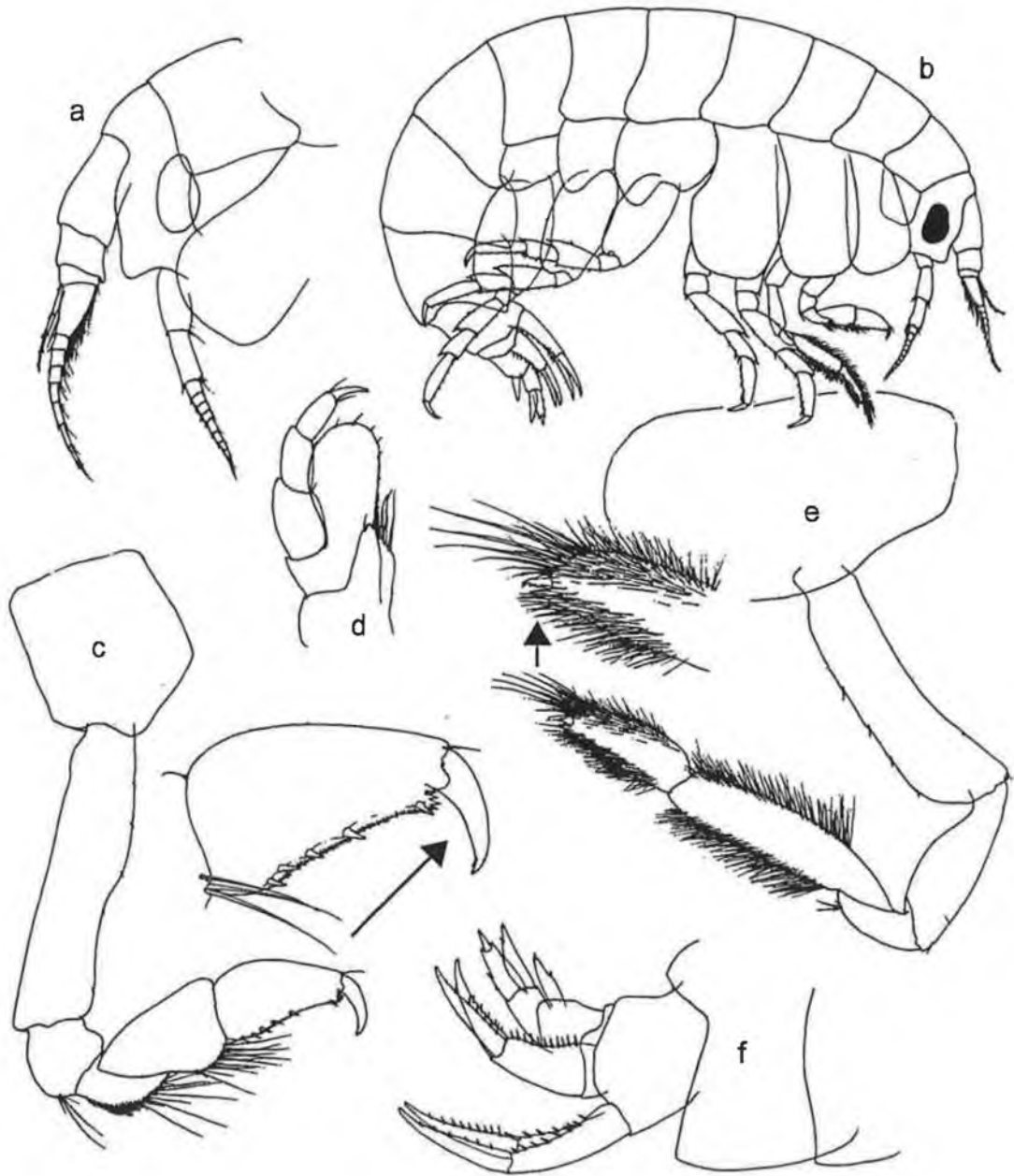


Figure 17: *Aristias neglectus* Hansen, 1887. (a) head, female; (b) entire, female; (c) gnathopod 1; (d) maxilliped; (e) gnathopod 2; (f) epimeron 3 and urosome. [After: Lincoln, 1979a].

Aroui setosus Chevreux, 1911

Fig. 18

Aroui setosus Chevreux, 1911: 170, fig. 3, pl. 7, figs 14– 27. – Stroobants, 1976: 239, figs 1– 11. – Diviacco & Ruffo, 1989: 476, figs 321– 322. – Lowry & Stoddart, 1989b: 111, figs 1-2. – Barnard & Karaman, 1991: 467.

Type material. LECTOTYPE: ovigerous female, 8mm, MNHN Am 3995 (designated by Lowry & Stoddart, 1989b).

Type locality. Annaba.

Material examined. Stroobants, 1976: 239, figs 1– 11; Diviacco & Ruffo, 1989: 476, figs 321– 322; Lowry & Stoddart, 1989b: 111, figs 1-2.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate, almost as long as remaining articles combined. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Coxae 1–4 with dense setal fringe. Gnathopod 1 coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel; dactylus rudimentary, shrouded in setae. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a very slight anterior lobe; basis distinctly broader than long.

Epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal, uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson distinctly longer than broad, deeply cleft.

Distribution. Mediterranean endemic.

Depth. Infralittoral to circalittoral.

Ecology. Thought to be an exclusive scavenger of the echinoid *Spatangus*.

Remarks. This genus is closely related to *Scopelocheirus*.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli absent.

Length. 7 mm.

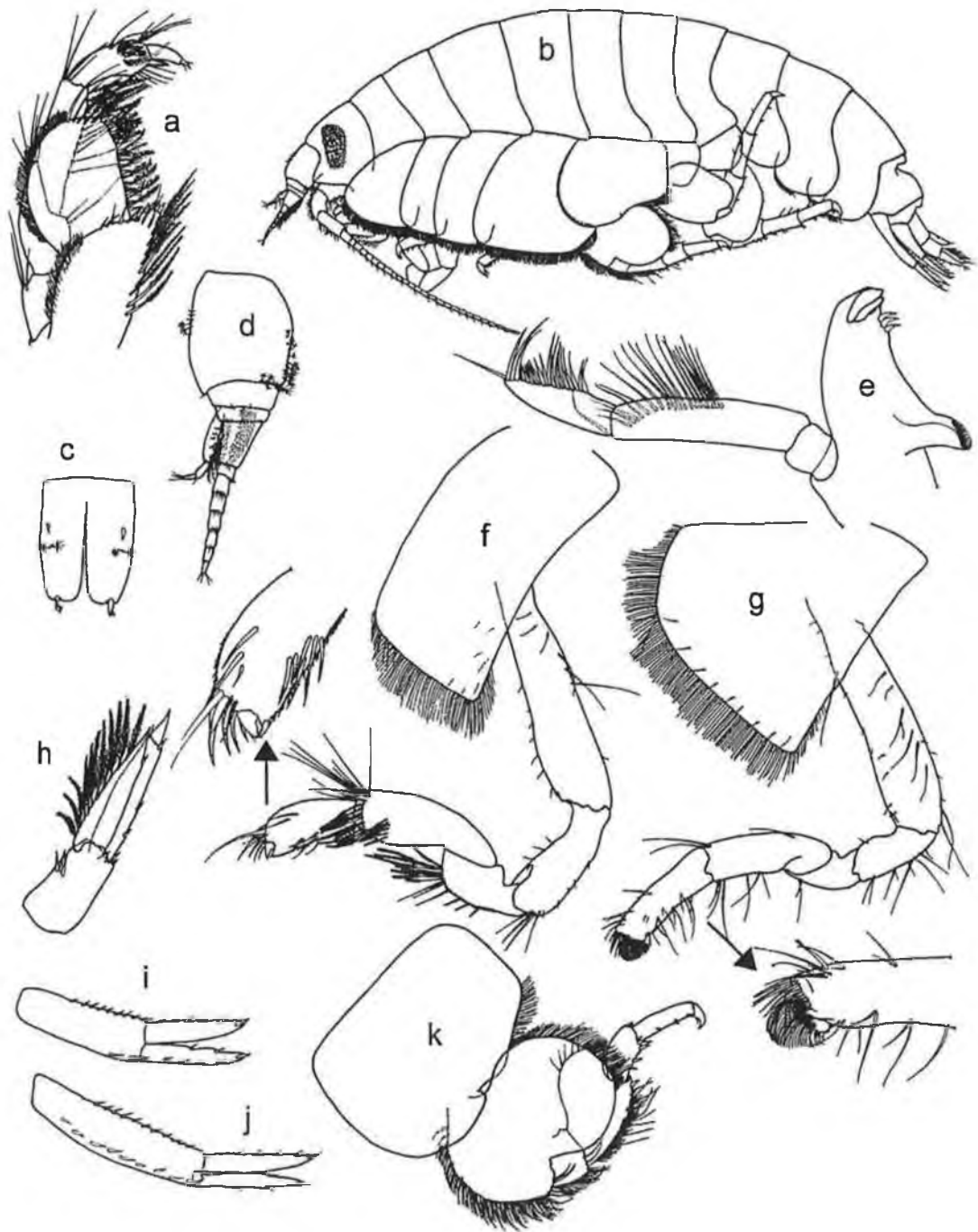


Figure 18: *Aroui setosus* Chevreux, 1911. Female. (a) maxilliped; (b) entire; (c) telson, (d) antenna 1; (e) mandible; (f) gnathopod 2; (g) gnathopod 1; (h) uropod 3; (i) uropod 2; (j) uropod 1; (k) pereopod 5. [After: Diviacco & Ruffo, 1989].

Caeconyx caecula (G.O. Sars, 1891)

Fig. 19

Hoplonyx caeculus G.O. Sars, 1891: 98, pl. 35, fig. 1.

Tmetonyx caeculus. – Stebbing, 1906: 76. – Stephensen, 1935: 97.

Tmetonyx coeculus. – Gurjanova, 1951: 271, fig. 140.

Tryphosella caecula. – Ruffo, 1985: 295. – Diviaco & Ruffo, 1989: 561, figs 384-385.

Caeconyx caecula. – Barnard & Karaman, 1991: 473.

Type material. ?ZMO

Type locality. Trondhjemsfjord.

Material examined. G.O. Sars, 1891: 98, pl. 35, fig. 1; Stebbing, 1906: 76; Diviaco & Ruffo, 1989: 561, figs 384-385; Barnard & Karaman, 1991: 473.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus palm extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopods 3-4 propodus without locking robust setae at posterodistal corner.

Epimeron 3 posterodistal corner acute or slightly produced, forming a very small spine. Urosomite 1 dorsally depressed, with a dorsally rounded carina. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long (greater than half the length of article 1), rami distinctly unequal, inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 4.5 mm.

Distribution. North Atlantic Ocean (from Iceland to Norway and Skagerrak); Mediterranean Sea.

Depth. Circalittoral to bathyal (110 – 1095 m).

Remarks. Oleröd (1987) noted that this species differs from true members of the genus *Tmetonyx* by its strongly produced third epimeron. It resembles *Tryphosella* in the presence of a short ischium of gnathopod 1; however, it lacks the strongly tapering coxa of that genus. It differs from both these genera in the form of its mouthparts. Barnard & Karaman (1991) follow Oleröd's suggestion in setting up the new genus *Caeconyx*, designating *C. caeculus* as the type species.

Female (sexually dimorphic characters)

Urosomite 1 not dorsally carinate.

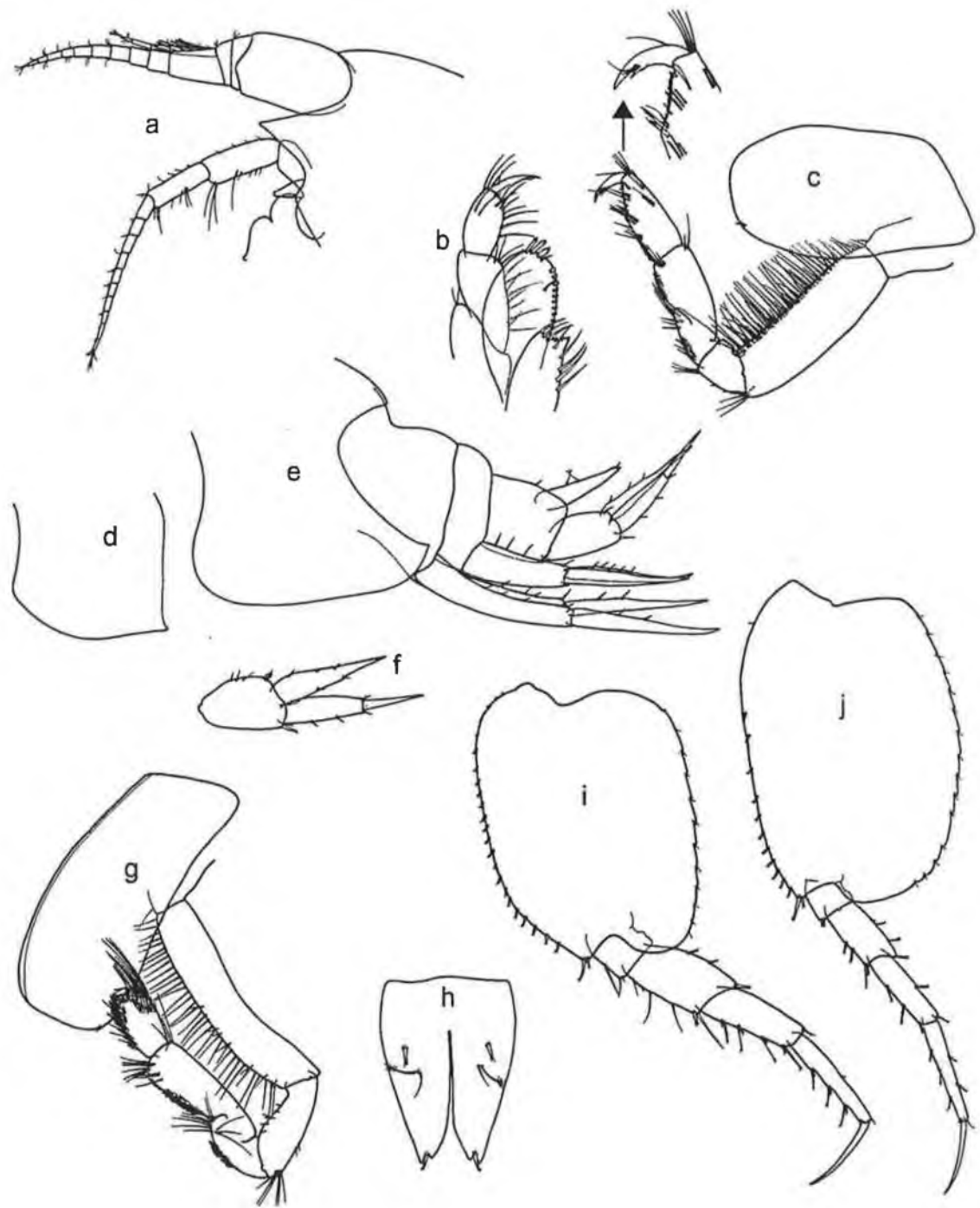


Figure 19: *Caeconyx caecula* (G.O. Sars, 1891). (a) head, female; (b) maxilliped; (c) gnathopod 1; (d) epimeron 2; (e) epimeron 3 and urosome; (f) uropod 3; (g) gnathopod 2; (h) telson; (i) pereopod 6; (j) pereopod 7. [After: Diviacco & Ruffo, 1989].

Centromedon calcaratus (G.O. Sars, 1879)

Fig. 20

Anonyx (*Hippomedon*?) *calcaratus* G.O. Sars, 1879: 440.

Anonyx calcaratus. – Sars, 1885: 142, pl. 12, fig. 3. – Della Valle, 1893: 829.

Centromedon calcaratus. – Stebbing, 1906: 65. – Stephensen, 1923b: 97. – Oleröd, 1980: 47, figs 100-122. – Barnard & Karaman, 1991: 474.

Type material. SYNTYPES: ZMO Reg. No. 1756; 1 adult female, 8.9mm and 1 juvenile, 7.6mm; ZMO No. 1756.

Type locality. NNH Stn 240 (69°02' N, 11°26' W, 1836 m); NNH Stn 312 (74°54' N, 14°53'E, 1203 m).

Material examined. G.O. Sars, 1891: 10; Stebbing, 1906: 65; Oleröd, 1980: 47, figs 100-122.

Description based on female.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2; calceoli present. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe. Pereopod 7 basis posterodistal corner produced into an acute, downward-pointing spine.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. 9 mm.

Distribution. Norwegian Sea; Arctic Ocean (between Iceland and Jan Mayen, North West of Bear Island).

Depth. Bathyal.

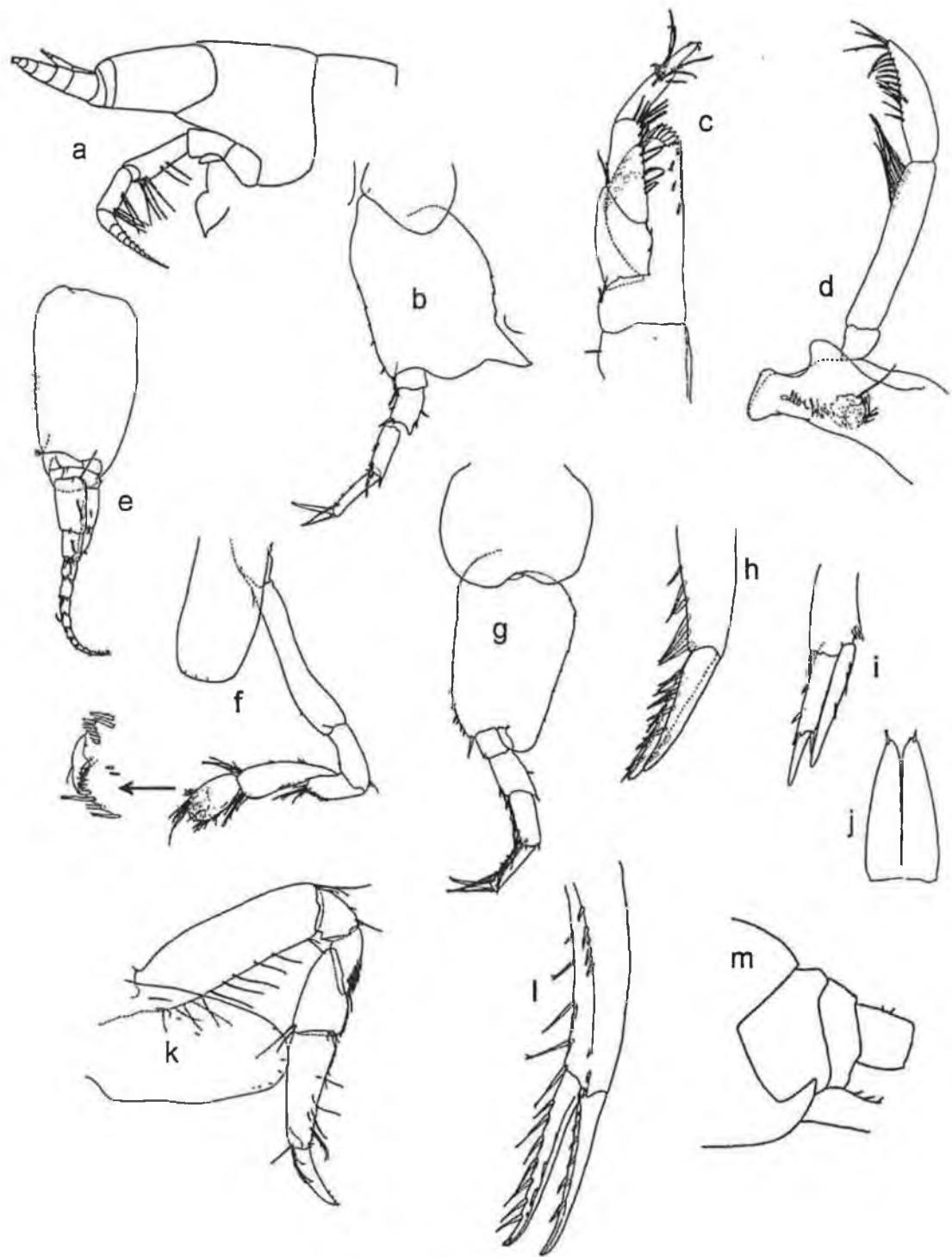


Figure 20: *Centromedon calcaratus* (Sars, 1879). (a) head and antennae; (b) pereopod 7; (c) maxilliped palp and outer plate; (d) mandible; (e) antenna 1; (f) gnathopod 2; (g) pereopod 5; (h) uropod 2; (i) uropod 3; (j) telson; (k) gnathopod 1; (l) uropod 1; (m) epimeron 3 and urosome. [After: Oleröd, 1980].

Centromedon pumilus (Lilljeborg, 1865)

Fig. 21

Anonyx pumilus Lilljeborg, 1865a: 26, pl. 4, figs 35-41.

Centromedon pumilus. – G.O.Sars, 1891: 100, pl. 34, fig. 2. – Oleröd, 1980:35, figs 1-29. – Barnard & Karaman, 1991: 474, figs 90A, 91P, 94B.

Type material. Probably lost.

Type locality. Molde, Norway.

Material examined. Lilljeborg, 1865a: 26, pl. 4, figs 35-41; G.O.Sars, 1891: 100, pl. 34, fig. 2; Oleröd, 1980:35, figs 1-29.

Description. Antenna 1 flagellum article 1 slightly longer than article 2. Calceoli present. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus quite short, of subequal length to propodus; propodus margins tapering, palm extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner quadrate; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal. Telson distinctly longer than broad, deeply cleft.

Length. About 6 mm.

Distribution. Arctic Ocean; North Atlantic: Coast of Labrador(?), East Greenland, Iceland, Norwegian coast, Swedish west coast, White Sea, Bering Sea.

Depth. Infralittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent.

Length. 6–10 mm.

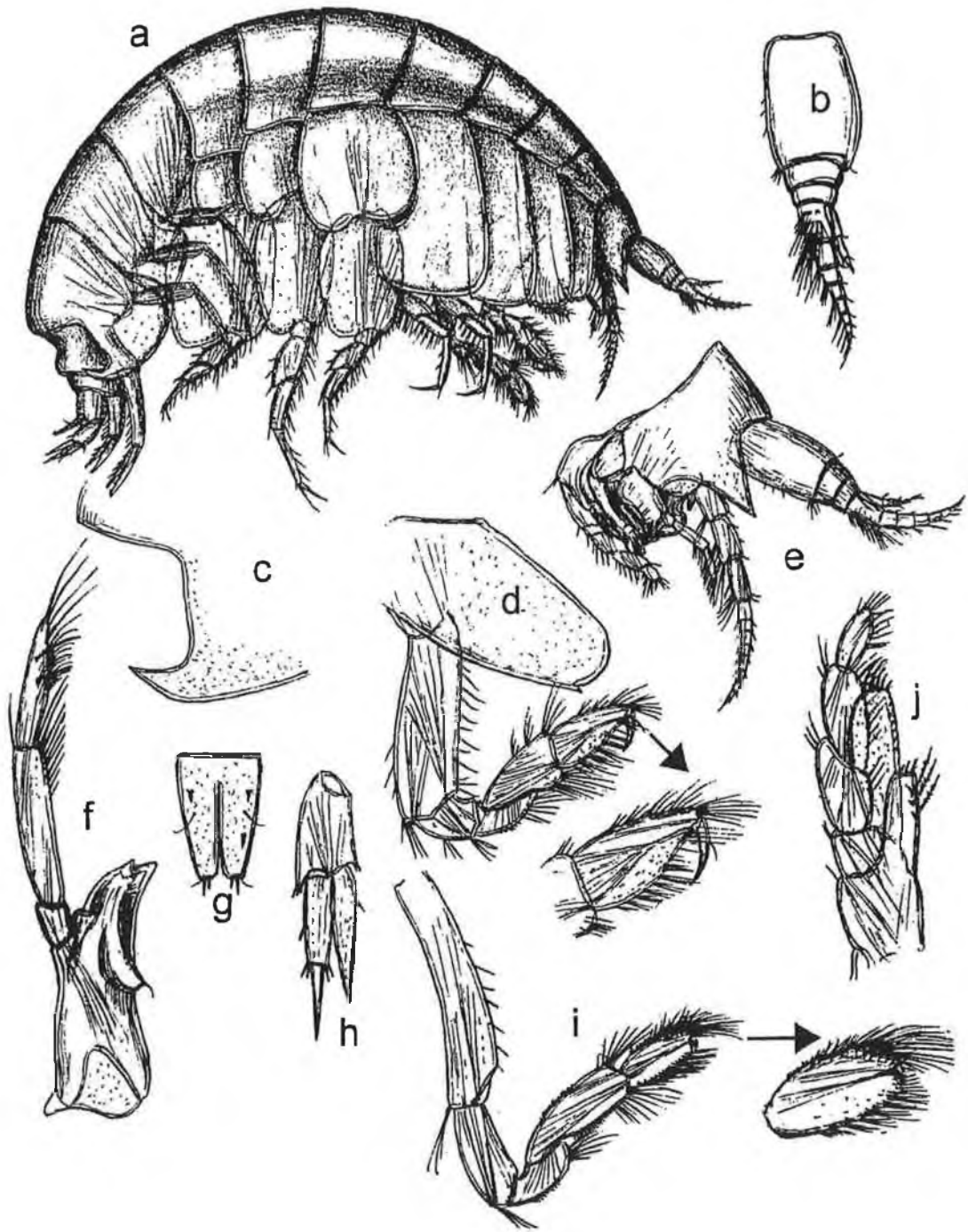


Figure 21: *Centromedon pumilis* (Lilljeborg, 1865). (a) entire, female; (b) antenna 1; (c) epimeron 3; (d) gnathopod 1; (e) head; (f) mandible; (g) telson; (h) uropod 3; (i) gnathopod 2; (j) maxilliped.
 [After: G.O. Sars, 1891].

Crybelocephalus megalurus Tattersall, 1906

Fig. 22

Crybelocephalus megalurus Tattersall, 1906: 33, pl. 3, fig. 2; pl. 4, figs 1–14. – Stephensen, 1923b: 55. – Gurjanova, 1962: 81, fig. 15. – Barnard & Karaman, 1991: 479.

Type material. SYNTYPE: NHML Reg. no. 1947: 11: 4: 18.

Type locality. 50 miles NW of Eagle Island, Co. Mayo, Ireland; 2200 m.

Material examined. Tattersall, 1906: 33, pl. 3, fig. 2; pl. 4, figs 1–14.

Description. Antenna 1 shorter than antenna 2; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2; accessory flagellum absent. Antenna 2 less than 40% of body length. Eyes apparently absent. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 weakly subchelate and much shorter than gnathopod 2; coxa reduced, subequal to coxa 2; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel. Gnathopod 2 subchelate; coxa strongly shortened; carpus longer than propodus; dactylus minute. Pereopod 3 propodus very robust with convex margins, with blunt, locking robust setae at posterodistal corner. Pereopod 4 propodus also with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad, posterior margin smooth. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin smooth. Pereopod 7 basis posterior margin smooth.

Epimeron 3 posterodistal corner acute. Urosomite 1 without dorsal depression, not dorsally carinate. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson subequal in length and breadth, entire.

Length. 11 mm.

Distribution. South Iceland and off southwest Ireland.

Depth. Bathyal to abyssal.

Ecology. *C. megalurus* is a pelagic deep-water species.

Female (sexually dimorphic characters)

Not differing significantly to male.

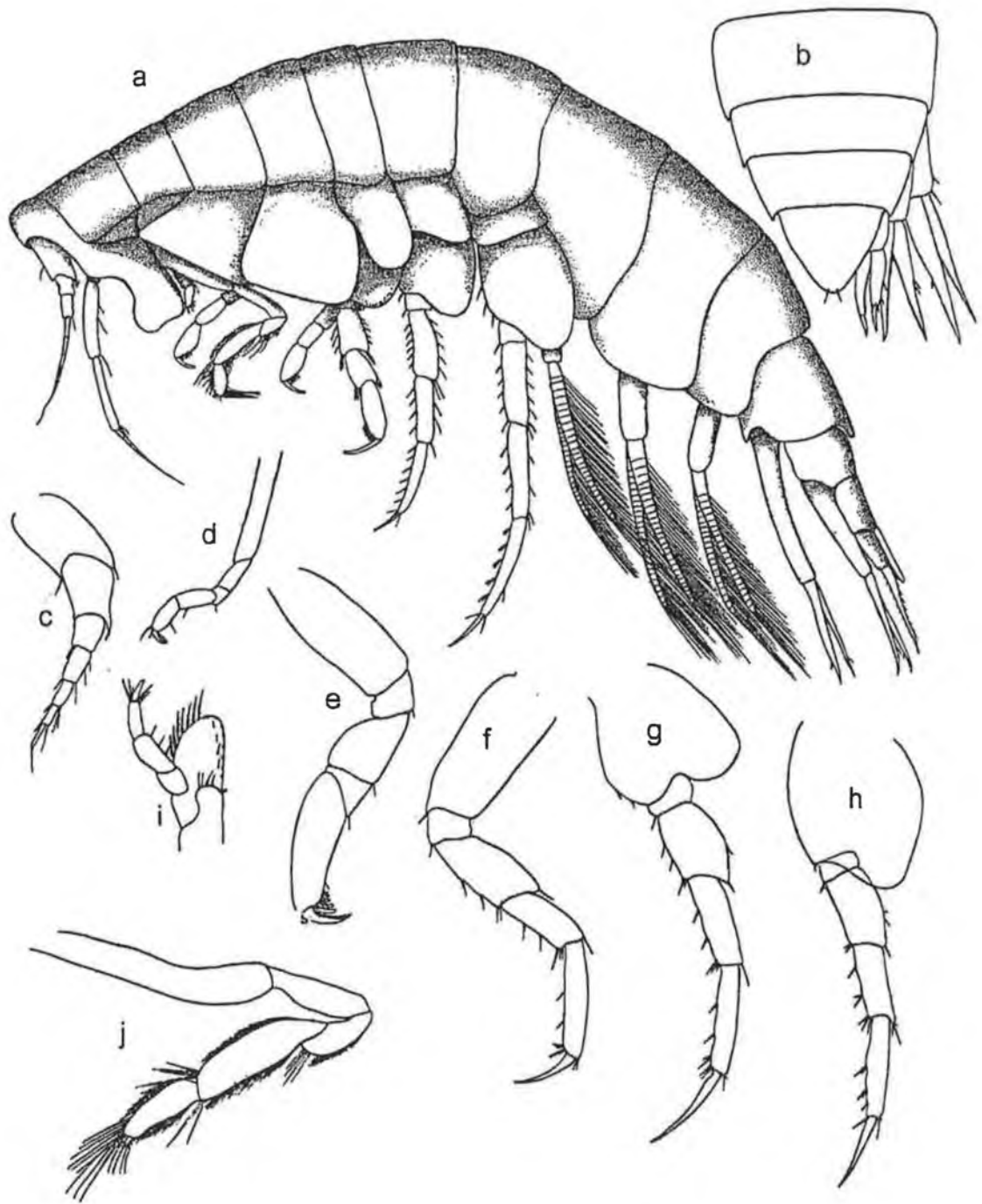


Figure 22: *Crybelocephalus megalurus* Tattersall, 1906. (a) entire, male; (b) usosome, uropods 1-3 and telson; (c) antenna 1; (d) gnathopod 1; (e) pereopod 4; (f) pereopod 5; (g) pereopod 6; (h) pereopod 7; (i) maxilliped; (j) gnathopod 2. [After: Tattersall, 1906].

Cyphocaris anonyx Boeck, 1871

Fig. 23

Cyphocaris anonyx Boeck, 1871: 104. – Boeck, 1872: 141, pl. 6, fig. 1. – Hansen, 1887: 67. – Stebbing, 1906: 29. – ?Chilton, 1912: 464. – Chevreux, 1916: 2. – Stephensen, 1923b: 50, chart 9. – Schellenberg, 1929: 195. – K.H. Barnard, 1932: 36. – Stephensen, 1933: 4. – Pirlot, 1933: 127. – Gurjanova, 1962: 69, fig. 9. – Hurley, 1963: 25. – Barnard & Karaman, 1991: 480.
Cyphocaris micronyx Stebbing, 1888: 656, pl. 16. – Chevreux, 1900: 165, pl. 14, fig. 11.

Type material. ZMUC CRU-5384.

Type locality. 30 miles southeast of Cape Farvel.

Material examined. ZMUC CRU-5384; Stebbing, 1888: 656, pl. 16; Stebbing, 1906: 29.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body with an inflated peduncle article 4, calceoli present. Eyes apparently absent. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Pereon segment 1 producing hood-like hump. Gnathopod 1 weakly subchelate; coxa reduced, significantly shorter than coxa 2; ischium short; carpus short, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; coxa shortened (but still longer than coxa 1); carpus longer than propodus; dactylus minute. Coxa 3 strongly shortened. Pereopod 5 coxa slightly produced into an anterior lobe; basis distinctly longer than broad, posterior margin strongly serrate; posterodistal corner produced into a long, downward-pointing spine. Pereopods 6 and 7 basis posterior margins strongly serrate.

Epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami distinctly unequal; uropod 2 inner ramus without marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus longer than outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 14 mm.

Distribution. North Atlantic Ocean off the Faeroes, Iceland and the deeper water off Ireland. Also found off Greenland and in the Arctic Ocean and Norwegian Sea.

Depth. Bathyal to abyssal.

Ecology. This is a pelagic deep-sea species.

Female (sexually dimorphic characters)

Calceoli absent.

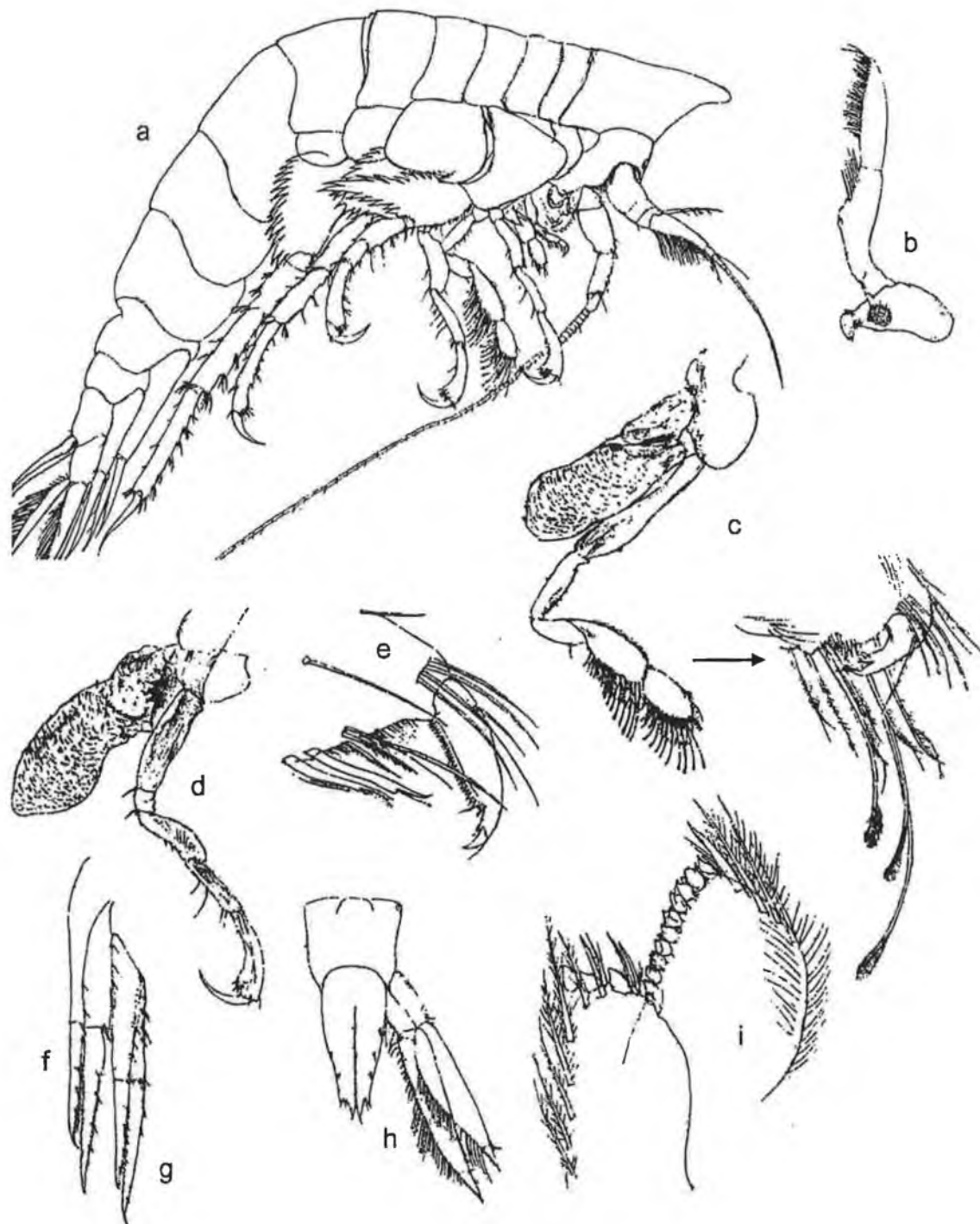


Figure 23: *Cyphocaris anonyx* Boeck, 1871. (a) entire; (b) mandible; (c) gnathopod 2; (d) pereopod 3; (e) gnathopod 1 palm; (f) uropod 1; (g) uropod 2; (h) uropod 3 and telson; (i) maxilliped inner and outer plates. [After: Stebbing, 1888].

Cyphocaris bouvieri Chevreux, 1916

Fig. 24

Cyphocaris bouvieri Chevreux, 1916: 4, fig. 2. – Gurjanova, 1962: 67, fig. 7. –
Barnard & Karaman, 1991: 480.

Cyphocaris Bouvieri. – Stephensen, 1923b: 52.

Type material. MOM 37 0502, male on 6 slides and in alcohol.

Type locality. Azores, 0-3000 m.

Material examined. Chevreux, 1916: 4, fig. 2; Gurjanova, 1962: 67, fig. 7.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; peduncle article 4 inflated; calceoli present. Eyes apparently absent. Maxilliped palp 4-articulate.

Gnathopod 1 weakly subchelate; coxa reduced, subequal to coxa 2; ischium short. Gnathopod 2 coxa strongly shortened; carpus longer than propodus. Coxa 3 strongly shortened. Pereopod 5 basis posterior margin strongly serrate; posterodistal corner produced into a long, downward-pointing spine. Pereopods 6 and 7 basis posterior margin strongly serrate.

Epimeron 3 posterodistal corner acute, and slightly rounded. Urosomite 1 with dorsal depression. Uropod 2 rami distinctly unequal, inner ramus without marginal constriction(s); uropod 3 rami subequal. Telson more than twice as long as broad.

Length. 10.5 mm.

Depth. Bathyal to abyssal.

Female (sexually dimorphic characters)

Calceoli absent.

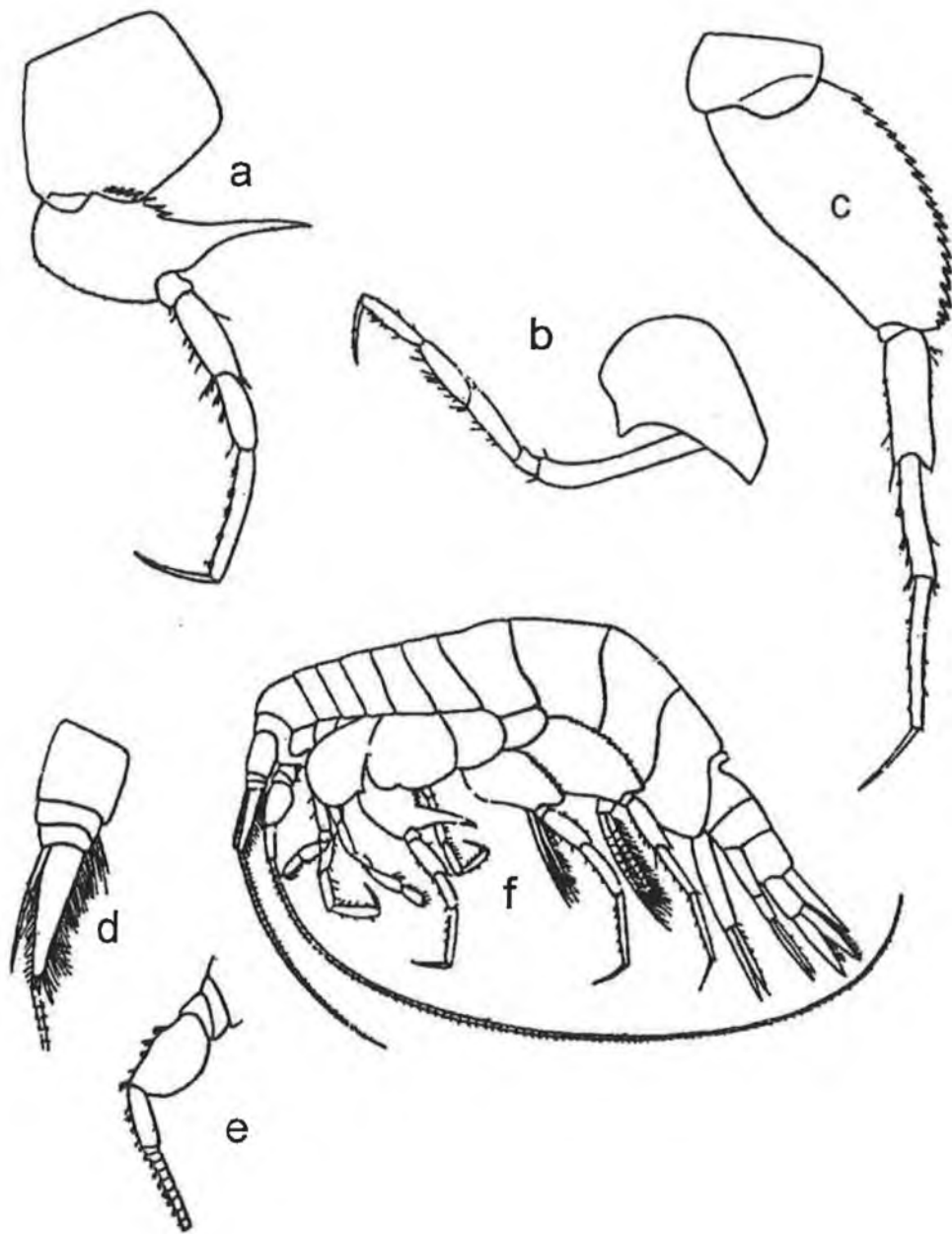


Figure 24: *Cyphocaris bouvieri* Chevreux, 1916. (a) pereopod 5; (b) pereopod 4; (c) pereopod 7; (d) antenna 1; (e) antenna 2; (f) entire, male. [After: Gurjanova, 1962].

Cyphocaris richardi Chevreux, 1905

Fig. 25

Cyphocaris Richardi Chevreux, 1905c: 1, figs 1-2.

Cyphocaris richardi. – Stebbing, 1906: 717. – Stebbing, 1910: 449. – Stephensen, 1915: 37, figs 21–22. – Chevreux, 1916: 1. – Schellenberg, 1926b: 245, fig. 4; 1931: 15. – Gurjanova, 1962: 69, fig. 10. – Hurley, 1963: 25. – Barnard & Karaman, 1991: 480.

Type material. MOM 37 0508.

Type locality. Azores (36°17'N, 28°53'W).

Material examined. Chevreux, 1905c: 1, figs 1-2; Stephensen, 1915: 37, figs 21–22.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Pereon segment 1 producing elongate, hood-like spine. Gnathopod 1 weakly subchelate; coxa reduced, subequal to coxa 2; ischium short; carpus short, of subequal length to propodus; propodus margins tapering, palm extremely acute. Gnathopod 2 subchelate; coxa strongly shortened; carpus longer than propodus; dactylus minute. Coxa 3 strongly shortened. Pereopod 5 coxa equilobate; basis distinctly longer than broad, posterior margin strongly serrate, posterodistal corner produced into a long, downward-pointing spine. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin strongly serrated. Pereopod 7 basis posterior margin strongly serrated.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami distinctly unequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson more than twice as long as broad, deeply cleft.

Length. 40 mm.

Distribution. Cosmopolitan.

Depth. This species is known occur in abyssal waters, however, its upper limits are unknown. Chevreux (1905c) records it as occurring from between 0-3000m. Hurley (1963) records it from depths between 51-53m off the coast of California.

Female (sexually dimorphic characters)

Calceoli absent.

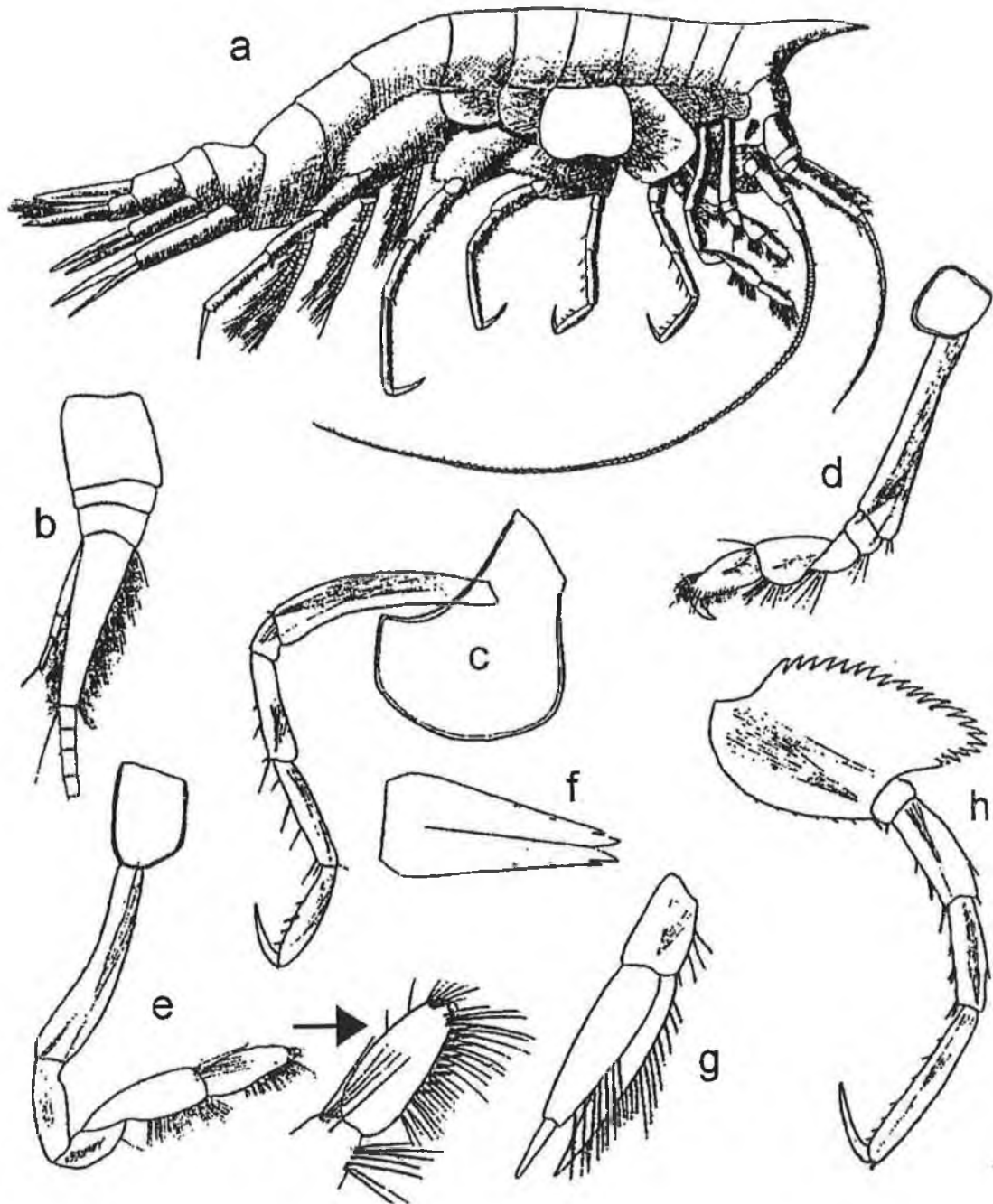


Figure 25: *Cyphocaris richardi* Chevreux, 1905. (a) entire, male; (b) antenna 1; (c) pereopod 4; (d) gnathopod 1; (e) gnathopod 2; (f) telson; (g) uropod 3; (h) pereopod 5.

[After: Chevreux, 1905].

Ensayra carpinei Bellan-Santini, 1974

Fig. 26

Ensayra carpinei Bellan-Santini, 1974: 3, figs 1-3. – Diviacco & Ruffo, 1989: 478, fig. 323. – Barnard & Karaman, 1991: 484.

Type material. HOLOTYPE/PARATYPE: MSNV Reg. no. MVR-Cr 96, in alcohol.

Type locality. Off Corsica (42°40'30"N, 8°29'00"E).

Material examined. Diviacco & Ruffo, 1989: 478, fig. 323.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 as long as remaining articles combined. Calceoli absent. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 3 propodus expanded, strongly chelate. Pereopod 5 coxa produced into an anterior lobe; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami subequal; uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, entire.

Length. 3 mm.

Distribution. Mediterranean endemic.

Depth. Bathyal, 490-1900 m.

Ecology. This species occurs in deep water and apparently lives on wood.

Female (sexually dimorphic characters)

Female unknown.

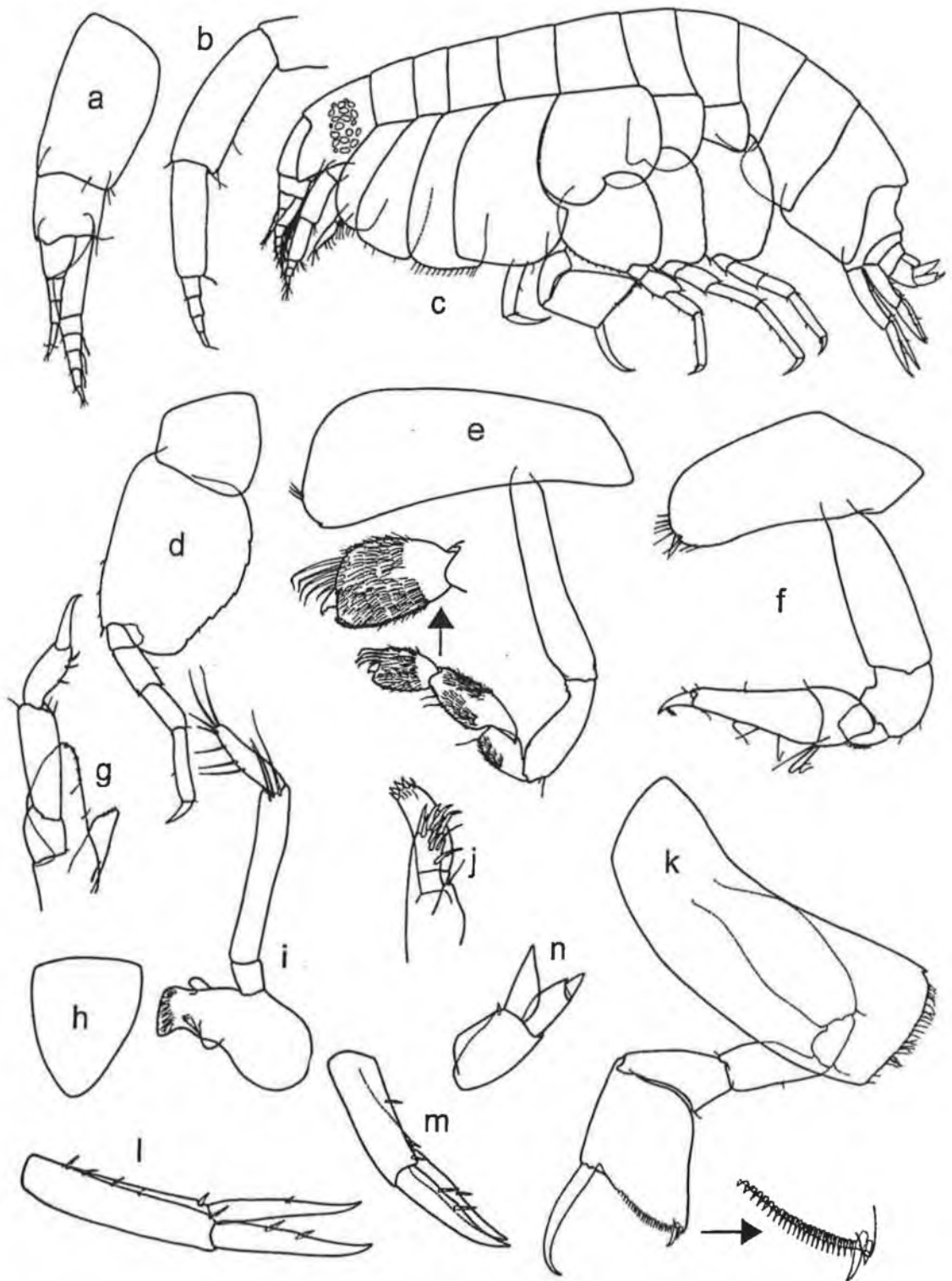


Figure 26: *Ensayara carpinei* Bellan-Santini, 1974. Female. (a) antenna 1; (b) antenna 2; (c) entire; (d) pereopod 7; (e) gnathopod 2; (f) gnathopod 1; (g) maxilliped; (h) telson; (i) mandible; (j) maxilla 1; (k) pereopod 3; (l) uropod 1; (m) uropod 2; (n) uropod 3. [After: Diviacco & Ruffo, 1989].

Euonyx chelatus Norman, 1867

Fig. 27

Euonyx chelatus Norman, 1867: 197. – Stebbing, 1888: 673. – G.O. Sars, 1895: 117, pl. 40, fig. 1. – Stebbing, 1906: 19. – Stephensen, 1923b: 41. – Lincoln, 1979a: 54, fig. 18. – Costello *et al.*, 1989: 33. – Lowry & Stoddart, 1989: 519, fig. 1. – Barnard & Karaman, 1991: 485, fig. 92I.
?Opis leptochela Bate & Westwood, 1868: 501.

Type material. SYNTYPES: NHML Reg. No. 1911: 11: 8: 13684-13686; Reg. No. 1911: 11: 8: M843-M845.

Type locality. Sleat Sound, Hebrides, North Atlantic Ocean (Approx. 57°10'N, 5°50'W).

Material examined. G.O. Sars, 1895: 117, pl. 40, fig. 1; Lincoln, 1979a: 54, fig. 18.

Description based on female, male not yet described.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length. Eyes large, reniform. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 chelate; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 subchelate; carpus longer than propodus; palm deeply excavate, dactylus well developed and strongly curved. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 equilobate.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1 and 2 rami subequal; uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson deeply cleft.

Length. 10 mm.

Distribution. North and west Norway; off the southwest Faeroes; British Isles.

Depth. Circalittoral to bathyal.

Ecology. Parasitic on echinoderms.

Remarks. Male not yet described.

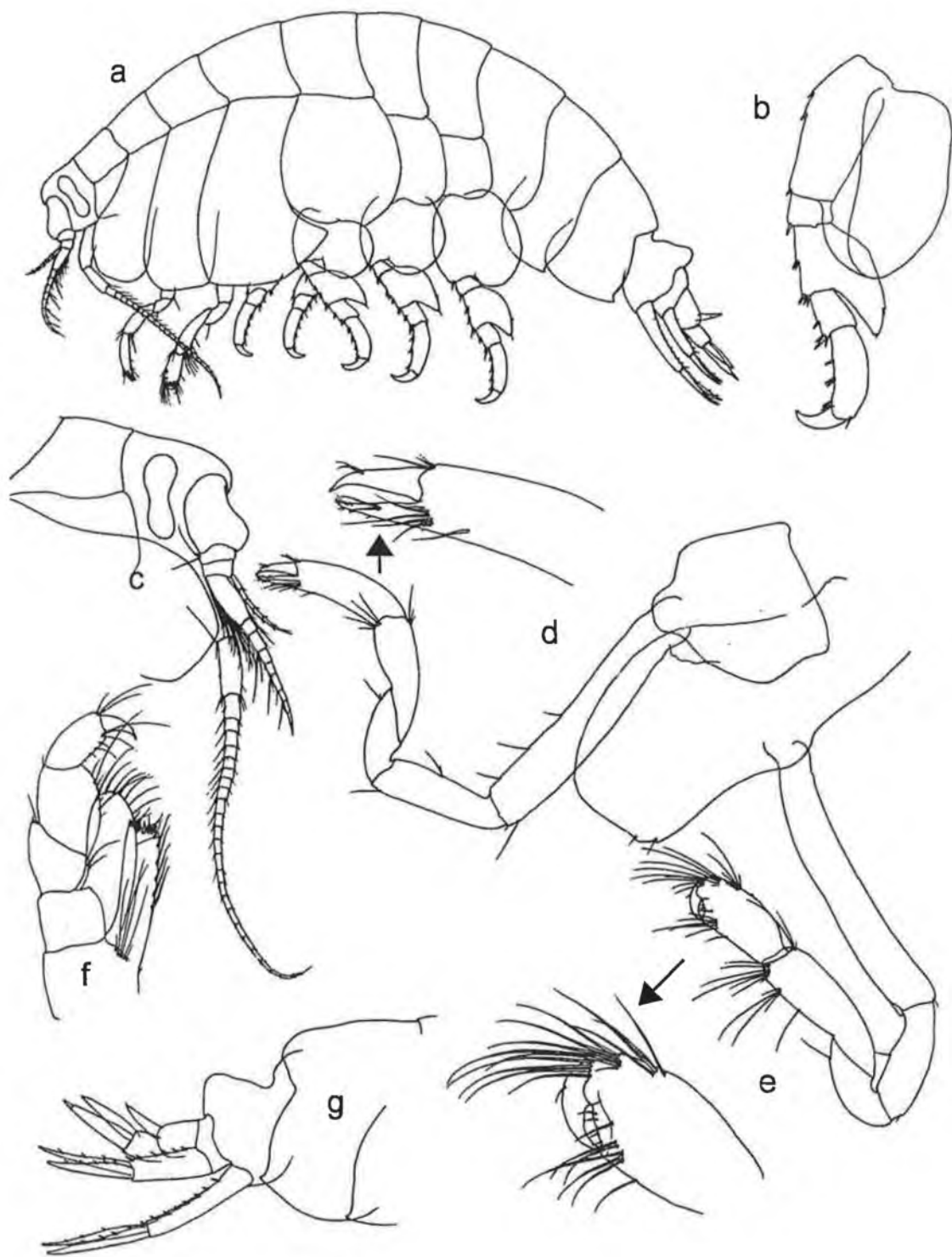


Figure 27: *Euonyx chelatus* Norman, 1867. Female. (a) entire; (b) pereopod 7; (c) head; (d) gnathopod 1; (e) gnathopod 2; (f) maxilliped; (g) epimeron 3 and urosome.
 [After: Lincoln, 1979a].

Eurythenes gryllus (Lichtenstein, 1822)

Fig. 28

Gammarus gryllus Lichtenstein, 1822: 34.

Lysianassa magellanica Milne-Edwards, 1848: 398.

Lysianassa gryllus. – Goës, 1866: 517, pl. 36, fig. 1.

Eurytenes gryllus. – Boeck, 1871: 105. – Boeck, 1872: 144.

Eurythenes gryllus. – Smith, 1884: 54. – Stebbing, 1906: 73. – Barnard & Karaman, 1991: 486, figs 88I, 89K, 90D, 93A, 95Q. – Stoddart & Lowry, 2004: 429, figs 1-11.

Euryporeia gryllus. – G.O. Sars, 1891: 86, pl. 30. – Della Valle, 1893: 848, pl. 60, fig. 58.

Eurythenes magellanicus. – Lilljeborg, 1865a: 11, pls 1–3, figs 1–22.

Type material. HOLOTYPE: ZMB 1265; female, 81 mm with well developed oostegites.

Type locality. Greenland Sea (from the stomach of a Northern Fulmar).

Material examined. G.O. Sars, 1891: 86, pl. 30; Stebbing, 1906: 73; Stoddart & Lowry, 2004: 429, figs 1-11.

Description. Antenna 1 shorter than antenna 2. Antenna 2 less than 40% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus of subequal length to propodus; propodus margins subparallel, palm acute; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 equilobate.

Pleonite 3 with dorsal depression. Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, rami distinctly unequal. Telson more than twice as long as broad, moderately to deeply cleft.

Length. To 90 mm.

Distribution. *E. gryllus* has been recorded from all major marine water bodies with the singular exception of the Mediterranean Sea (Stoddart & Lowry, 2004).

Female (sexually dimorphic characters)

Calceoli absent from antennae.

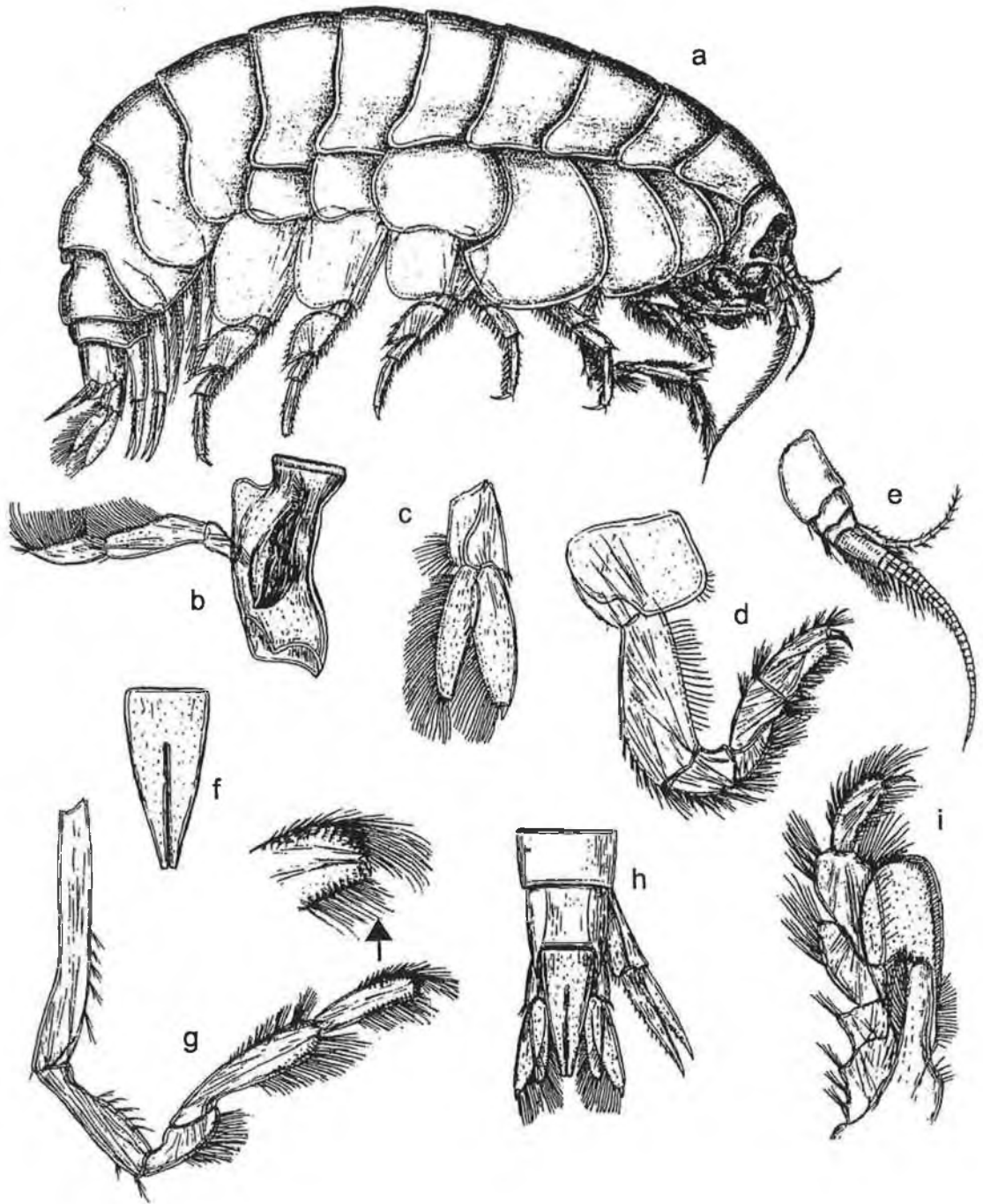


Figure 28: *Eurythenes gryllus* (Lichtenstein, 1822). Female. (a) entire; (b) mandible; (c) uropod 3; (d) gnathopod 1; (e) antenna 1; (f) telson; (g) gnathopod 2; (h) urosome; (i) maxilliped. [After: G.O. Sars, 1891].

Eurythenes obesus (Chevreux, 1905)

Fig. 29

- Katius obesus* Chevreux, 1905a: 1, figs 1-3; 1935: 63. – Stebbing, 1906; 721. – Tattersall, 1906: 29; 1909: 210. – Stephensen, 1912a: 614; 1912b: 89; 1913: 123; 1915: 37. – Shoemaker, 1920: 8E. – Stephensen, 1925: 126. – Schellenberg, 1926a: 217, fig. 26d; 1927: 681, fig. 72; 1931: 16. – K.H. Barnard, 1932: 56, fig. 21, pl. 1, fig. 1. – Stephensen, 1933: 12, 13, 18, figs 6, 7. – Shoemaker, 1956: 177. – Belloc, 1960: 7. – Costello *et al.*, 1989: 32.
- Eurythenes obesus*. – Schellenberg, 1955: 183, 192. – Shoemaker, 1956: 178. – J.L. Barnard, 1958: 92. Birstein & Vinogradov, 1960: 184. – J.L. Barnard, 1961: 38, fig. 8. – Birstein & Vinogradov, 1962: 36. – Hurley, 1963: 59. – Birstein & Vinogradov, 1964: 163. – Brusca, 1967: 384. – Birstein & Vinogradov, 1970: 420 (table 1). – Bellan-Santini & Ledoyer, 1974: 681, pl. 25. – Griffiths, 1975: 145; 1976: 56, 100. – Lowry & Bullock, 1976: 89. – Ortiz, 1979: 19. – Andres, 1983: 186. – Andres, 1987: 96, 97. – Costello *et al.*, 1989: 32. – Barnard & Karaman, 1991: 486. – Boudrias, 1991: 13. – Palerud & Vader, 1991: 35. – De Broyer & Jazdzewski, 1993: 68. – Kaufmann, 1994: 54. – Thurston & Bett, 1995: 201. – Johnson *et al.*, 2001: 198 (table 3). – Stoddart & Lowry, 2004: 445, figs 12–15.
- Eurythenes gryllus*. – K.H. Barnard, 1940: 440, 515 (list). – Springer & Bullis, 1956: 6. – Stephensen, 1932: 256 (in part).

Type material. NEOTYPE: female 48 mm, with setose oostegites and hatchlings; NHML Reg. No. 2003.1059 (designated by Stoddart & Lowry, 2004).

Type locality. (Neotype) RRS *Discovery*, Stn 9541#30, NE of Cape Verde Islands. 20°1.8'N, 21°19.8'W - 20°1.3'N, 21°20.0'W, 995–1500 m.

Material examined. Female, 9mm, *Thor* Stn 180, 61°37'N, 19°05'W. ZMUC (no accession no.); Chevreux, 1905a: 1, figs 1-3; Stoddart & Lowry, 2004: 445, figs 12–15.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli present. Eyes apparently absent. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half the length of outer plate.

Gnathopod 1 subchelate; coxa reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm transverse. Gnathopod 2 subchelate; coxa strongly shortened; carpus subequal or slightly longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Pleonite 3 with slight dorsal depression. Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner quadrate or somewhat rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson more than twice as long as broad, deeply cleft.

Length. 12 mm.

Distribution. Widely recorded from the Atlantic, Pacific and Indian Oceans.

Depth. Circalittoral to bathyal.

Ecology. This is a pelagic species, frequently taken in midwater trawls. Little is known about its mode of life. It has never been taken in a baited trap (Stoddart & Lowry, 2004).

Remarks. Stephensen (1915) recorded this species as burrowing in to a salp.

Female (sexually dimorphic characters)

Calceoli absent from antennae.

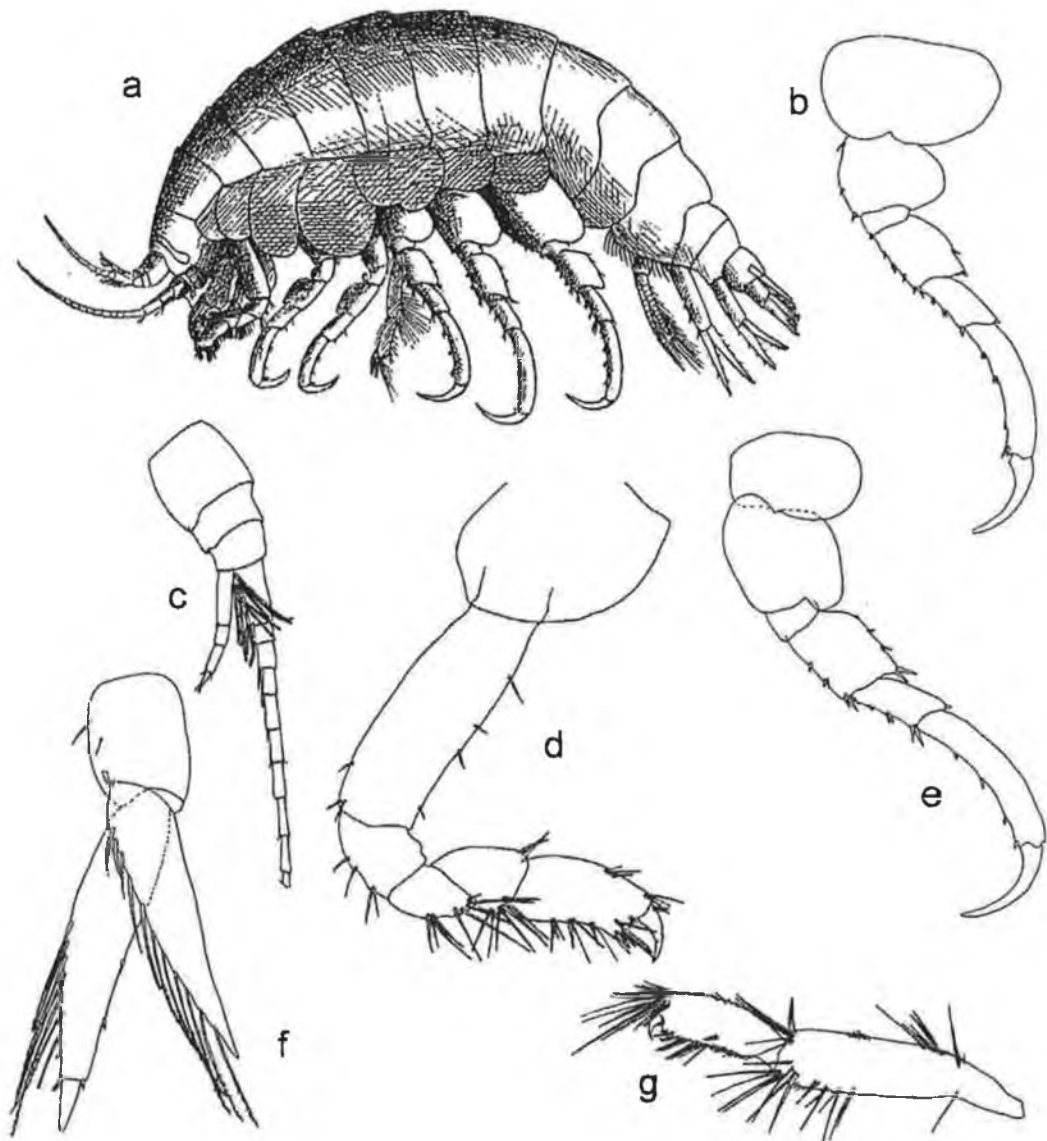


Figure 29: *Eurythenes obesus* (Chevreux, 1905). Female. (a) entire; (b) pereopod 5; (c) antenna 1; (d) gnathopod 1; (e) pereopod 6; (f) uropod 3; (g) gnathopod 2. [(a) after Chevreux, 1905; (b-g) by author].

Hippomedon ambiguus Ruffo, 1946

Fig. 30

Hippomedon ambiguus Ruffo, 1946: 53. – Diviacco & Ruffo, 1989: 480, fig. 324. – Barnard & Karaman, 1991: 490.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 124, slides 1654-1655.

Type locality. Rovinj (45°05'N, 13°40'E).

Material examined. Diviacco & Ruffo, 1989: 480, fig. 324.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing slight anterodistal lobe; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes present but not always visible in preserved specimens; large, rectangular, oval at base. Lateral cephalic lobes rather narrowly rounded to subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins subparallel or slightly diverging distally, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; palm not deeply excavate; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a large upturned spine, with distinct notch immediately above spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal, uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. 5.5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral and circalittoral (2–60 m).

Ecology. Found on sandy and muddy bottoms.

Remarks. This species is very similar to *H. massiliensis*, but is smaller and can be identified by the small, upturned spine on the anterodistal corner of the 1st epimeron.

Female (sexually dimorphic characters)

Antenna 2 between 40 to 60% of body length; calceoli absent.

Length. 5–6.5 mm.

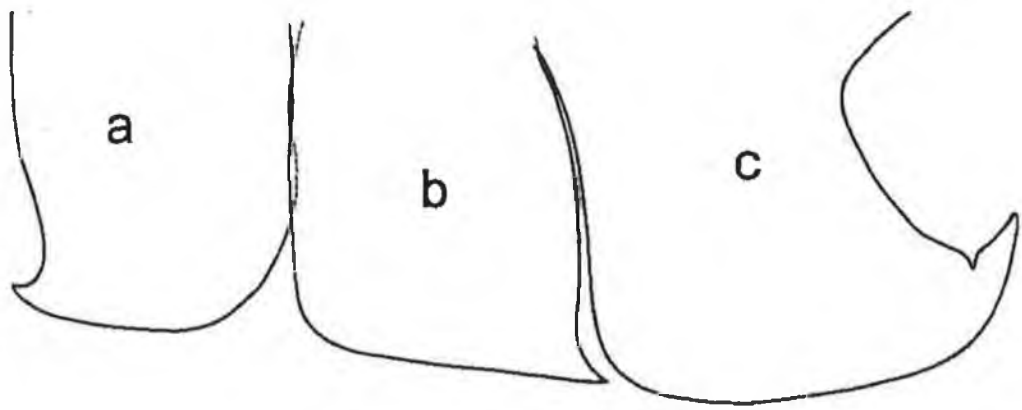


Figure 30: *Hippomedon ambiguous* Ruffo, 1946. Female. (a) epimeron 1; (b) epimeron 2; (c) epimeron 3. [After: Diviacco & Ruffo, 1989].

Hippomedon bidentatus Chevreux, 1903

Fig. 31

Hippomedon bidentatus Chevreux, 1903: 87, fig. 4. – Chevreux & Fage, 1925: 54, fig. 38. – Chevreux, 1935: 37, pl. 7, fig. 2. – G. Karaman, 1973: 126. – Diviacco & Ruffo, 1989: 481, fig. 325. – Barnard & Karaman, 1991: 490.

Type material. MOM 37 0574 – 37 0576, in alcohol and on 12 slides.

Type locality. Off Monaco, 1503 m.

Material examined. Chevreux, 1903: 87, fig. 4; Chevreux & Fage, 1925: 54, fig. 38; Diviacco & Ruffo, 1989: 481, fig. 325.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing very strong anterodistal lobe; flagellum article 1 as long as remaining articles combined. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, rectangular. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus palm acute to extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 basis distinctly longer than broad.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming 2 spines, the superior the largest. Urosomite 1 not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 7–8 mm.

Distribution. Atlantic Ocean off France and Iberia; Mediterranean.

Depth. Circalittoral to abyssal.

Ecology. Found on muddy bottoms.

Female (sexually dimorphic characters)

Antenna 1 peduncle article 1 producing strong anterodistal lobe/spine. Antenna 2 between 40 to 60% of body length; calceoli absent.

Length. 7–9 mm.

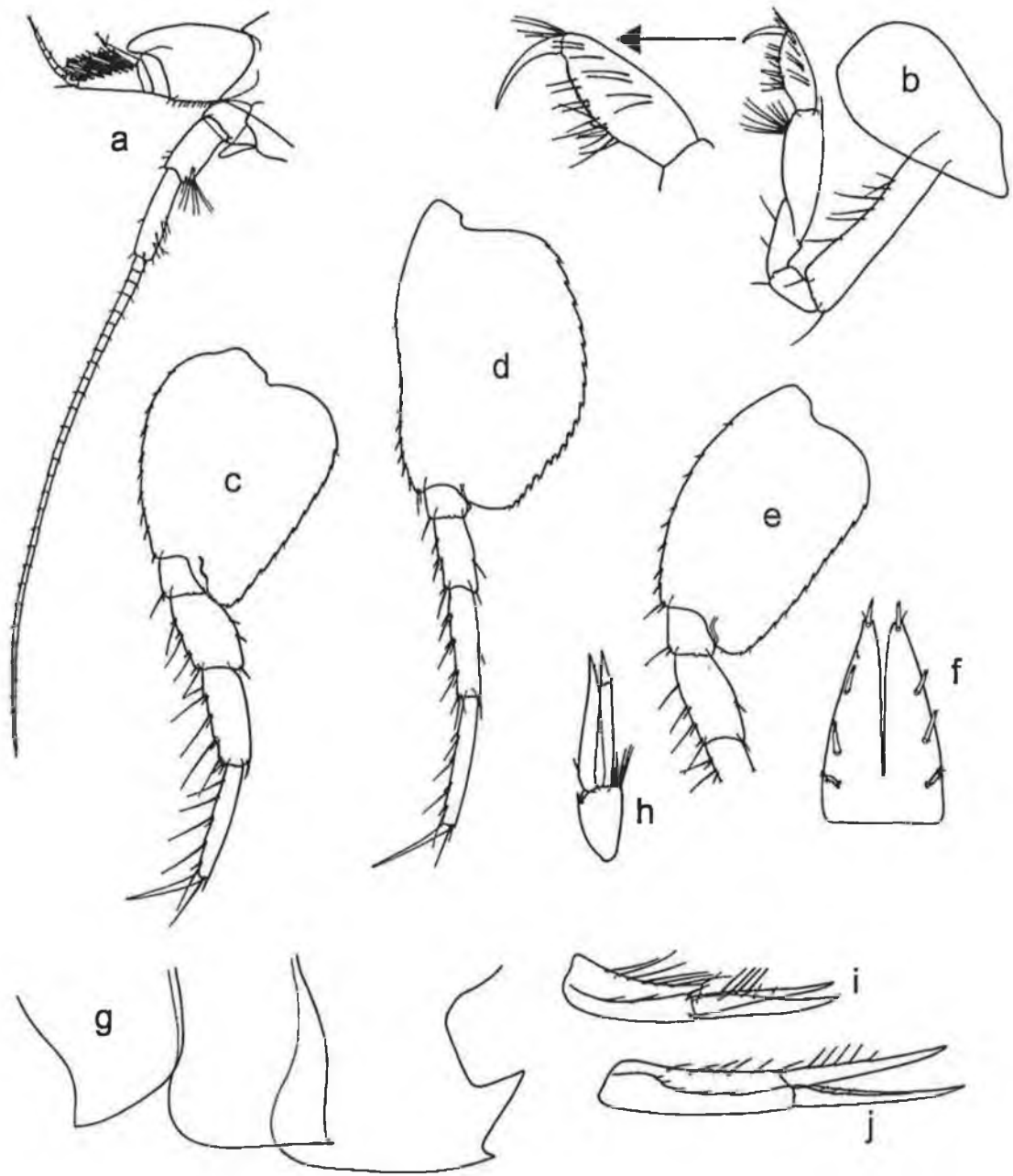


Figure 31: *Hippomedon bidentatus* Chevreux, 1903. Female. (a) head; (b)gnathopod 1; (c) pereopod 5; (d) pereopod 7; (e) pereopod 6; (f) telson; (g) epimeron 1 – 3; (h) uropod 3; (i) uropod 2; (j) uropod 1. [After: Diviacco & Ruffo, 1989].

Hippomedon denticulatus (Bate, 1857)

Fig. 32

Anonyx denticulata Bate, 1857: 139. – Bate & Westwood, 1861: 101. – Bate, 1962: 74, pl. 12, fig. 2.

Hippomedon denticulatus. – G.O. Sars, 1890: 56, pl. 20. – Stebbing, 1906: 59. – Stephensen, 1923b: 89. – Chevreux & Fage, 1925: 53. – Schellenberg, 1942: 104. – Lincoln, 1979a: 74, fig. 28. – Costello *et al.*, 1989: 33. – Barnard & Karaman, 1991: 490, figs 88A, 89B, 90H, 93H, 95D. – Dauvin *et al.*, 1994: 551, table 3. – Dauvin & Sorbe, 1995: 449, 456.

Hippomedon holbolli. – Boeck, 1871: 102 (non Krøyer, 1946).

non *Hippomedon denticulatus*. – Hansen, 1887: 65, pl. 2, fig. 2 (= *H. propinquus* G.O. Sars).

?*Hippomedon denticulatus*. – Chevreux & Fage, 1925: 53, fig. 37. – G. Karaman, 1973: 126.

Type material. SYNTYPES: NHML Reg. No. 1952: 5: 7: 8-9

Type locality. Moray Firth.

Material examined. G.O. Sars, 1890: 56, pl. 20; Stebbing, 1906: 59; Stephensen, 1923b: 89; Chevreux & Fage, 1925: 53.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing strong anterodistal spine; peduncle article 2 also producing distal spine; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, subrectangular. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 rather weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins slightly diverging distally, palm extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 coxa equilobate; basis distinctly longer than broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a large upturned spine, with distinct notch immediately above spine. Urosomite 1 with weak dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 11 mm.

Distribution. Öresund; Bohusän; west and north Norway; Kolafjord; Shetlands; British Isles; France.

Depth. Infralittoral to circalittoral (c. 10–180 m).

Ecology. This is a rather shallow water species found often on sandy bottoms.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 as long as remaining articles combined. Antenna 2 between 40 to 60% of body length; calceoli absent. Urosomite 1 with dorsal depression.

Length. 14 mm.

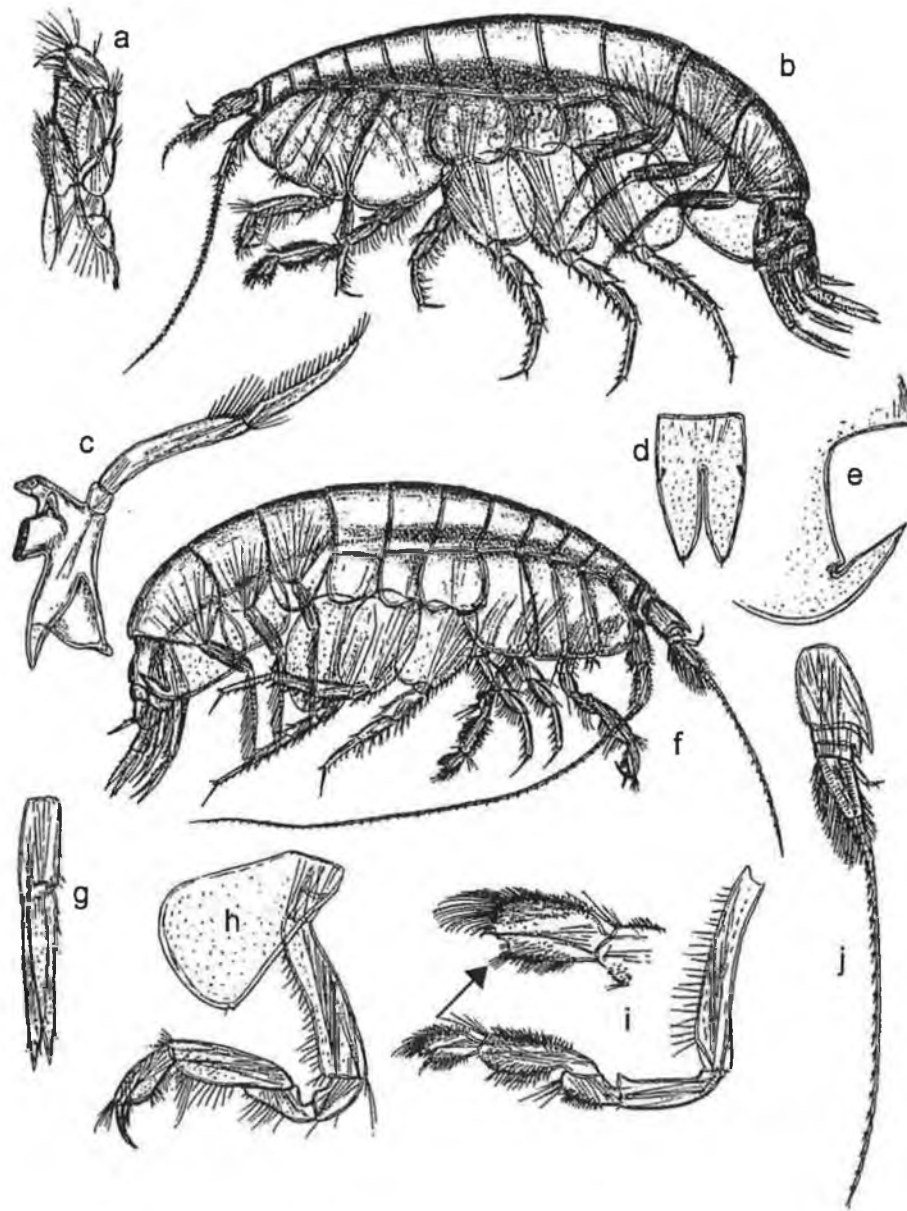


Figure 32: *Hippomedon denticulatus* (Bate, 1857). (a) maxilliped; (b) entire, female; (c) mandible; (d) telson, male; (e) epimeron 3; (f) entire, male; (g) uropod 3, male; (h) gnathopod 1; (i) gnathopod 2; (j) antenna 1, male. [After: G.O. Sars, 1891].

Hippomedon holbolli (Kroyer, 1846)

Fig. 33

Anonyx Holbølli Krøyer, 1846: 8, 38.

Hippomedon Holbølli. – Hansen, 1887: 63, pl. 2, fig. 1. – G.O. Sars, 1895: 58, pl. 21, fig. 2. – Stappers, 1911: 6.

Hippomedon holbolli. – Stebbing, 1906: 58. – Stephensen, 1923b: 89. – Gurjanova, 1951: 229, fig. 93. – Gurjanova, 1962: 104.

non *Hippomedon holbolli*. – Boeck, 1871: 102.

Hippomedon holbolli. – Barnard & Karaman, 1991: 490.

Type material. SYNTYPE: ZMUC CRU-6735.

Type locality. South Greenland.

Material examined. G.O. Sars, 1895: 58, pl. 21, fig. 2; Stebbing, 1906: 58; Stephensen, 1923b: 89.

Description. Antenna 1 shorter than antenna 2; peduncle articles 1 and 2 not produced; flagellum article 1 almost as long as remaining articles combined. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes small, rounded and situated on very narrowly rounded lateral cephalic lobes. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus palm acute. Gnathopod 2 subchelate; carpus longer than propodus. Pereopod 5 basis about as long as broad or slightly longer than broad.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine but lacking distinct notch above the spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. 16 mm.

Distribution. Skagerrak; north Norway; Arctic Seas; off north Faeroes.

Depth. Infralittoral to abyssal.

Female (sexually dimorphic characters)

Calceoli absent from antennae.

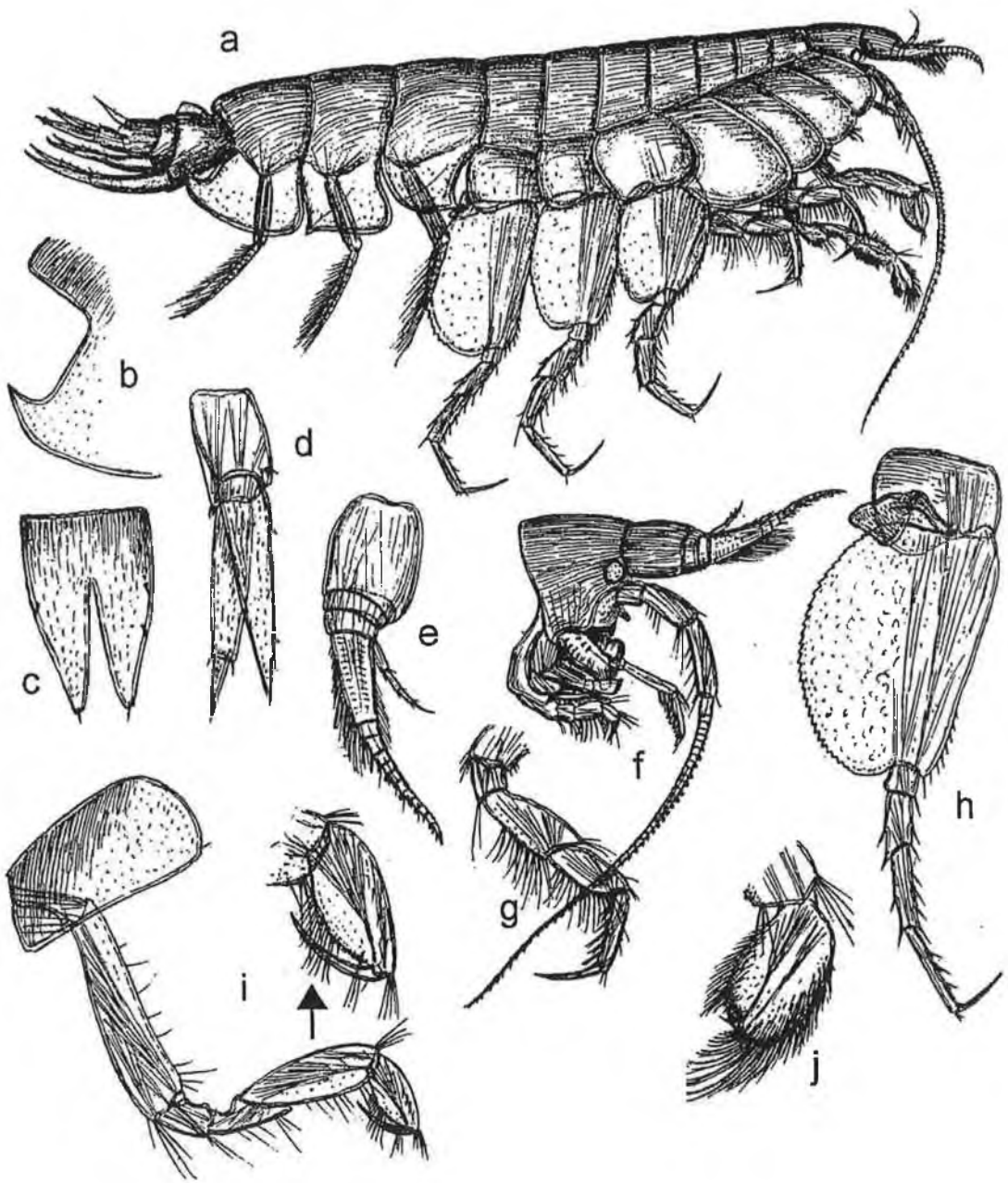


Figure 33: *Hippomedon holbolli* (Krøyer, 1846). Male. (a) entire; (b) epimeron 3; (c) telson; (d) uropod 3; (e) antenna 1; (f) head; (g) pereopod 3; (h) pereopod 7; (i) gnathopod 1; (j) gnathopod 2, propodus. [After: G.O. Sars, 1891].

Hippomedon longimanus (Stebbing, 1888)

Fig. 34

Platamon longimanus Stebbing, 1888: 643, pl. 13.

Hippomedon longimanus. – Della Valle, 1893: 808 (in part). – Stebbing, 1906: 60.

Type material. HOLOTYPE: NHML Reg. No. 1889: 5: 15: 14 (part).
PARATYPE: NHML Reg. No. 1889: 5: 15: 14 (part).

Type locality. Off Cape Finisterre (41°58' N, 9°42' W).

Material examined. Stebbing, 1888: 643, pl. 13; Stebbing, 1906: 60.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 as long as remaining articles combined. Antenna 2 between 40 to 60% of body length, calceoli absent. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus long, distinctly longer than propodus; propodus margins diverging distally, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus well developed. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 3 posterodistal corner produced, forming a large upturned spine, lacking distinct notch above this spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson moderately cleft.

Length. 14 mm.

Distribution. North Atlantic.

Depth. Bathyal to abyssal.

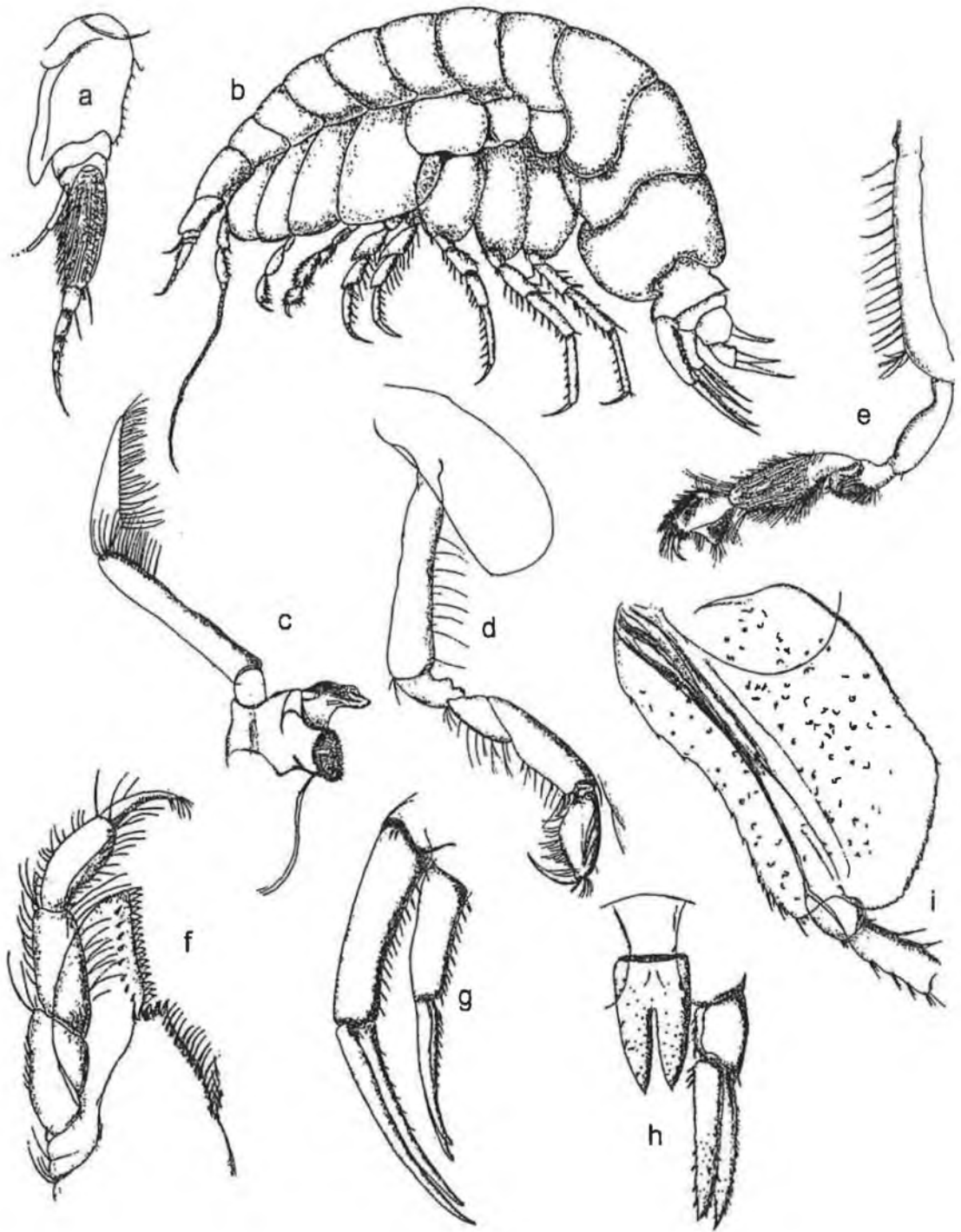


Figure 34: *Hippomedon longimanus* (Stebbing, 1888). Female. (a) antenna 1; (b) entire; (c) mandible; (d) gnathopod 1; (e) gnathopod 2; (f) maxilliped; (g) uropods 1-2; (h) uropod 3 and telson; (i) pereopod 7. [After: Stebbing, 1888].

Hippomedon massiliensis Bellan-Santini, 1965

Fig. 35

Hippomedon massiliensis Bellan-Santini, 1965: 165, figs 1-4. – Bellan-Santini & Ledoyer, 1973: 919. – Diviacco & Ruffo, 1989: 482, figs 326-327. – Barnard & Karaman, 1991: 490.

?*Hippomedon denticulatus*. – Chevreux & Fage, 1925: 53, fig. 37. – G. Karaman, 1973: 126.

Type material. MSNV.

Type locality. Marseille.

Material examined. Diviacco & Ruffo, 1989: 482, figs 326-327.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing anterodistal lobe; flagellum article 1 as long as remaining articles combined. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, subrectangular. Lateral cephalic lobes narrowly rounded to subquadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine with distinct notch immediately above spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately to deeply cleft.

Length. 6–8 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral to bathyal.

Ecology. Generally found on sandy or muddy bottoms.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli absent.

Length. 6.5–9.5 mm.

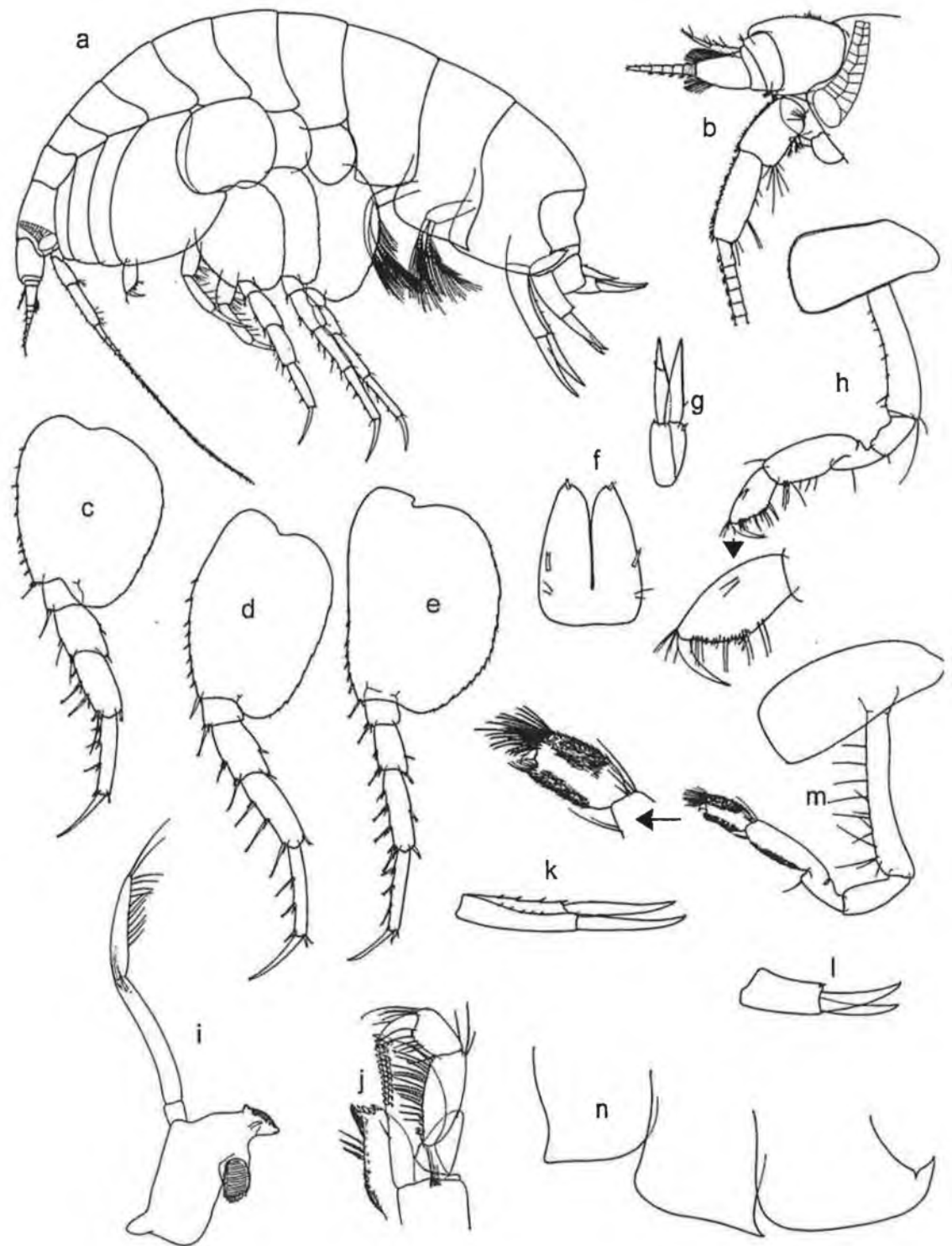


Figure 35: *Hippomedon massiliensis* Bellan-Santini, 1965. (a) entire, female; (b) head, male; (c) pereopod 5; (d) pereopod 6; (e) pereopod 7; (f) telson; (g) uropod 3; (h) gnathopod 1; (i) mandible; (j) maxilliped; (k) uropod 1; (l) uropod 2; (m) gnathopod 2; (n) epimeron 1-3. [After: Diviacco & Ruffo, 1989].

Hippomedon oculatus Chevreux & Fage, 1925

Fig. 36

?*Hippomedon tunisiacus* Stephensen, 1915: 36, fig. 20.

Hippomedon oculatus Chevreux & Fage, 1925: 52, figs 35-36. – Ledoyer, 1977: 373.
– Diviacco & Ruffo, 1989: 482, fig. 328. – Barnard & Karaman, 1991: 490.

Type material. Unknown.

Type locality. Bonafacio.

Material examined. Chevreux & Fage, 1925: 52, figs 35-36; Diviacco & Ruffo, 1989: 482, fig. 328.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing slight anterodistal lobe; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length. Eyes small, rounded to slightly suboval, situated on lateral cephalic lobes. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 basis distinctly longer than broad.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, 3 posterodistal corner forming a large upturned spine but lacking distinct notch above spine. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, moderately cleft.

Length. 7.5 mm.

Distribution. Mediterranean.

Depth. Infralittoral to bathyal.

Ecology. On dendritic or muddy bottoms.

Remarks. According to Diviacco & Ruffo (1989), this species may be synonymous with *H. tunisiacus* Stephensen, 1915, also a mediterranean species of which only one specimen is known. There are only minor differences which include an apparent lack of eyes in *H. tunisiacus* (although Stephensen (1915) remarks that this may be due to preservation in alcohol), and a posterodistally subquadrate epimeron 2 in *H. tunisiacus* in comparison to *H. oculatus* where the 2nd epimeron is posterodistally produced into a small spine (see Stephensen, 1915: 36, fig. 20; Diviacco & Ruffo, 1989: 482, fig. 328).

Female (sexually dimorphic characters)

Antenna 2 between 40 to 60% of body length; calceoli absent.

Length. 7.5–10 mm.

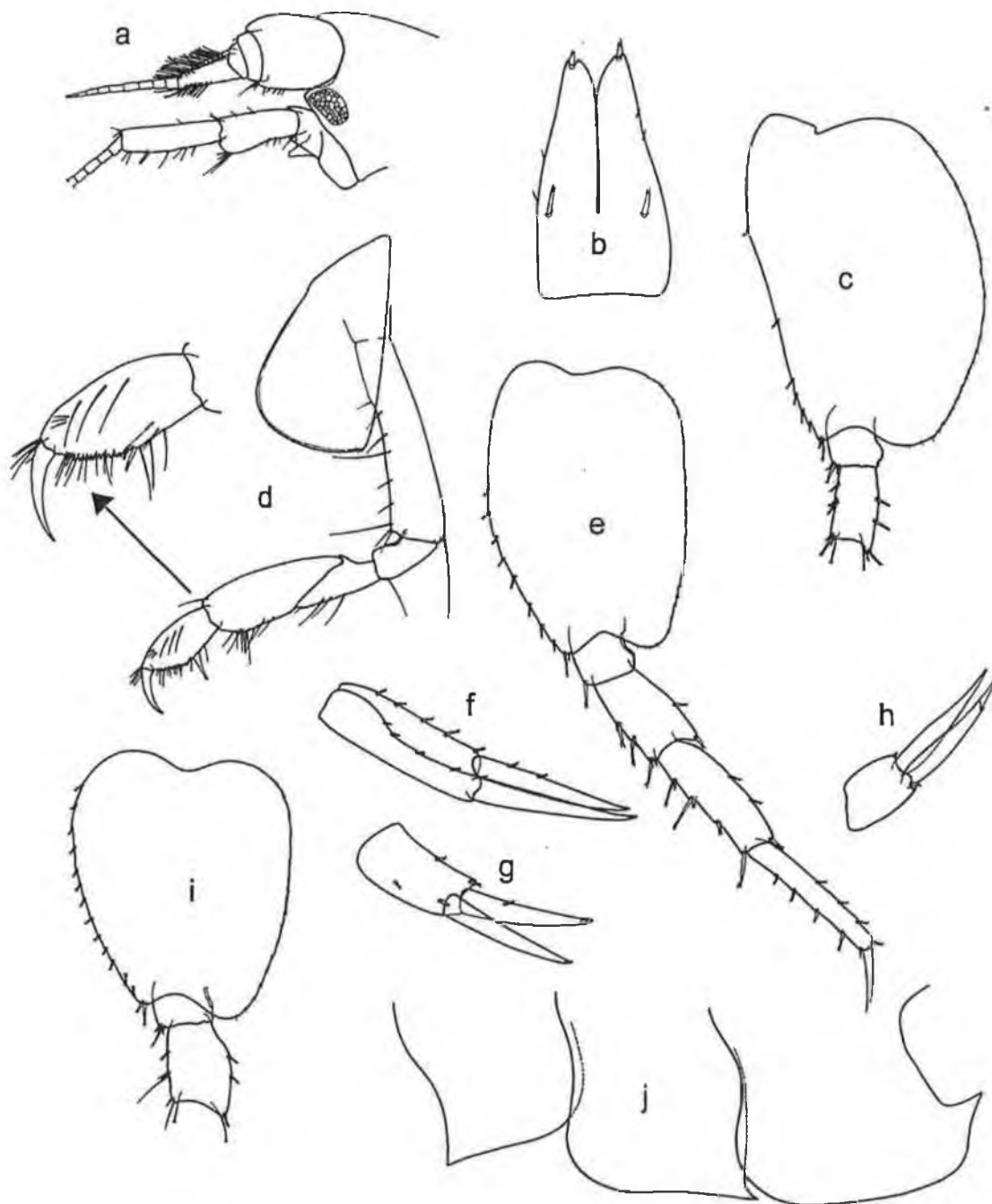


Figure 36: *Hippomedon oculatus* Chevreux & Fage, 1925. Female. (a) head; (b) telson; (c) pereopod 7; (d) gnathopod 1; (e) pereopod 6; (f) uropod 1; (g) uropod 2; (h) uropod 3; (i) pereopod 5; (j) epimeron 1-3. [After: Diviacco & Ruffo, 1989].

Hippomedon propinquus G.O. Sars, 1895

Fig. 37

Hippomedon propinquus G.O. Sars, 1890: 57, pl. 21, fig. 1. – Della Valle, 1893: 180.
– Stephensen, 1923b: 90. – Shoemaker, 1930b: 4. – Barnard & Karaman, 1991:
490.

Hippomedon squamosus. – Stebbing, 1894: 4, pl. 1.

Hippomedon denticulatus. – Hansen, 1887: 65, pl. 2, fig. 2.

Hippomedon propinquus propinquus. – Gurjanova, 1962: 107, fig. 24.

Type material. ?ZMO.

Type locality. Western Norway.

Material examined. G.O. Sars, 1890: 57, pl. 21, fig. 1; Stephensen, 1923b: 90.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing weak lobe; flagellum article 1 as long as remaining articles combined. Antenna 2 between 40 to 60% of body length; calceoli absent. Eyes large, subrectangular. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins diverging distally, palm extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner produced, forming a large upturned spine, lacking distinct notch above this spine. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami approximately subequal, with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 10 mm.

Distribution. Skagerrak; West and North Norway; South Iceland; Arctic Seas.

Depth. Circalittoral to bathyal.

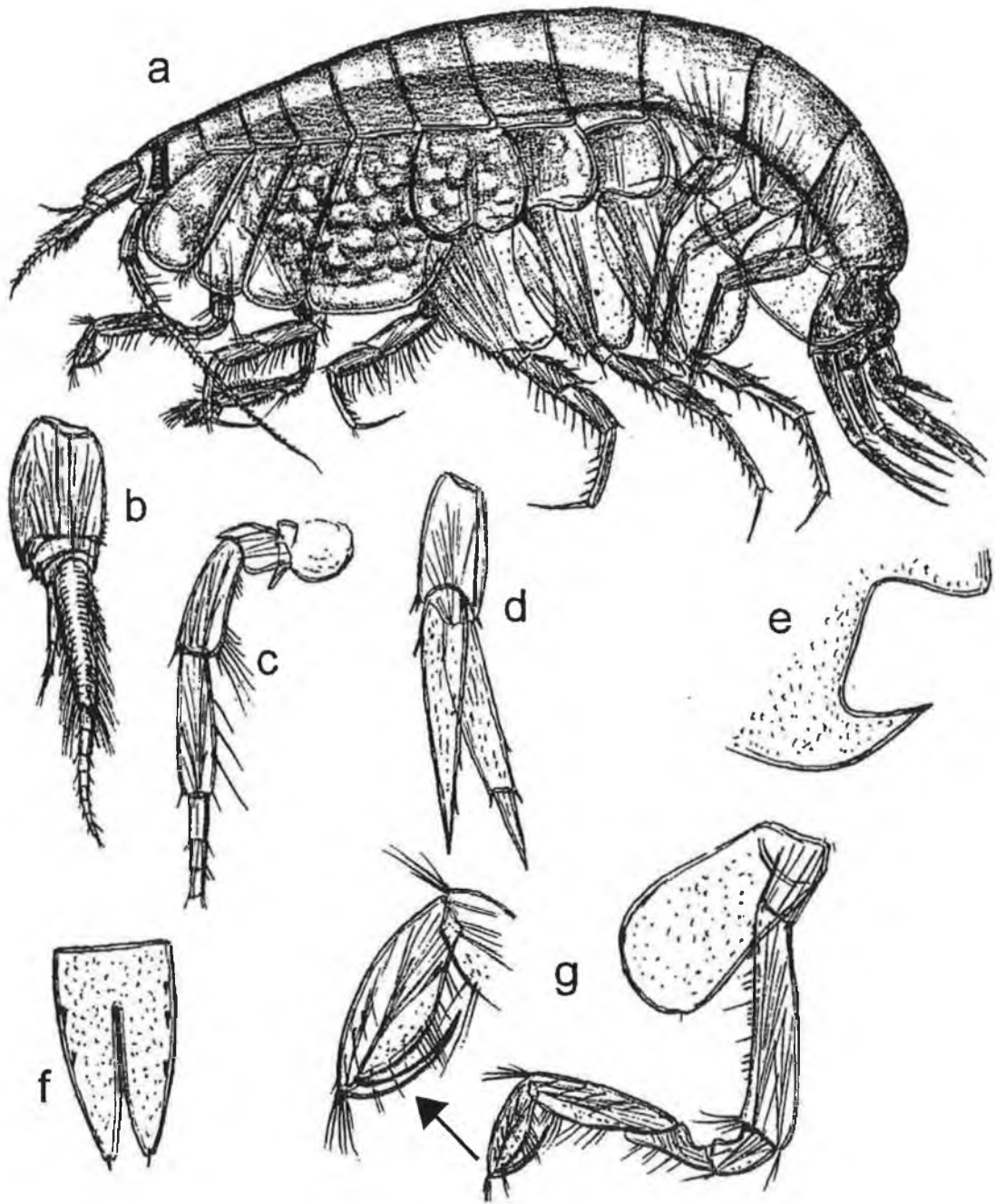


Figure 37: *Hippomedon propinquus* G.O. Sars, 1895. Female. (a) entire; (b) antenna 1; (c) antenna 2; (d) uropod 3; (e) epimeron 3; (f) telson; (g) gnathopod 1.

[After: G.O. Sars, 1895].

Hirondellea trioculata Chevreux, 1889

Fig. 38

Hirondellea trioculata Chevreux, 1889: 285, fig. – Chevreux, 1900: 20, pl. 4, fig. 1, pl. 14, fig. 3. – Stebbing, 1906: 17. – Barnard & Karaman, 1991: 491.

Type material. MOM 37 0387, in alcohol and on 17 slides.

Type locality. Azores (38°21'48"N 30°30'30"E).

Material examined. Chevreux, 1889: 285; Chevreux, 1900: 20, pl. 4, fig. 1, pl. 14, fig. 3; Stebbing, 1906: 17.

Description based on mature female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Three eyes present, one situated on top of the head, with one crescent-shaped eye on each broadly rounded lateral cephalic lobe. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, but distinctly shorter than propodus; dactylus well developed. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, rami subequal. Telson distinctly longer than broad, moderately cleft.

Length. 13 mm.

Distribution. North-Atlantic.

Depth. Bathyal.

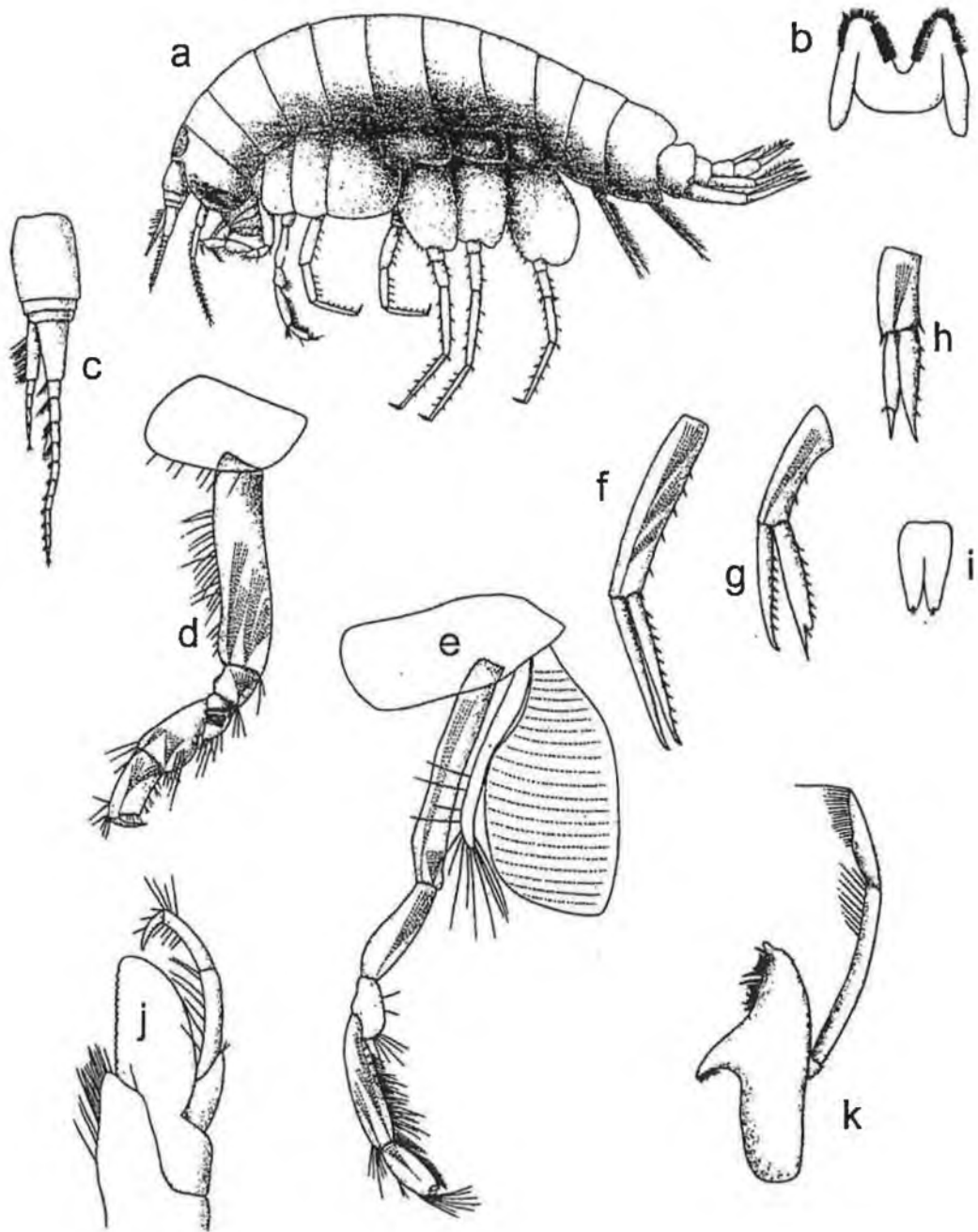


Figure 38: *Hirondellea trioculata* Chevreux, 1889. Female. (a) entire; (b) lower lip; (c) antenna 1; (d) gnathopod 1; (e) gnathopod 2; (f) uropod 1; (g) uropod 2; (h) uropod 3; (i) telson; (j) maxilliped; (k) mandible. [After: Chevreux, 1900].

Ichnopus spinicornis Boeck, 1861

Fig. 39

- Ichnopus spinicornis* Boeck, 1861: 645. – Boeck, 1871: 98. Chevreux, 1888: 39. – G.O. Sars, 1890: 40, pl. 15. – Norman, 1900a: 142. – Stebbing, 1906: 52. – Walker, 1910: 159. – Nordgaard, 1911: 21. – Sexton, 1911b: 200. – Tattersall, 1913: 3. – Stephensen, 1915: 35; 1923: 78. – Stephensen, 1923b: 78. – Chevreux & Fage, 1925: 47, figs 28–29. – Cecchini & Parenzan, 1935: 162, fig. 6. – Chevreux, 1935: 162, fig. 6. – Stephensen, 1942: 472. – Gurjanova, 1951: 220, fig. 86. – Reys, 1960: 90. – Toulmond & Truchot, 1964: 6. – Macquart-Moulin, 1968: 313. – Poizat, 1969: 402. Vader, 1969: 6. – Bellan-Santini & Ledoyer, 1973: 919. – Krapp-Schickel, 1974: 322, 337. – Ledoyer, 1977: 374. – Drago *et al.*, 1978: 75. – Vader & Johannessen, 1978: 336. – Lincoln, 1979a: 94, fig. 38. – Macquart-Moulin, 1984: 185. – Marques & Bellan-Santini, 1985: 323, 349. – Tully & Ó Céidigh, 1987: 62. – Dauvin & Toulemont, 1988: 218 (table 1). – Costello *et al.*, 1989: 33. – Diviacco & Ruffo, 1989: 486, fig. 329. – Kaartvedt, 1989: 189. – Barnard & Karaman, 1991: 492, figs 89L, 90J, 91M, 92K, 95P. – Palerud & Vader, 1991: 36. – Lowry & Stoddart, 1992: 224, figs 25–26.
- Lysianassa spinicornis*. – Lilljeborg, 1865a: 20. – Lilljeborg, 1865b: 11.
- Ichnopus calceolatus* Heller, 1866: 20, pl. 2, figs 26–28. – Marion, 1883: 44. – Krapp-Schickel, 1974: 322, 337.
- Ichnopus minutus* Boeck, 1871: 99.
- Ichnopus tarus*. – Della Valle, 1893: 801, pl. 27, figs 1–22 (in part).
- non *Ichnopus spinicornis*. – Ledoyer, 1986: 764, fig. 297 (= *I. comorensis*).

Type material. Unknown.

Type locality. Bejan (Norway).

Material examined. G.O. Sars, 1890: 40, pl. 15; Stephensen, 1915: 35; 1923: 78; Stephensen, 1923b: 78; Lincoln, 1979a: 94, fig. 38; Diviacco & Ruffo, 1989: 486, fig. 329; Lowry & Stoddart, 1992: 224, figs 25–26.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight to slightly concave anterior margin.; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin weakly serrated. Pereopod 7 basis posterior margin serrated.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner

ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. To 17 mm.

Distribution. From North Norway to the Mediterranean Sea.

Depth. Infralittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Antenna 2 between 40 to 60% of body length; *calceoli present*. Gnathopod 2 dactylus well developed.

Length. 14 mm.

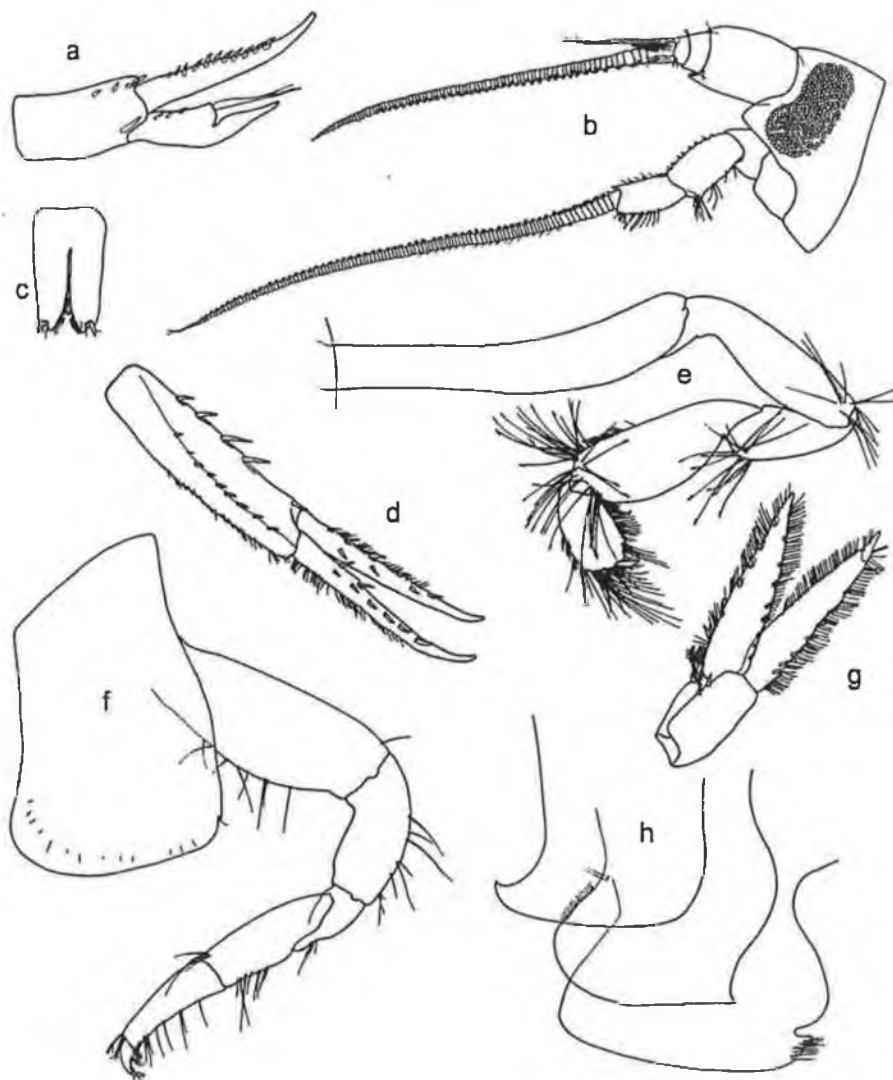


Figure 39: *Ichnopus spinicornis* Boeck, 1861. Female. (a) uropod 2; (b) head and antennae; (c) telson; (d) uropod 1; (e) gnathopod 2; (f) gnathopod 1; (g) uropod 3; (h) epimeron 1-3.

[After: Diviacco & Ruffo, 1989].

Ichnopus tarus Costa, 1853

Fig. 40

Ichnopus tarus A. Costa, 1853b: 172. – Costa, 1857: 189, pl. 1, fig. 3. – Marion, 1883: 44. – Della Valle, 1893: 801, pl. 3, fig. 1, pl. 27, figs 1-22 (in part). – Stebbing, 1906: 53. – Chevreux & Fage, 1925: 48, fig. 30. – Chevreux, 1935: 36, pl. 6, fig. 4. – Cecchini & Parenzan, 1935: 163, fig. 7. – Ruffo, 1946: 50. – Krapp-Schickel, 1974: 322, 337. – Ledoyer, 1977: 374. – Diviaco & Ruffo, 1989: 488, figs 330-331. – Barnard & Karaman, 1991: 492. – Palerud & Vader, 1991: 36. – Lowry & Stoddart, 1992: 227, figs 27-28.

Ichnopus affinis Heller, 1866: 19, pl. 2, figs 19-25. – Chevreux, 1903: 84. – Chevreux, 1935: 35. – Thurston & Allen, 1969: 359. – Krapp-Schickel, 1974: 322, 337.

non *Ichnopus tarus*. – Walker, 1904: 238, pl. 1, fig. 3. – K.H. Barnard, 1916: 123.

Type material. Unknown.

Type locality. Napoli.

Material examined. Stebbing, 1906: 53; Chevreux & Fage, 1925: 48, fig. 30; Diviaco & Ruffo, 1989: 488, figs 330-331; Lowry & Stoddart, 1992: 227, figs 27-28.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; peduncle article 2 producing distal spine; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight to slightly concave anterior margin; ischium elongate, more than twice as long as broad; carpus very long, distinctly longer than propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin weakly serrated. Pereopod 7 basis posterior margin serrated.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 without dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson more than twice as long as broad, deeply cleft.

Distribution. Atlantic Ocean; Mediterranean; (?)Indian Ocean.

Depth. Infralittoral to abyssal.

Length. 13 mm.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Antenna 2 between 40 to 60% of body length; calceoli absent.

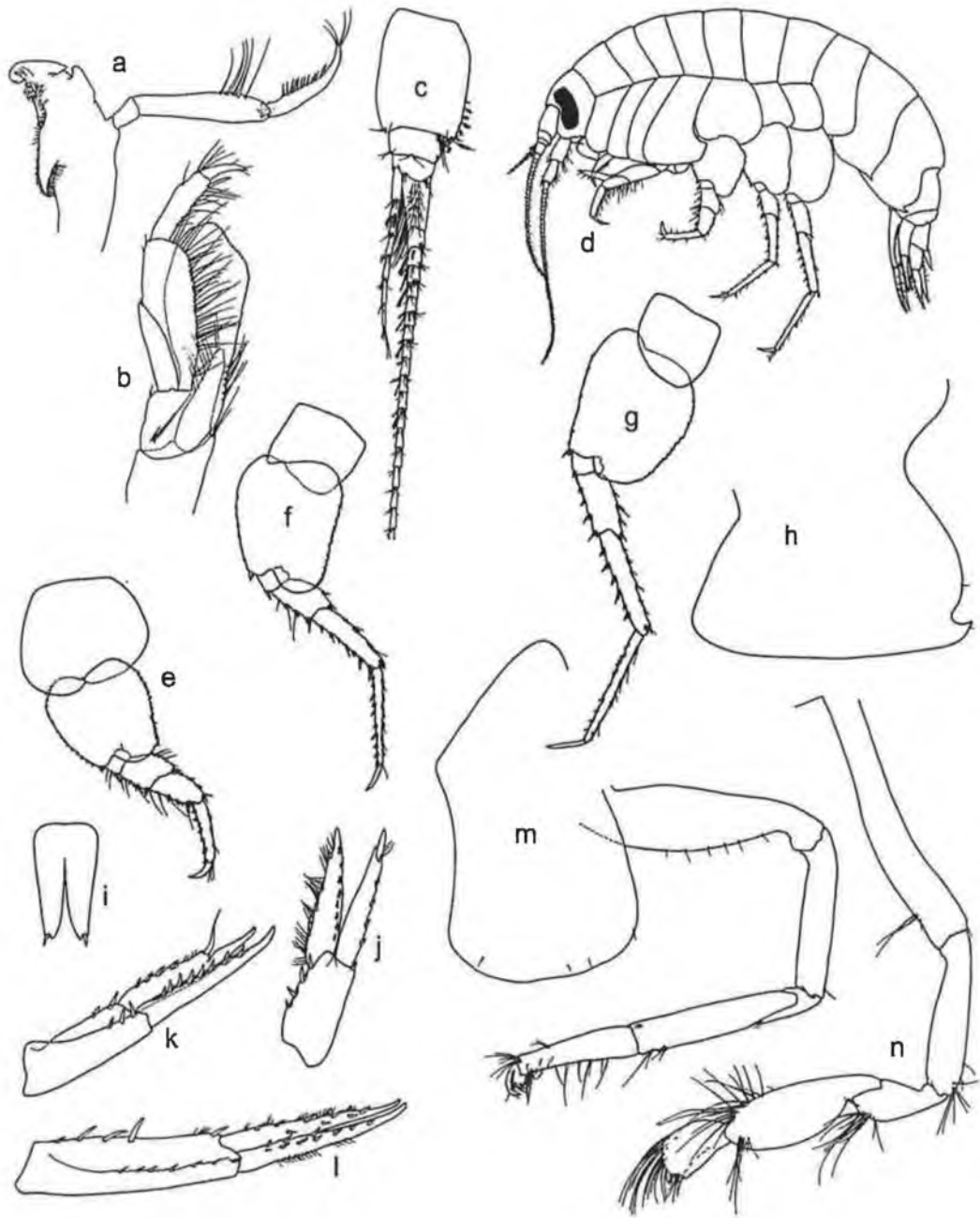


Figure 40: *Ichnopus tarus* Costa, 1853. Female. (a) mandible; (b) maxilliped; (c) antenna 1; (d) entire; (e) pereopod 5; (f) pereopod 6; (g) pereopod 7; (h) epimeron 3; (i) telson; (j) uropod 3; (k) uropod 2; (l) uropod 1; (m) gnathopod 1; (n) gnathopod 2. [After: Diviacco & Ruffo, 1989].

Kerguelenia borealis G.O. Sars, 1895

Fig. 41

Kerguelenia borealis G.O. Sars, 1895: 119, pl. 40, fig. 2. – Stebbing, 1906: 12. – Barnard & Karaman, 1991: 493, figs 88G, 90C, 91J, 92O.

Type material. ?ZMO.

Type locality. Not designated.

Material examined. G.O. Sars, 1895: 119, pl. 40, fig. 2; Stebbing, 1906: 12.

Description based on mature female, male unknown.

Description. Antenna 1 subequal to antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 slightly longer than article 2. Antenna 2 peduncle article 3 slightly elongated; calceoli absent. Eyes small, subtriangular. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, slightly tapering and rounded distally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad.

Urosomite 1 without dorsal depression, not dorsally carinate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson subequal in length and breadth, entire.

Length. 5 mm.

Distribution. Hardangerfjord; north Norway; Arctic Ocean.

Depth. Bathyal.

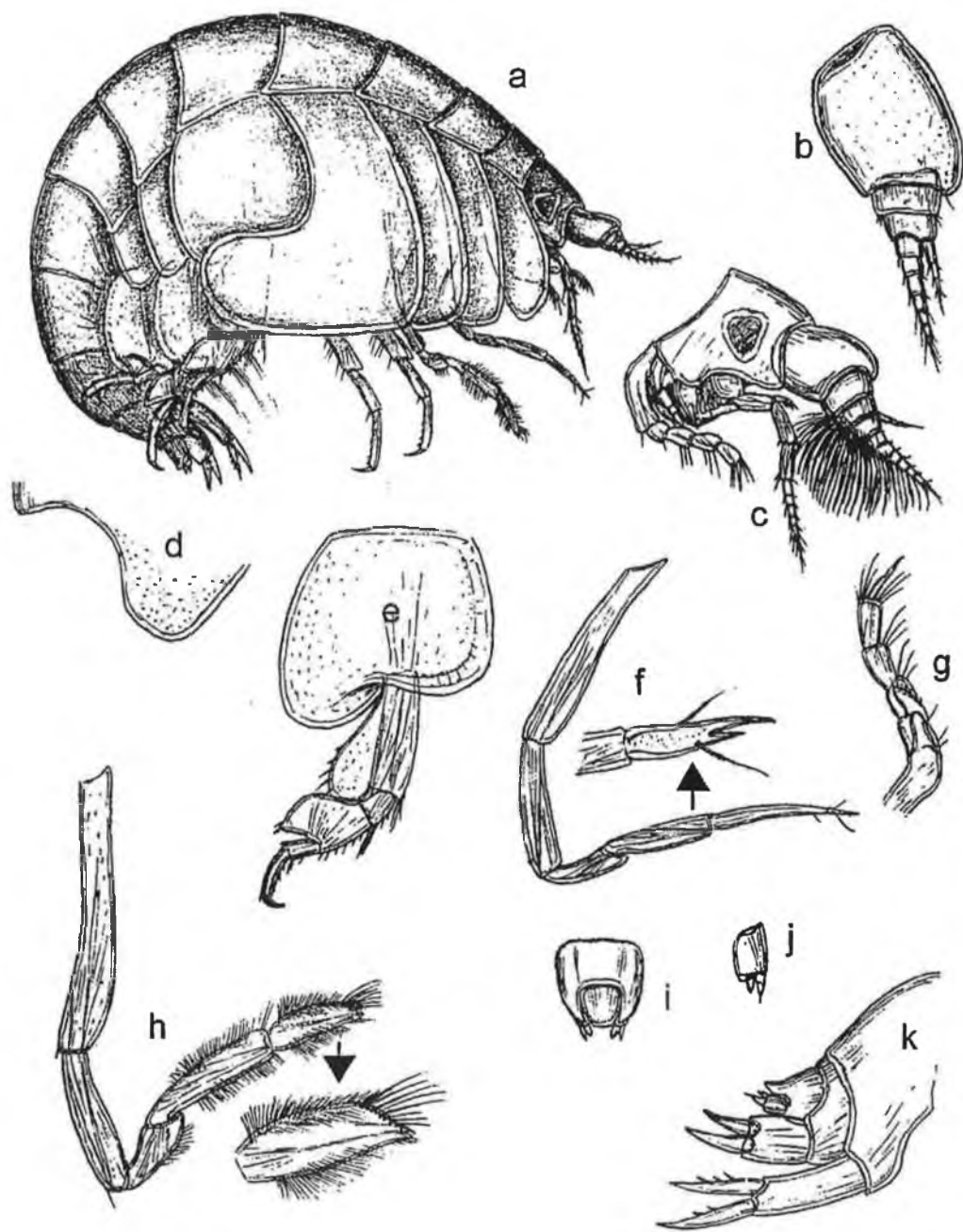


Figure 41: *Kerguelenia borealis* G.O. Sars, 1895. (a) entire, female; (b) antenna 1, female; (c) head, male; (d) epimeron 3; (e) pereopod 5; (f) gnathopod 1; (g) maxilliped; (h) gnathopod 2; (i) telson and uropod 3; (j) uropod 3; (k) urosome, uropods 1-3.

[After: G.O. Sars, 1895].

Kerguelenia reducta Ledoyer, 1977

Fig. 42

Kerguelenia reducta Ledoyer, 1977: 374, fig. 18. – Diviacco & Ruffo, 1989: 488, fig. 332. – Barnard & Karaman, 1991: 493.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 142, slides 492-494.
PARATYPE: MSNV Reg. no. MVR-Cr 142, in alcohol.

Type locality. Marseille (43°11'N, 5°13'E)

Material examined. Diviacco & Ruffo, 1989: 488, fig. 332.

Description. Antenna 1 subequal to antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 almost as long as remaining articles combined. Antenna 2 peduncle article 3 slightly elongate; calceoli absent. Eyes apparently absent. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, slightly tapering anterodistally, rounded distally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, not dorsally carinate. Uropod 1 rami subequal; uropod 2 rami distinctly unequal; uropod 3 rami subequal. Telson subequal in length and breadth, entire.

Length. 3 mm.

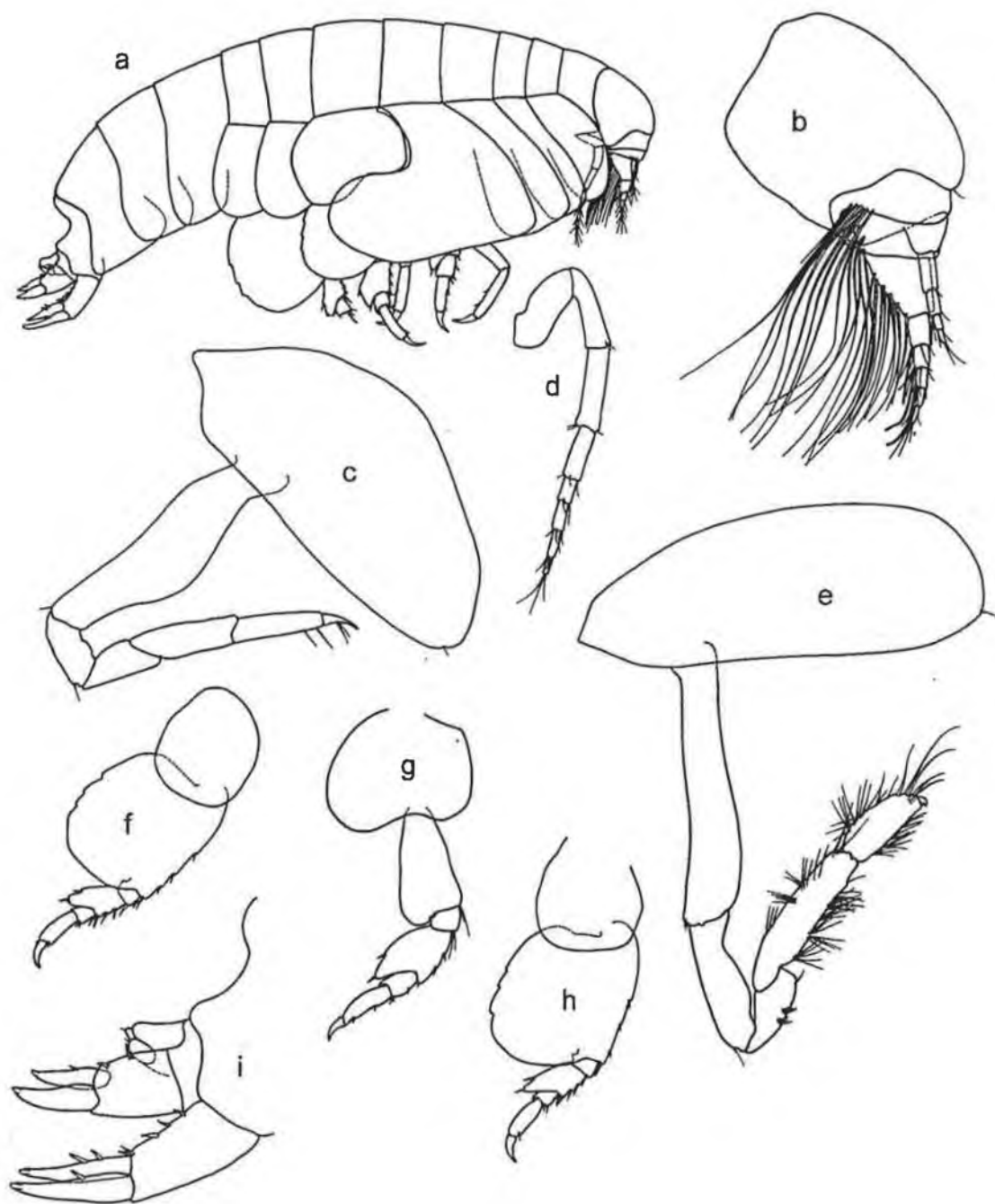
Distribution. Mediterranean endemic.

Depth. Circalittoral.

Ecology. Found on muddy bottoms.

Female (sexually dimorphic characters)

Not significantly different from male.



**Figure 42: *Kerguelenia reducta* Ledoyer, 1977. Male. (a) entire; (b) antenna 1; (c) gnathopod 1; (d) antenna 2; (e) gnathopod 2; (f) pereopod 6; (g) pereopod 5; (h) pereopod 7; (i) urosome, uropods 1-3.
[After: Diviacco & Ruffo, 1989].**

Lepidepecreum clypeatum Chevreux, 1888

Fig. 43

Lepidepecreum clypeatum Chevreux, 1888: 40. – Chevreux, 1900: 28, pl. 4, fig. 2. – Stebbing, 1906: 79. – Chevreux & Fage, 1925: 64, fig. 52. – Barnard & Karaman, 1991: 496.

Type material. MOM 37 0770, on 9 slides.

Type locality. Gulf of Gascony, 180 m.

Material examined. Chevreux, 1900: 28, pl. 4, fig. 2; Stebbing, 1906: 79; Chevreux & Fage, 1925: 64, fig. 52.

Based on female, male not yet described.

Description. Antenna 1 subequal to antenna 2; peduncle articles 1 and 2 producing strong anterodistal lobe; flagellum article 1 slightly longer than article 2; accessory flagellum absent; calceoli absent. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad, basis posterior margin smooth. Coxa 6 equilobate.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, acutely produced dorsodistally, carinate dorsally. Uropod 1 rami distinctly unequal; uropod 2 rami subequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 1-articulate, rami distinctly unequal. Telson more than twice as long as broad, moderately to deeply cleft.

Length. 5 mm.

Distribution. Northeast Atlantic.

Depth. Bathyal.

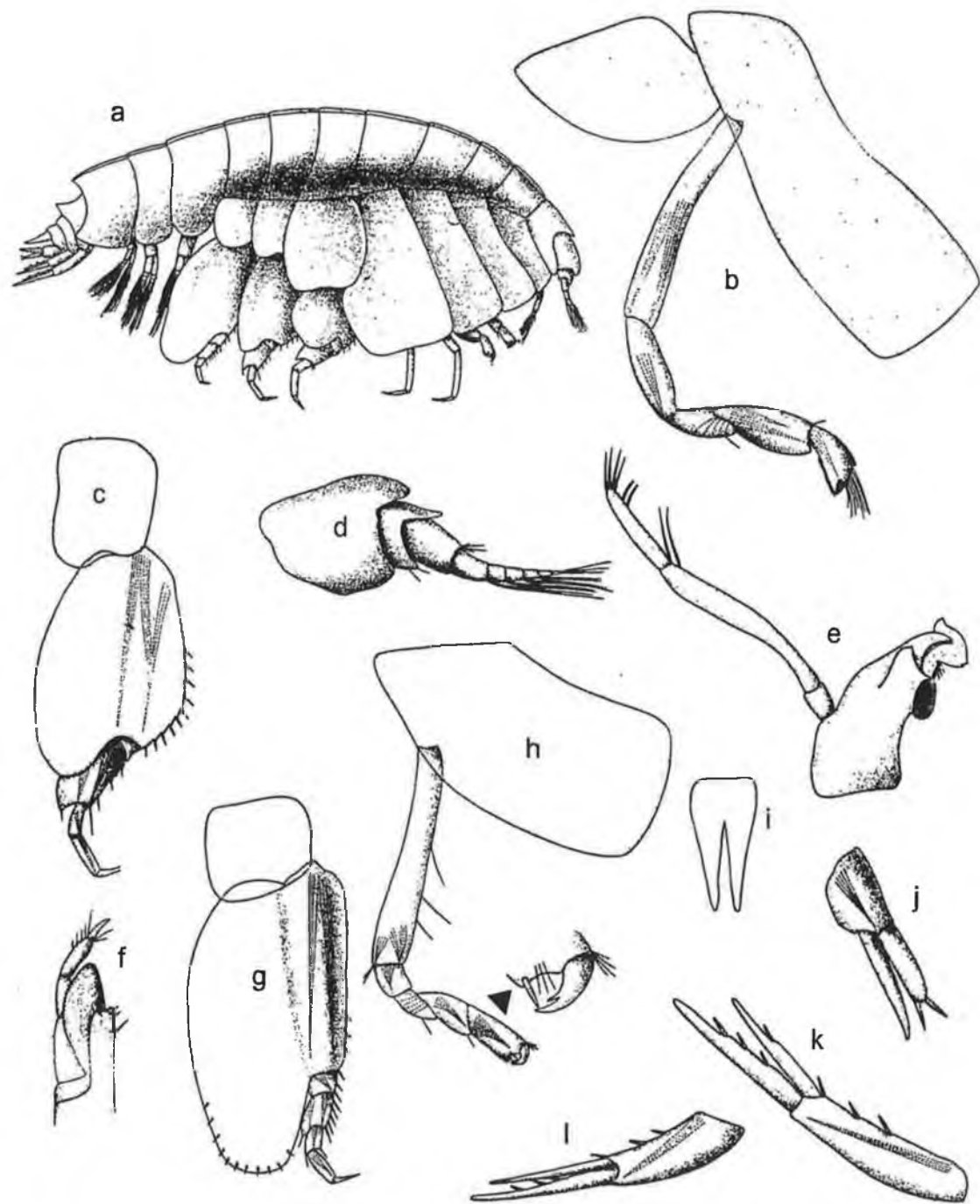


Figure 43: *Lepidepcreum clypeatum* Chevreux, 1888. Female. (a) entire; (b) gnathopod 2; (c) pereopod 6; (d) antenna 1; (e) mandible; (f) maxilliped; (g) pereopod 7; (h) gnathopod 1; (i) telson; (j) uropod 3; (k) uropod 1; (l) uropod 2. [After: Chevreux, 1900].

Lepidepcreum crypticum Ruffo & Schiecke, 1977

Fig. 44

Lepidepcreum crypticum Ruffo & Schiecke, 1977: 435, figs 2-7. – Diviacco & Ruffo, 1989: 492, fig. 333. – Barnard & Karaman, 1991: 496.

Type material. HOLOTYPE/PARATYPE: MSNV Reg. No. MVRCr 156, in alcohol.

Type locality. Napoli.

Material examined. Diviacco & Ruffo, 1989: 492, fig. 333.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 almost as long as remaining articles combined; accessory flagellum absent. Antenna 2 longer than body; peduncle article 3 elongate, at least three times as long as broad; calceoli present. Eyes large, suboval. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, subequal in length to propodus; propodus margins subparallel, palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression, acutely produced dorsodistally, carinate dorsally. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 1-articulate, rami subequal and fringed with long plumose setae. Telson more than twice as long as broad, deeply cleft.

Length. 5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral.

Ecology Endopsammic on coarse sand.

Female (sexually dimorphic characters)

Antenna 1 longer than antenna 2; flagellum article 1 slightly longer than article 2; calceoli absent. Urosomite 1 with very slight dorsal depression, not dorsally carinate. Uropod 3 rami lacking the plumose setae of the male.

Length. 3.5–4.5 mm.

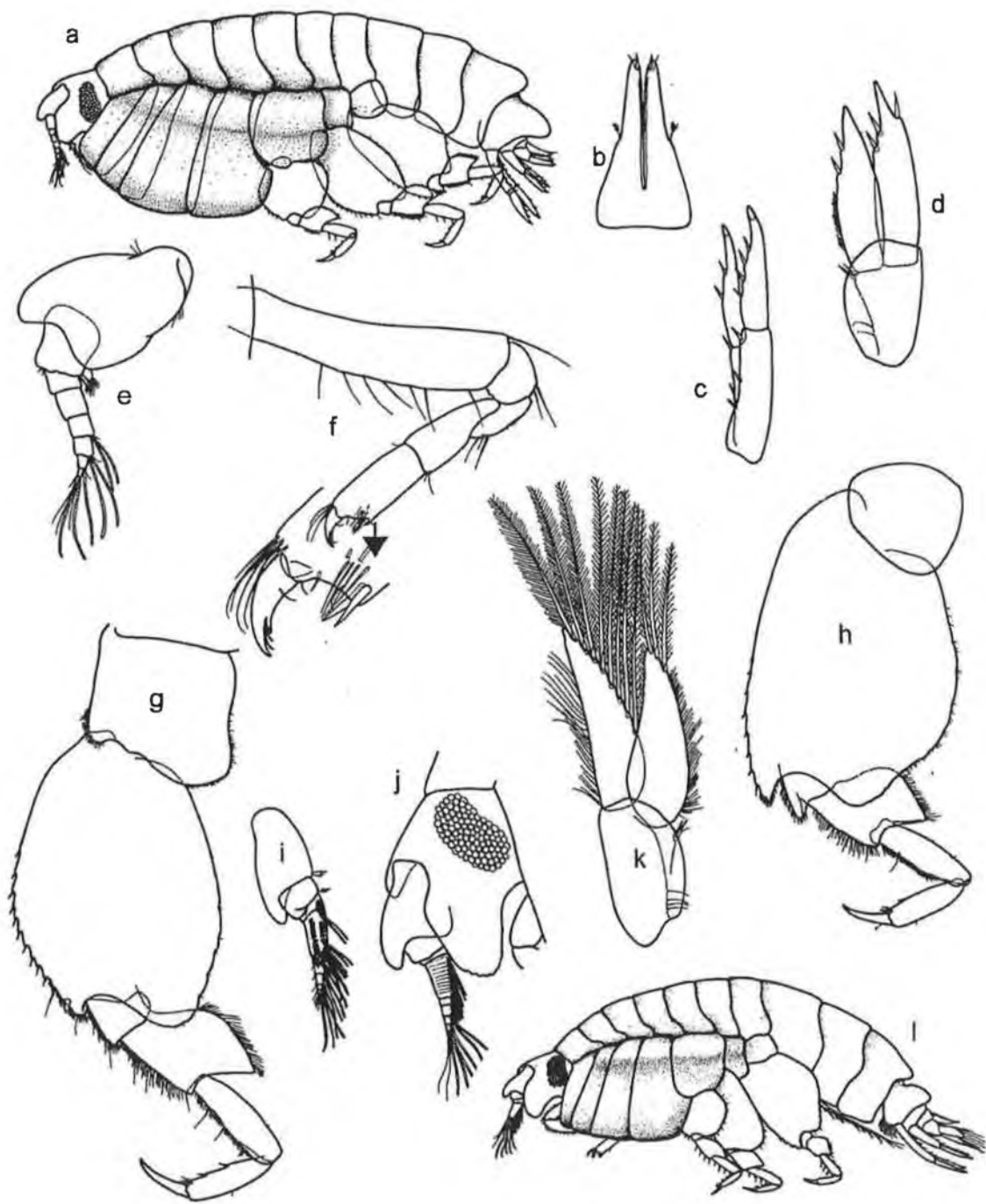


Figure 44: *Lepidepecreum crypticum* Ruffo & Schiecke, 1977. (a) entire, female; (b) telson; (c) uropod 2; (d) uropod 3, female; (e) antenna 1, female; (f) gnathopod 1; (g) pereopod 6; (h) pereopod 7; (i) antenna 1, male; (j) head, male; (k) uropod 3, male; (l) entire, male. [After: Diviacco & Ruffo, 1989].

Lepidepcreum longicorne (Bate & Westwood, 1861)

Fig. 45

Anonyx longicornis Bate & Westwood, 1861: 91, fig. – Bate, 1862: 72, pl. 11, fig. 4.

Lepidepcreum longicorne. – Stebbing, 1906: 80, figs 12-13. – Chevreux, 1925: 285.

– Chevreux & Fage, 1925: 63, figs 50– 51. – Schellenberg, 1942: 112, fig. 89. –

Ruffo & Schiecke, 1977: 429, fig. 1. – Lincoln, 1979a: 72, fig. 27. – Costello *et*

al., 1989: 33. – Diviacco & Ruffo, 1989: 492, figs 334-335. – Barnard &

Karaman, 1991: 496, figs 86G, 89F, 93F.

Lepidepcreum carinatum Bate & Westwood, 1868: 509, fig. – G.O. Sars, 1891: 113, 687, pl. 38, fig. 2; pl. 39, fig. 1.

Lepidepcreum mirabile Meinert, 1890: 153, pl. 1, figs 7-12.

Type material. Unknown.

Type locality. Off coast of Shetland.

Material examined. Bate & Westwood, 1861: 91, fig; Stebbing, 1906: 80, figs 12-13; Lincoln, 1979a: 72, fig. 27; Diviacco & Ruffo, 1989: 492, figs.334-335.

Description. Antenna 1 shorter than antenna 2; peduncle articles 1 and 2 producing strong anterodistal lobe; flagellum article 1 distinctly elongate; accessory flagellum absent. Antenna 2 longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Coxae 3 - 5 with distinct lateral ridges. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Pleonite 3 dorsal margin with mid-dorsal carina. Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded slightly. Urosomite 1 with dorsal depression, acutely produced dorsodistally, carinate dorsally. Uropods 1 -3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 1-articulate, rami fringed with long, plumose setae. Telson more than twice as long as broad, deeply cleft.

Length. 5 mm.

Distribution. Mediterranean; Kattegat; North Sea; Britain; Ireland; Portugal.

Depth. Infralittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 longer than antenna 2; flagellum article 1 slightly longer than article 2; calceoli absent. Uropod 3 rami lacking the plumose setae of the male.

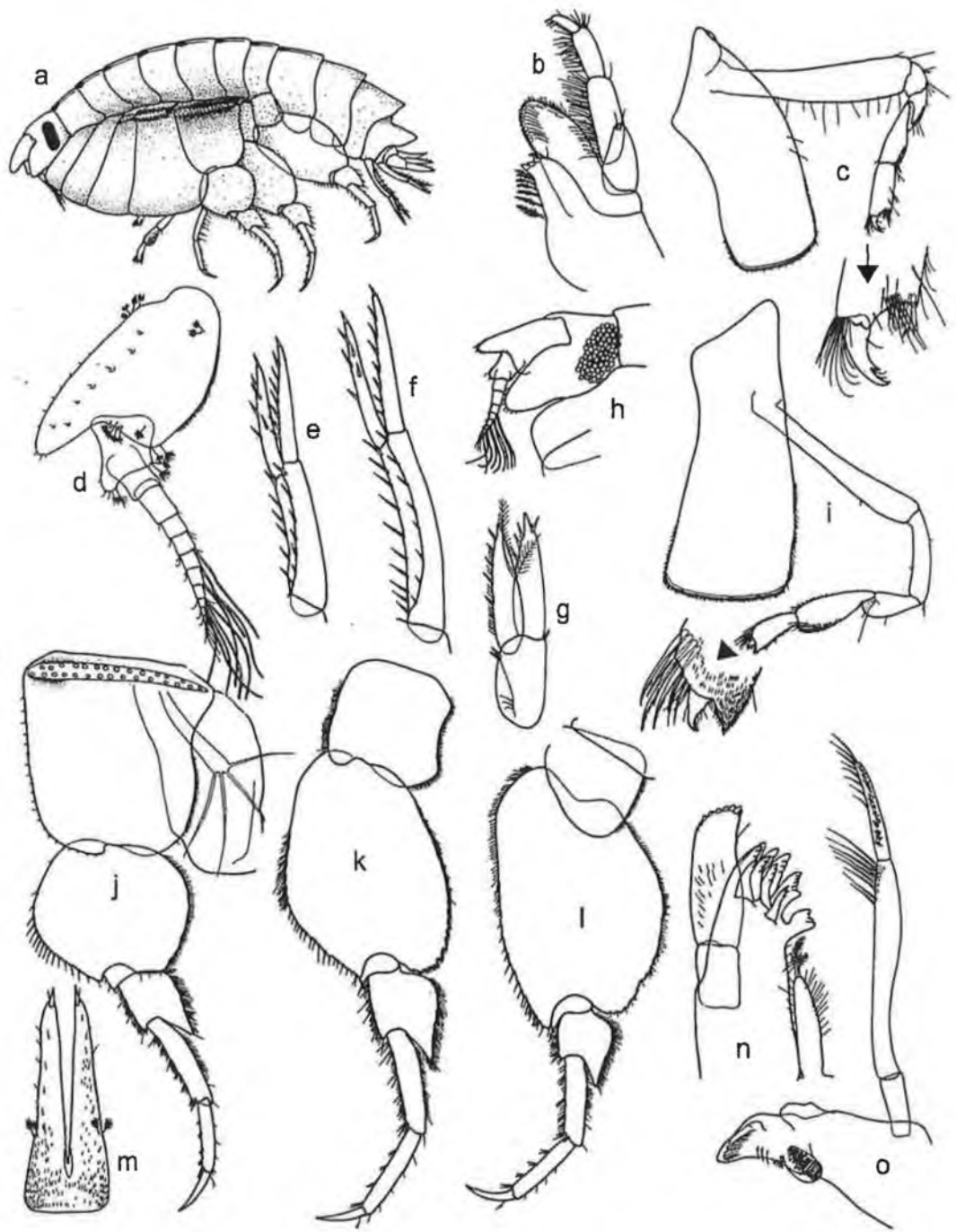


Figure 45: *Lepidepecreum longicorne* (Bate & Westwood, 1961). (a) entire, female; (b) maxilliped; (c) gnathopod 1; (d) antenna 1; (e) uropod 2; (f) uropod 1; (g) uropod 3; (h) head, male; (i) gnathopod 2; (j) pereopod 5; (k) pereopod 6; (l) pereopod 7; (m) telson; (n) maxilla 1; (o) mandible. [After: Diviacco & Ruffo, 1989].

Lepidepecreum serratum Stephensen, 1925

Fig. 46

Lepidepecreum serratum Stephensen, 1925: 118, fig. 32. – Barnard & Karaman, 1991: 496.

non *Lepidepecreum serratum* Chevreux, 1925: 288, fig. 3 (= Homonym).

Type material. SYNTYPES: ZMUC CRU-2272, CRU-2273.

Type locality. 61°15'N, 9°35'W, 900 m.

Material examined. SYNTYPES: ZMUC CRU-2272, CRU-2273; Stephensen, 1925: 118, fig. 32.

Description based on mature female, male unknown.

Description. Antenna 1 subequal to antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 slightly longer than article 2; calceoli absent. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, slightly shorter than propodus; propodus palm slightly acute to acute. Gnathopod 2 minutely chelate; carpus distinctly longer than propodus, producing rounded lobe posterodistally. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe. Pereopod 7 basis posterodistally produced to about distal end of merus.

Pleonite 1 dorsal margin acutely produced dorsodistally, dorsal margin with mid-dorsal carina; pleonite 2 dorsal margin acutely produced dorsodistally, dorsal margin with mid-dorsal carina; pleonite 3 dorsal margin with mid-dorsal carina. Epimeron 3 posterodistal corner quadrate to very slightly acute. Urosomite 1 with dorsal depression. Uropod 1 - 2 rami distinctly unequal, uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Distribution. Southwest Iceland and Faeroes.

Depth. Bathyal.

Remarks. Stephensen (1925) notes that the entire integument of this species is covered with microscopic grooves.

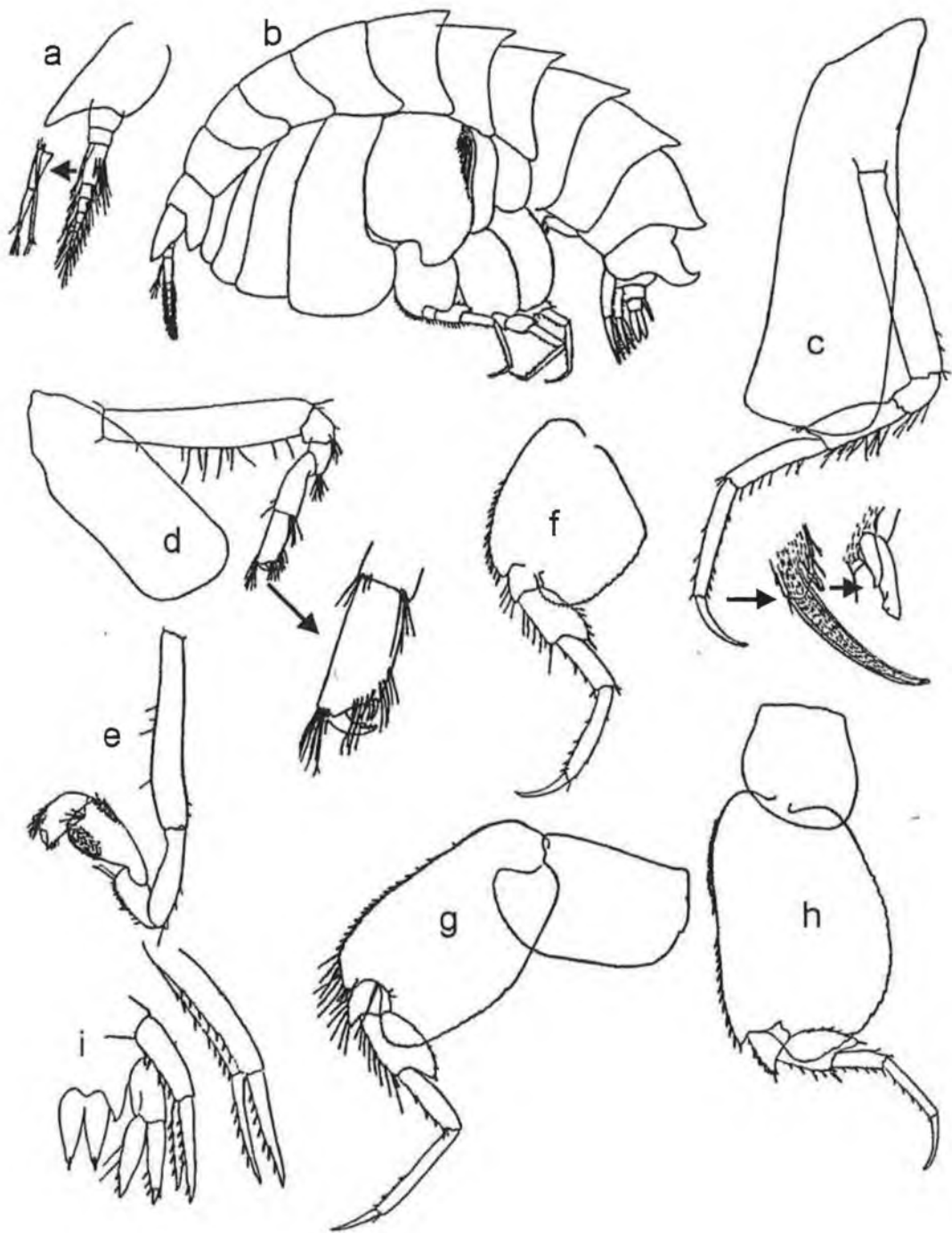


Figure 46: *Lepidepcreum serratum* Stephensen, 1925. Female. (a) antenna 1; (b) entire; (c) pereopod 3; (d) gnathopod 1; (e) gnathopod 2; (f) pereopod 5; (g) pereopod 6; (h) pereopod 7; (i) uropods 1-3, telson. [After: Stephensen, 1925].

Lepidepcreum subclypeatum Ruffo & Schiecke, 1977

Fig. 47

Lepidepcreum subclypeatum Ruffo & Schiecke, 1977: 441, figs 8-10. – Diviacco & Ruffo, 1989: 495, figs 336-337. – Barnard & Karaman, 1991: 496.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 157, slides 1367-1369.

Type locality. Central Adriatic (43°20.7'N 15°27'E).

Material examined. Diviacco & Ruffo, 1989: 495, figs 336-337.

Based on mature female, male unknown.

Description. Antenna 1 subequal to antenna 2; peduncle articles 1 and 2 producing strong anterodistal spines; flagellum article 1 slightly longer than article 2; accessory flagellum rudimentary. Antenna 2 peduncle article 3 elongate, at least three times as long as broad; calceoli absent. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 equilobate. Pereopod 7 basis posterodistally produced beyond the merus.

Pleonite 3 dorsal margin with mid-dorsal carina. Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, acutely produced dorsodistally, carinate dorsally. Uropods 1 - 2 rami distinctly unequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal. Telson more than twice as long as broad, deeply cleft.

Length. 2.7 mm.

Distribution. Adriatic.

Depth. Bathyal.

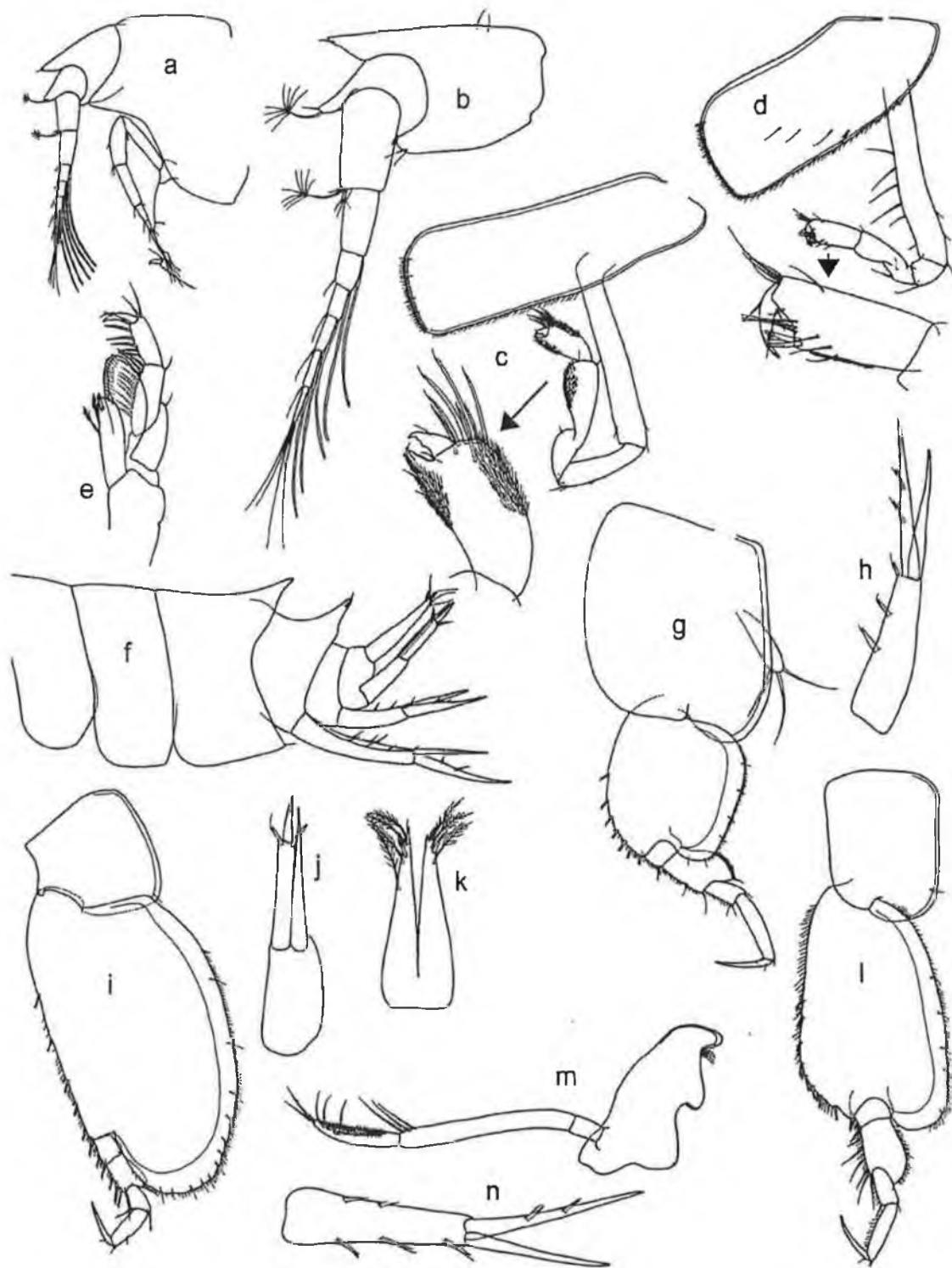


Figure 47: *Lepidepecreum subclypeatum* Ruffo & Schiecke, 1977. Female. (a) head; (b) antenna 1; (c) gnathopod 2; (d) gnathopod 1; (e) maxilliped; (f) pleosome; (g) pereopod 5; (h) uropod 2; (i) pereopod 7; (j) uropod 3; (k) telson; (l) pereopod 6; (m) mandible; (n) uropod 1. [After: Diviacco & Ruffo, 1989].

Lepidepcreum typhlops (Bonnier, 1896)

Fig. 48

Lepidepcreum typhlops Bonnier, 1896: 621, pl. 36, fig. 2.

Lepidepcreum typhlops Stebbing, 1906: 78. – Stephensen, 1925: 118. – Dauvin & Sorbe, 1995: 449, table 4, 456. – Barnard & Karaman, 1991: 496.

Type material. Unknown.

Type locality. Gulf of Gascony.

Material examined. Female, 3 mm, *Celtic Explorer* Stn 7, (52°50'N, 12°40'W), 441.5 m; Bonnier, 1896: 621, pl. 36, fig. 2. – Stebbing, 1906: 78.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing very weak anterodistal lobe; flagellum article 1 as long as remaining articles combined. Antenna 2 as long as or longer than body; calceoli present. Eyes apparently absent. Lateral cephalic lobes narrowly rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus long, slightly longer than propodus; propodus palm acute. Gnathopod 2 chelate; carpus longer than propodus; propodus inflated at the distal end, forming a rounded lobe beyond the dactylus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis slightly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner slightly rounded. Urosomite 1 with dorsal depression, acutely produced dorsodistally, carinate dorsally. Uropods 1 and 2 rami subequal; uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 6 mm.

Distribution. Bay of Biscay; off the South West Faeroes; off the west of Ireland 52°50'N, 12°40'W (new record).

Depth. Bathyal.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent.

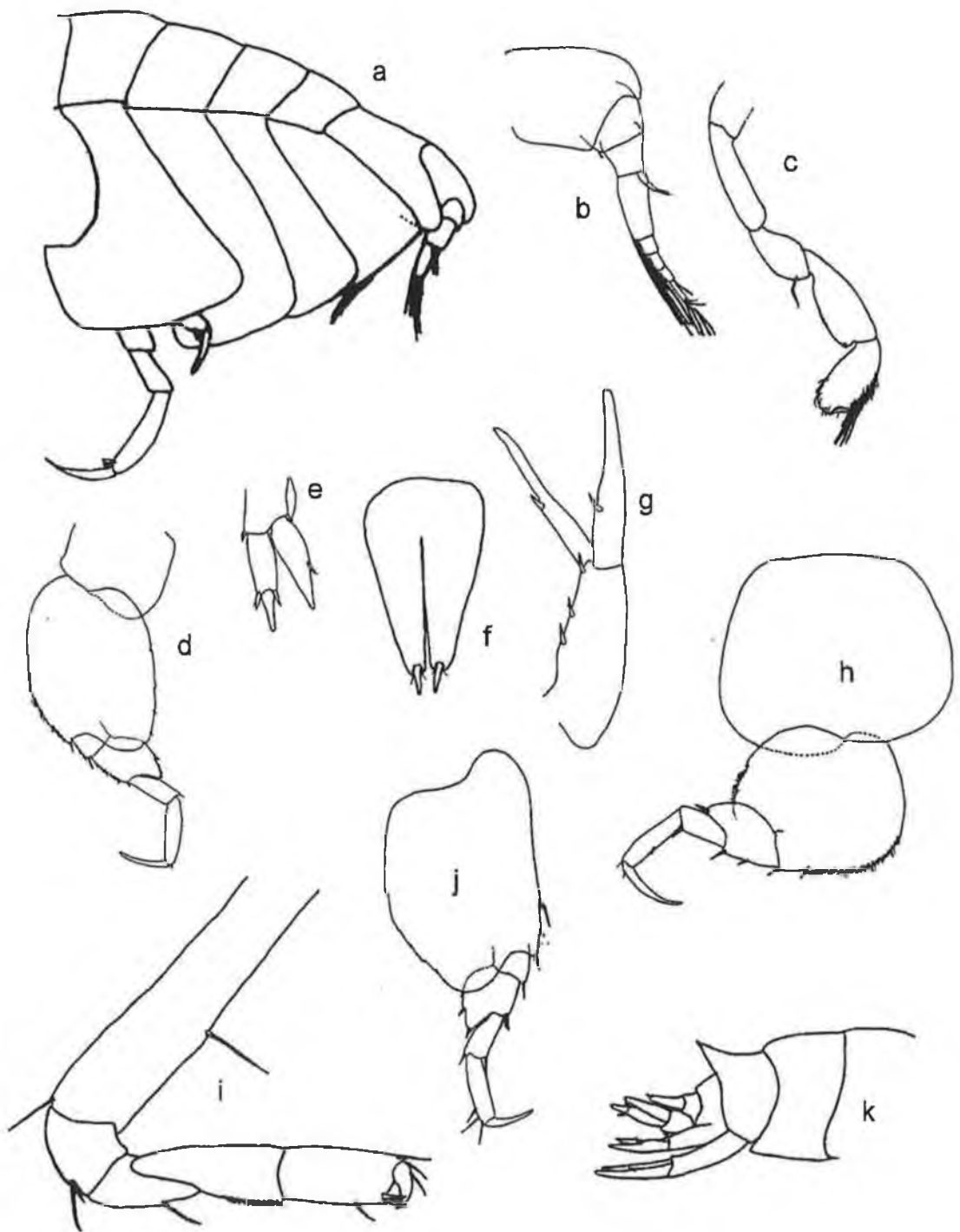


Figure 48: *Lepidepcreum typhlops* Bonnier, 1896. Female. (a) head, pereonites 1-4; (b) antenna 1; (c) gnathopod 1; (d) pereopod 6; (e) uropod 3; (f) telson; (g) uropod 2; (h) pereopod 5; (i) gnathopod 1; (j) pereopod 7; (k) pleosome. [Illustration by author].

Lepidepecreum umbo Goës, 1866

Fig. 49

Lepidepecreum umbo Goës, 1866: 520, pl. 37, fig. 6. – G.O. Sars, 1882: 81. – G.O. Sars, 1891: 115, pl. 39, fig. 2. – Stebbing, 1906: 80. – Barnard & Karaman, 1991: 496, fig. 87A.

Orchomene umbo. – Boeck, 1871: 117.

Anonyx umbo. – Della Valle, 1893: 815.

Type material. Probably lost.

Type locality. Unknown.

Material examined. G.O. Sars, 1891: 115, pl. 39, fig. 2; Stebbing, 1906: 80.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing strong anterodistal lobe; flagellum article 1 as long as remaining articles combined. Antenna 2 peduncle article 3 elongate, at least three times as long as broad; calceoli present. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus palm slightly acute. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus well developed. Pereopod 5 coxa with circular depression (umbo), produced into a posterior lobe; basis distinctly broader than long, posterior margin smooth. Coxa 6 equilobate.

Pleonites 1-3 dorsal margins with mid-dorsal carina. Epimeron 3 posterodistal corner quadrate. Urosomite 1 without dorsal depression, acutely produced dorsodistally. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson more than twice as long as broad, deeply cleft.

Distribution. Between Iceland and the Faeroe Islands; Norwegian Sea.

Depth. Bathyal.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate; calceoli absent.

Length. Length 11 mm.

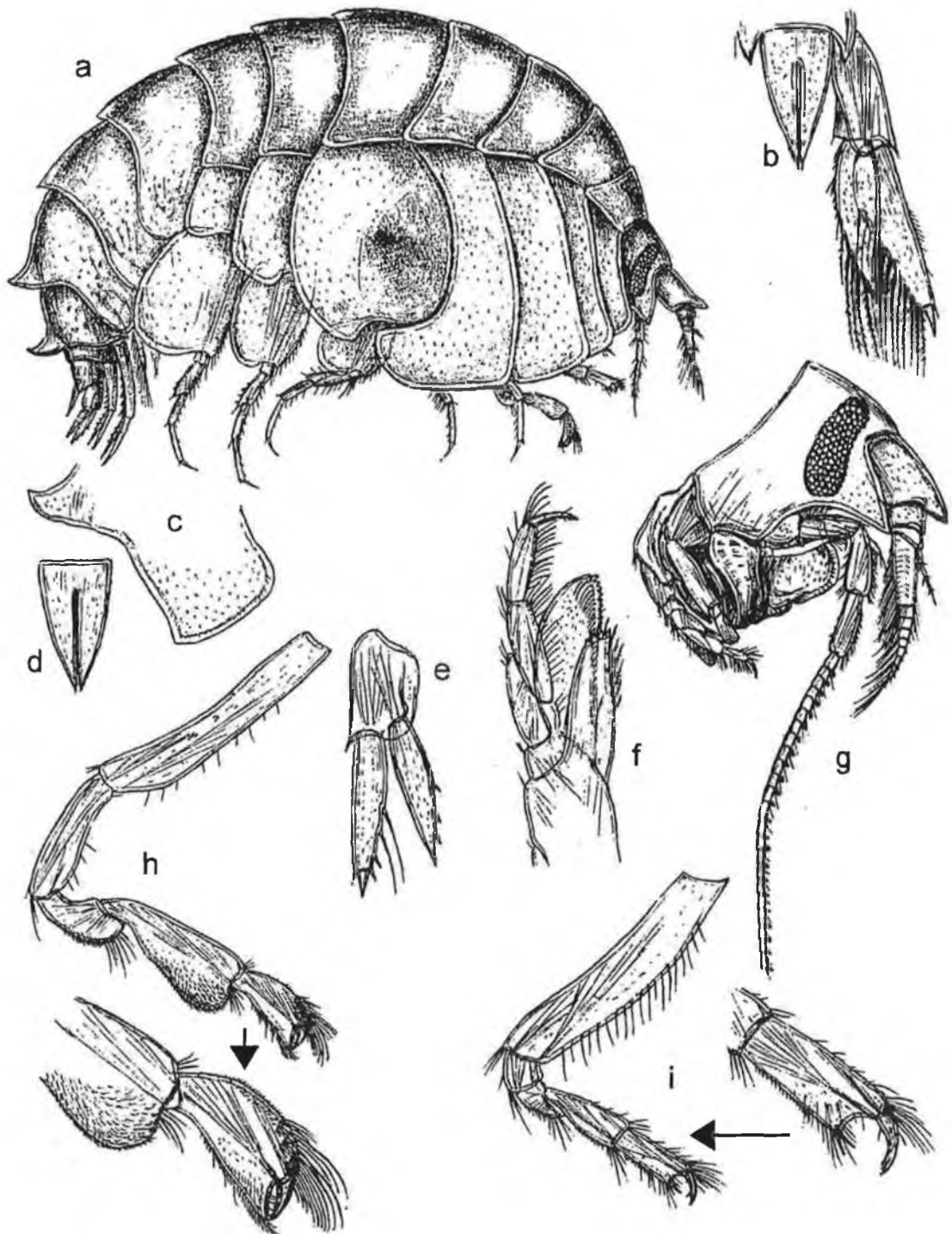


Figure 49: *Lepidepecreum umbo* Goës, 1866. (a) entire, female; (b) telson and uropod 3, male; (c) epimeron; (d) telson; (e) uropod 3, female; (f) maxilliped; (g) head and antennae, male; (h) gnathopod 2; (i) gnathopod 1. [After: G.O. Sars, 1895].

Lysianassa caesarea Ruffo, 1987

Fig. 50

Lysianassa caesarea Ruffo, 1987: 36, figs 4-6. – Diviacco & Ruffo, 1989: 498, fig. 338.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr, slides 883-886.
PARATYPE: MSNV reg. no MVR-Cr, in alcohol and slides 887-888.

Type locality. Caesarea, Israel (32°30'N, 34°54'E).

Material examined. Diviacco & Ruffo, 1989: 498, fig. 338.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, subequal in length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Coxa 5 equilobate.

Epimeron 3 posterodistal corner rounded. Urosomite 1 without dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami subequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Length. 5.5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral to circalittoral.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli absent. Uropod 3 rami lacking plumose setae.

Length 6mm.

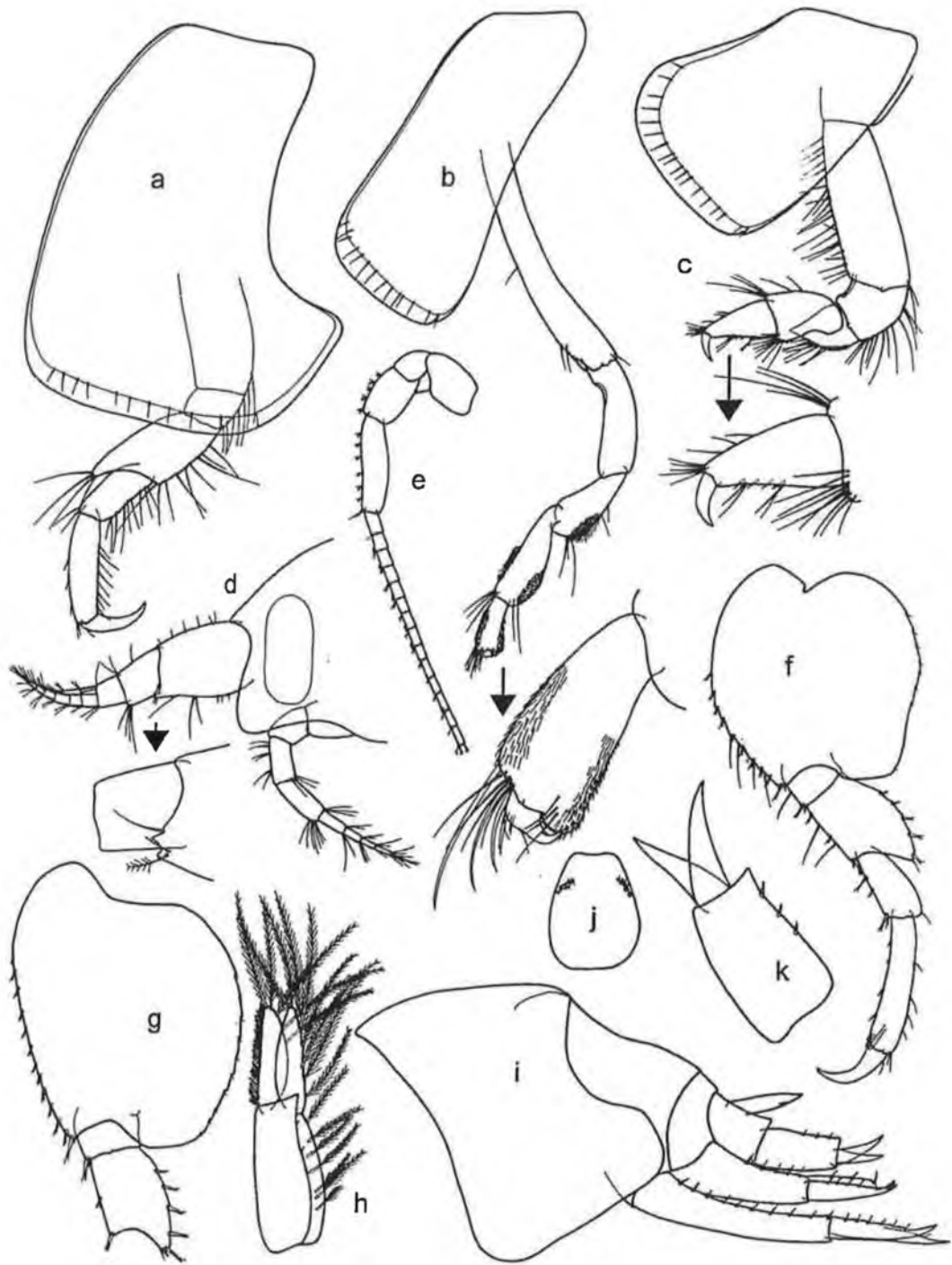


Figure 50: *Lysianassa caesarea* Ruffo, 1987. (a) pereopod 4; (b) gnathopod 2; (c) gnathopod 1; (d) head and antennae, female; (e) antenna 2, male; (f) pereopod 6; (g) pereopod 7; (h) uropod 3, male; (i) epimeron 3 and urosome. [After: Diviacco & Ruffo, 1989].

Lysianassa ceratina (Walker, 1889)

Fig. 51

Lysianax ceratinus Walker, 1889: 200, pl. 10, figs 1-8. – Chevreux, 1900: 16.

Lysianassa ceratina. – Schellenberg, 1925: 113. – Chevreux, 1925: 284. – Chevreux & Fage, 1925: 42. – Ruffo, 1938: 154. – Barnard, 1940: 439. – Reid, 1951: 194. – Lincoln, 1979a: 102, fig. 41a-g, fig. 24a-e. – Costello *et al.*, 1989: 33– Barnard & Karaman, 1991: 498.

Type material. Unknown.

Type locality. Unknown.

Material examined. Chevreux & Fage, 1925: 42; Lincoln, 1979a: 102, fig. 41a-g, fig. 24a-e.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 without dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami distinctly unequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Distribution. Atlantic coasts of Europe and North Africa to Senegal; Indian Ocean.

Depth. Infralittoral to circalittoral.

Remarks. *L. ceratina* is one of the most common Lysianassoids from the shallow subtidal in the Northeast Atlantic. However, according to Diviacco & Ruffo (1989), it is probable that records of this species from the Mediterranean probably refer to *L. costae*.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Lateral cephalic lobes subacute. Uropod 3 rami without plumose setae.

Length 10 mm.

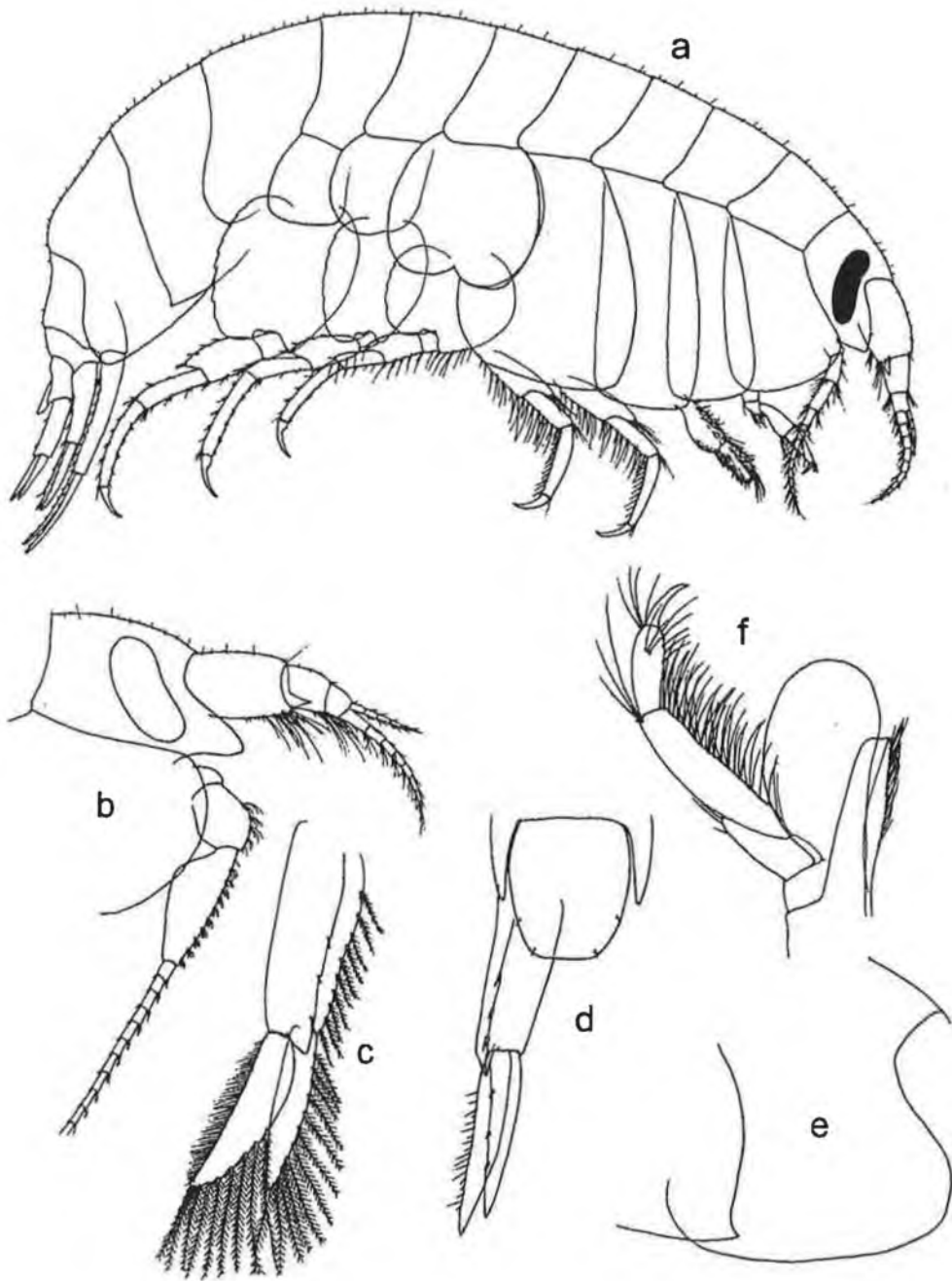


Figure 51: *Lysianassa ceratia* (Walker, 1889). (a) entire, female; (b) head, male; (c) uropod 3, male; (d) telson and uropod 3, female; (e) epimeron 3; (f) maxilliped. [After: Lincoln, 1979a].

Lysianassa costae Milne-Edwards, 1830

Fig. 52

Lysianassa costae Milne-Edwards, 1830: 35, pl. 10, fig. 17. – Lowry & Ruffo, 1986: 206, figs 1-5. – Diviacco & Ruffo, 1989: 500, figs 339-340. – Barnard & Karaman, 1991: 498.

Lysianassa ceratina. – (*non* Walker, 1889) Chevreux, 1911: 158, pl. 6, fig. 10. – Cecchini & Parenzan, 1935: 158, fig. 3. – Ruffo, 1969: 6, figs 1-3.

Type material. NEOTYPE: MSNV reg. no. MVR-Cr 203, ovigerous female, 7.2 mm

Type locality. Napoli.

Material examined. Lowry & Ruffo, 1986: 206, figs 1-5; Diviacco & Ruffo, 1989: 500, figs 339-340.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 without dorsal depression. Uropod 1 rami distinctly unequal; uropod 2 rami subequal, inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami subequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Length. 8.5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral to circalittoral.

Ecology. This species lives amongst algae in shallow water, in *Posidonia* beds and on corraline bottoms to 90m.

Remarks. According to Diviacco & Ruffo (1989), it is probable that records of *L. ceratina* from the Mediterranean probably refer to *L. costae*.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Uropod 3 rami lacking plumose setae.

Length. 6–7 mm.

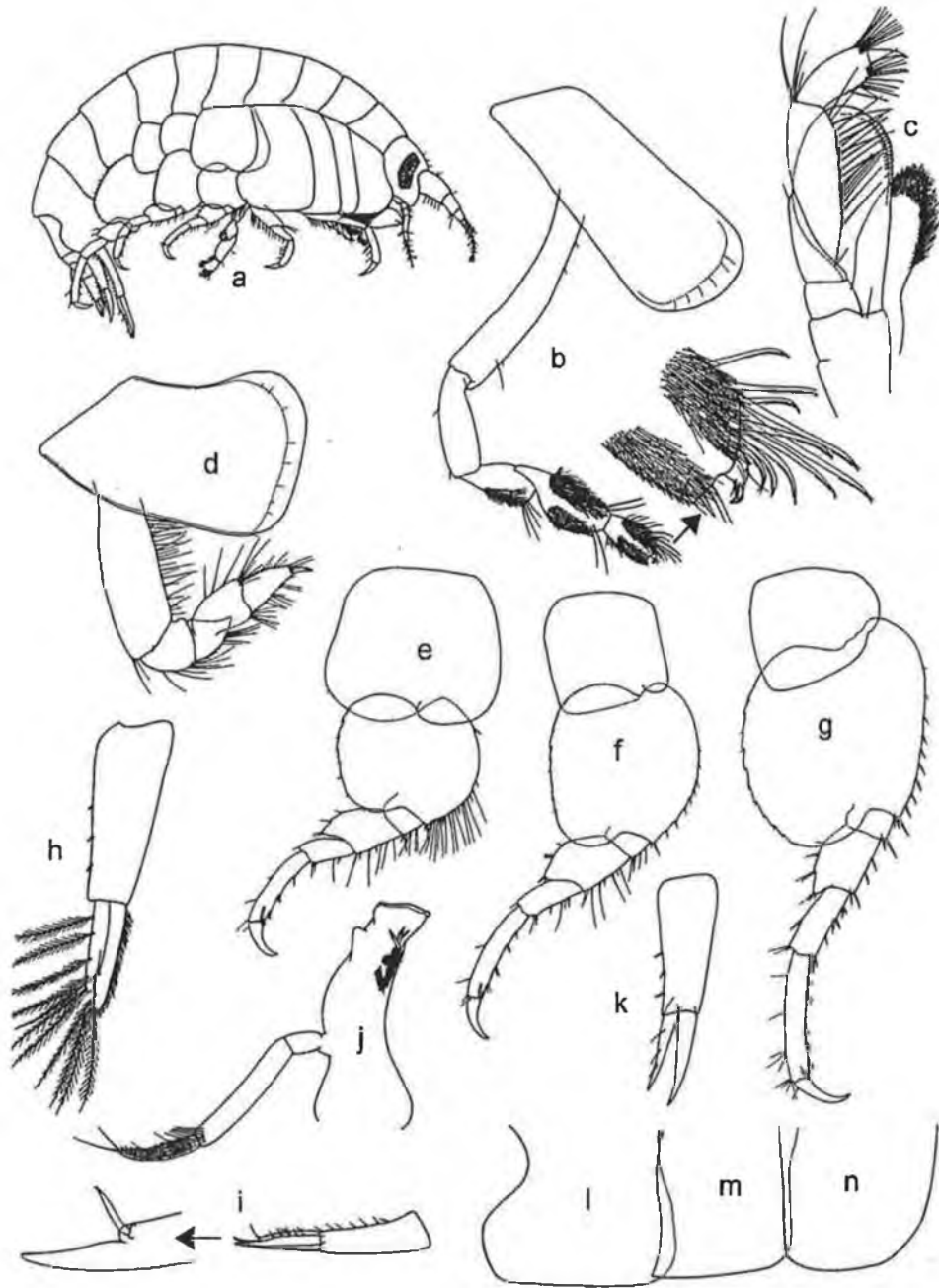


Figure 52: *Lysianassa costae* Milne-Edwards, 1830. (a) entire, female; (b) gnathopod 2; (c) maxilliped; (d) gnathopod 1; (e) pereopod 5; (f) pereopod 6; (g) pereopod 7; (h) uropod 3, male; (i) uropod 2; (j) mandible; (k) uropod 3, female; (l) epimeron 3, (m) epimeron 2; (n) epimeron 1.

[After: Diviacco & Ruffo, 1989].

Lysianassa insperata Lincoln, 1979

Fig. 53

Lysianassa insperata Lincoln, 1979b: 251, figs 1-3. – Lincoln, 1979a: 104, fig. 43. – Ruffo, 1987: 50, fig. 13. – Diviaco & Ruffo, 1989: 500, figs 341-342. – Barnard & Karaman, 1991: 498.

Type material. HOLOTYPE: female, 9 mm; NHML Reg. No.1978.288.1. PARATYPES: 15 females, 7.5 – 10mm; 17 juveniles, 2.5 – 5mm; NHML Reg. No. 1978.289.32.

Type locality. Guernsey (English Channel).

Material examined. Lincoln, 1979b: 251, figs 1-3; Lincoln, 1979a: 104, fig. 43; Diviaco & Ruffo, 1989: 500, figs 341-342

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; palm deeply excavate, dactylus strongly curved; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner quadrate; epimeron 3 posterodistal corner produced, forming a large upturned spine. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami subequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Distribution. English Channel; Mediterranean.

Remarks. This species is very similar to *L. plumosa* in general body morphology, however is easily distinguished by the deep excavation of the gnathopod 2 palm.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent. Lateral cephalic lobes wider than in male. Urosomite 1 without dorsal depression. Uropod 3 rami lacking plumose setae.

Length. 7.5mm.

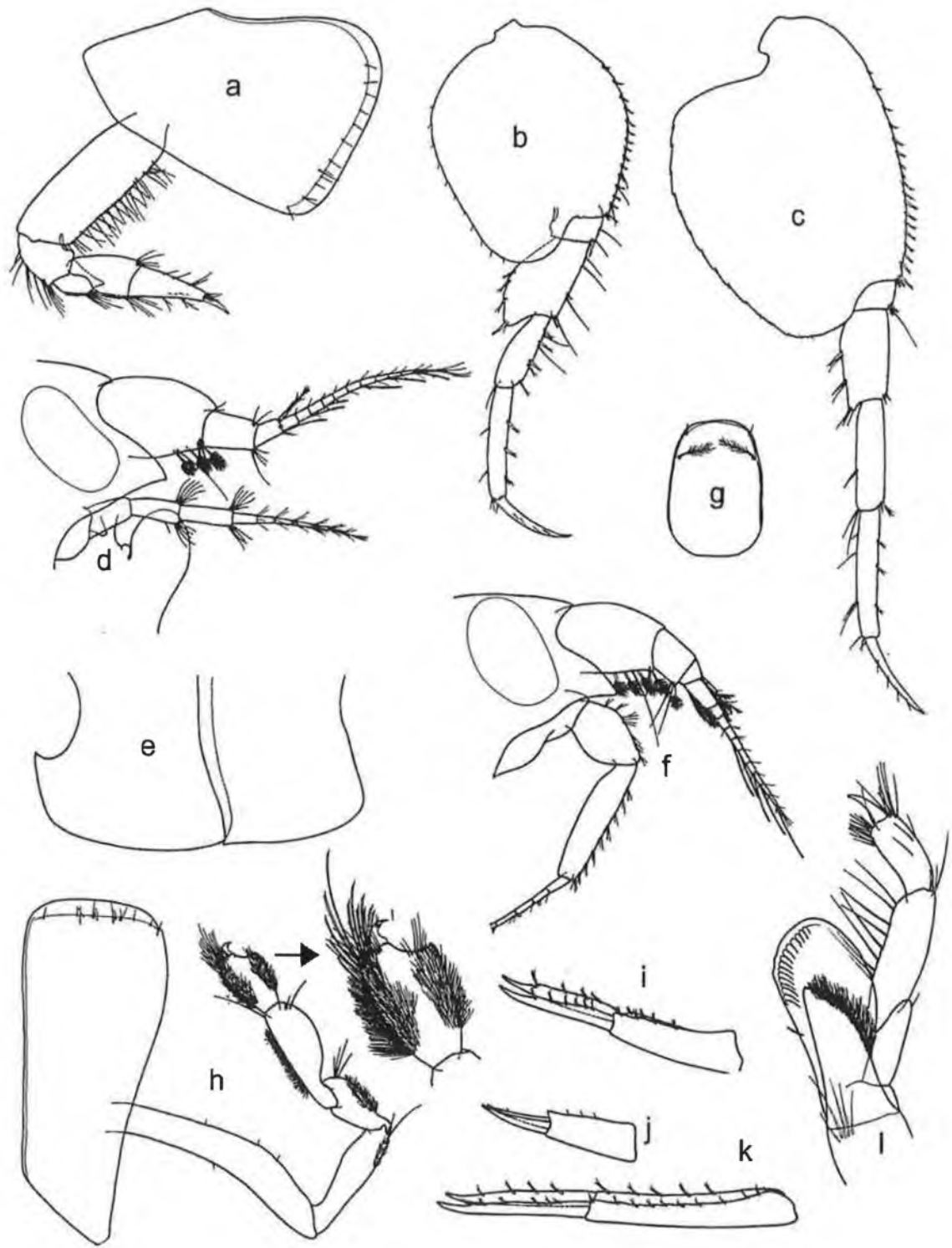


Figure 53: *Lysianassa insperata* Lincoln, 1979b. (a) gnathopod 1; (b) pereopod 6; (c) pereopod 7; (d) head, female; (e) epimeron 3; (f) head, male; (g) telson; (h) gnathopod 2; (i) uropod 2; (j) uropod 3, female; (k) uropod 1; (l) maxilliped. [After: Diviacco & Ruffo, 1989].

Lysianassa longicornis Lucas, 1849

Fig. 54

- Lysianassa longicornis* Lucas, 1849:53, pl. 5, fig. 2. – Heller, 1866: 17, pl. 2, figs 12-15. – Chevreux, 1911: 158, pl. 6, fig. 9. – Chevreux & Fage, 1925: 40, figs 20-22. – Cecchini & Parenzan, 1935: 157, fig. 2. – Ruffo, 1987: 41, figs 9-10. – Diviacco & Ruffo, 1989: 503, fig. 343.
- Lysianassa spinicornis* A. Costa, 1857: 185, pl. 1, fig. 4. – Grube, 1866: 390, pl. 9, fig. 6. – Heller, 1866: 15, pl. 2, figs 3-11.
- Lysianassa filicornis* A. Costa, 1862: 80, pl. 2, figs 18-23.
- Lysianax longicornis*. – Della Valle, 1893: 790, pl. 3, fig. 6; pl. 25, figs 1-15. – Chevreux, 1900: 17, pl. 5, fig. 2.
- Lysianassina longicornis*. – Barnard & Karaman, 1991: 498.

Type material. Unknown.

Type locality. Annaba.

Material examined. Chevreux & Fage, 1925: 40, figs 20-22; Diviacco & Ruffo, 1989: 503, fig. 343; Chevreux, 1900: 17, pl. 5, fig. 2.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 equilobate.

Epimeron 3 posterodistal corner round ed. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami distinctly unequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Length. 5.5–10 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral to bathyal.

Ecology. According to Diviacco & Ruffo (1989), this species is frequently found on algae and in *Zostera* and *Posidonia* beds as well as on coralline and muddy bottoms. It is also associated with sponges, crinoids and holothurians.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent. Urosomite 1 without dorsal depression. Uropod 3 rami more or less subequal and lacking plumose setae.

Length. 5.5–11 mm.

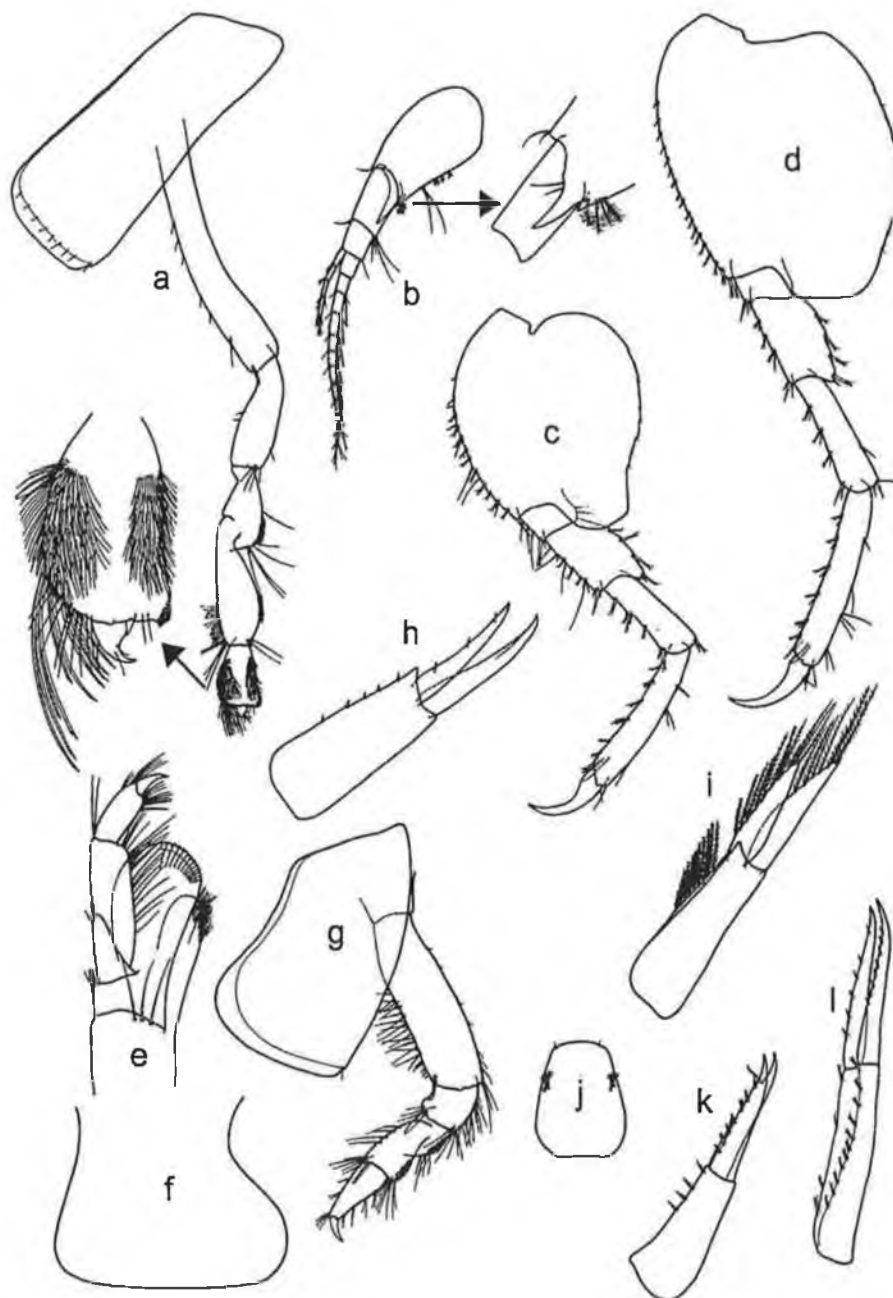


Figure 54: *Lysianasssa longicornis* Lucas, 1849. (a) gnathopod 2; (b) antenna 1; (c) pereopod 6; (d) pereopod 7; (e) maxilliped; (f) epimeron 3; (g) gnathopod 1; (h) uropod 3, female; (i) uropod 3, male; (j) telson; (k) uropod 2; (l) uropod 1. [After: Diviacco & Ruffo, 1989].

Lysianassa pilicornis Heller, 1866

Fig. 55

Lysianassa pilicornis Heller, 1866: 17, pl. 2, fig. 16. – Krapp-Schickel, 1974: 336, pls 23-24. – Krapp-Schickel, 1976: 33, figs 1-3. – Ruffo, 1987: 46, figs 11-12. – Diviacco & Ruffo, 1989: 506, figs 344-345. – Barnard & Karaman, 1991: 498.
Lysianax bispinosa Della Valle, 1893: 792, pl. 1, fig. 5, pl. 25, figs 16-21. – Chevreux, 1911: 159.
Lysianassa bispinosa. – Stebbing, 1906: 38. – Chevreux & Fage, 1925: 43, fig. 24. – Ruffo, 1938: 128. – Ruffo, 1946: 50. – G. Karaman, 1973: 128.
Arugella bispinosa. – Pirlot, 1939: 73.

Type material. Unknown.

Type locality. Lošinj.

Material examined. Stebbing, 1906: 38; Chevreux & Fage, 1925: 43, fig. 24; Diviacco & Ruffo, 1989: 506, figs 344-345.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2. Antenna 2 between 60 to 99% of body length; calceoli absent. Eyes large, reniform. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus at least twice as long as propodus.

Epimeron 3 posterodistal corner quadrate. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami subequal and fringed with plumose setae. Telson distinctly longer than broad, entire.

Length. 6–7mm.

Distribution. Atlantic Ocean (from Portugal to South Africa); Mediterranean.

Depth. Infralittoral to circalittoral.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Uropod 3 rami without plumose setae.

Length. 10–12 mm.

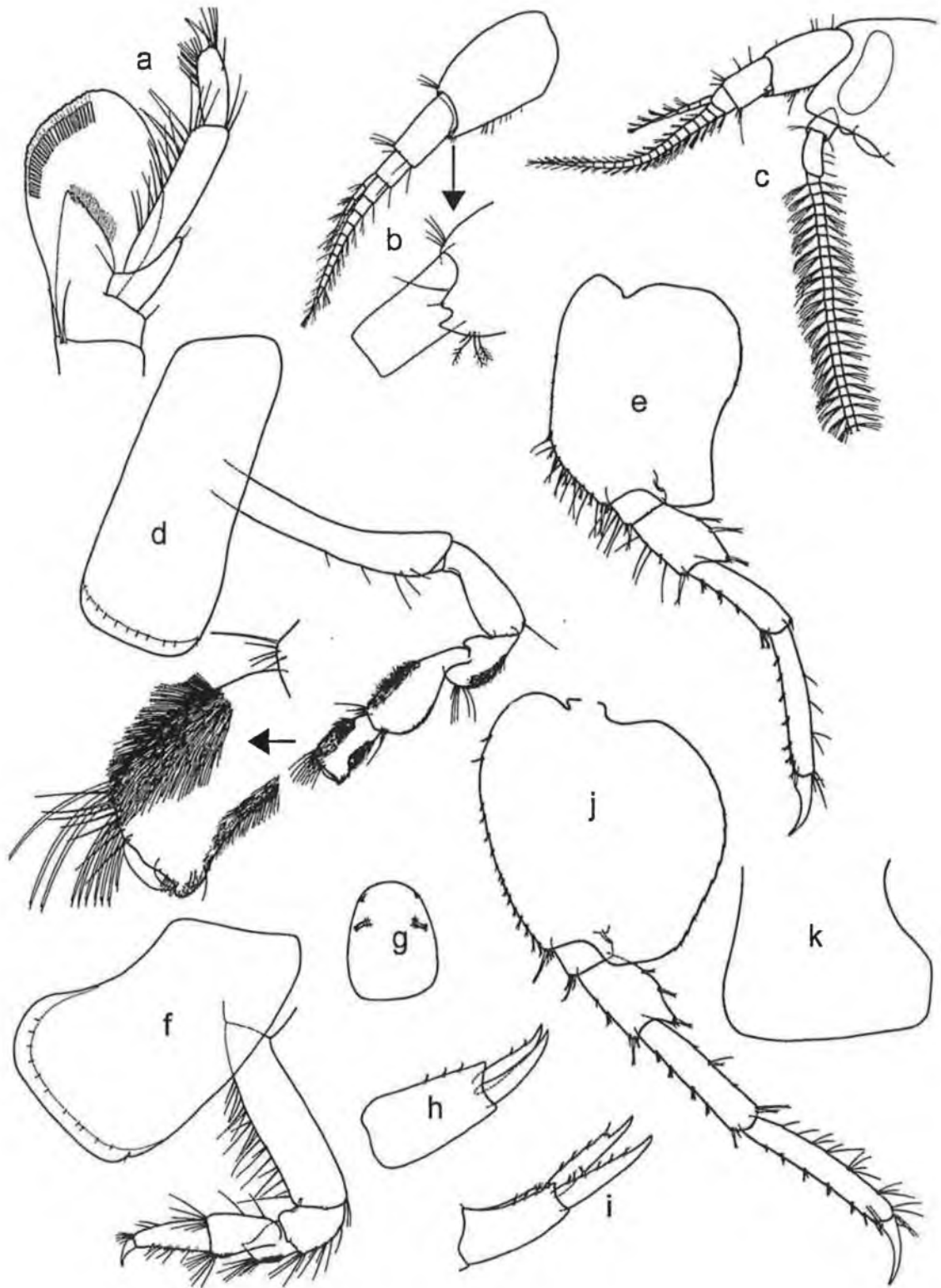


Figure 55: *Lysianassa pilicornis* Heller, 1866. (a) maxilliped; (b) antenna 1, female; (c) head, male; (d) gnathopod 2; (e) pereopod 6; (f) gnathopod 1; (g) telson; (h) uropod 3, female; (i) uropod 2; (j) pereopod 7; (k) epimeron 3. [After: Diviacco & Ruffo, 1989].

Lysianassa plumosa Boeck, 1871

Fig. 56

Lysianassa plumosa Boeck, 1871: 96. – Boeck, 1872: 116, pl. 3, fig. 5. – Stebbing, 1906: 38. – Chevreux, 1911: 159, pl. 6, figs 11-20. – Chevreux, 1925: 285. – Chevreux & Fage, 1925: 43, fig. 25. – Lincoln, 1979a: 102, fig. 41h; fig. 42f-j. – Ruffo, 1987: 52, fig. 13. – Costello *et al.*, 1989: 34. – Diviacco & Ruffo, 1989: 507, fig. 346. – Barnard & Karaman, 1991: 498, figs 88H, 89D, 90I, 91F, 92E, 93J, 95E. – Dauvin & Sorbe, 1995: 456.

Lysianassa Costae. – (*non* Milne-Edwards, 1830) Boeck, 1872: 118, pl. 4, fig. 1. – G.O. Sars, 1890: 42, pl. 16, fig. 1.

Type material. ZMO.

Type locality. Haugesund (Norway).

Material examined. Stebbing, 1906: 38; Lincoln, 1979a: 102, fig. 41h; fig. 42f-j; Diviacco & Ruffo, 1989: 507, fig. 346.

Description. Antenna 1 shorter than antenna 2; peduncle article 2 elongate; flagellum article 1 slightly longer than article 2. Antenna 2 as long as or longer than body; calceoli present. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus short, of subequal length to propodus; propodus margins tapering; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus. Pereopod 5 coxa equilobate; basis very slightly broader than long, posterior margin smooth.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 without dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami subequal. Telson distinctly longer than broad, entire.

Length. 12 mm.

Distribution. Haugesund; Trondheim; Shetlands; British Isles; northwest France; Mediterranean.

Depth. Infralittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent. Lateral cephalic lobes slightly more rounded than in male.

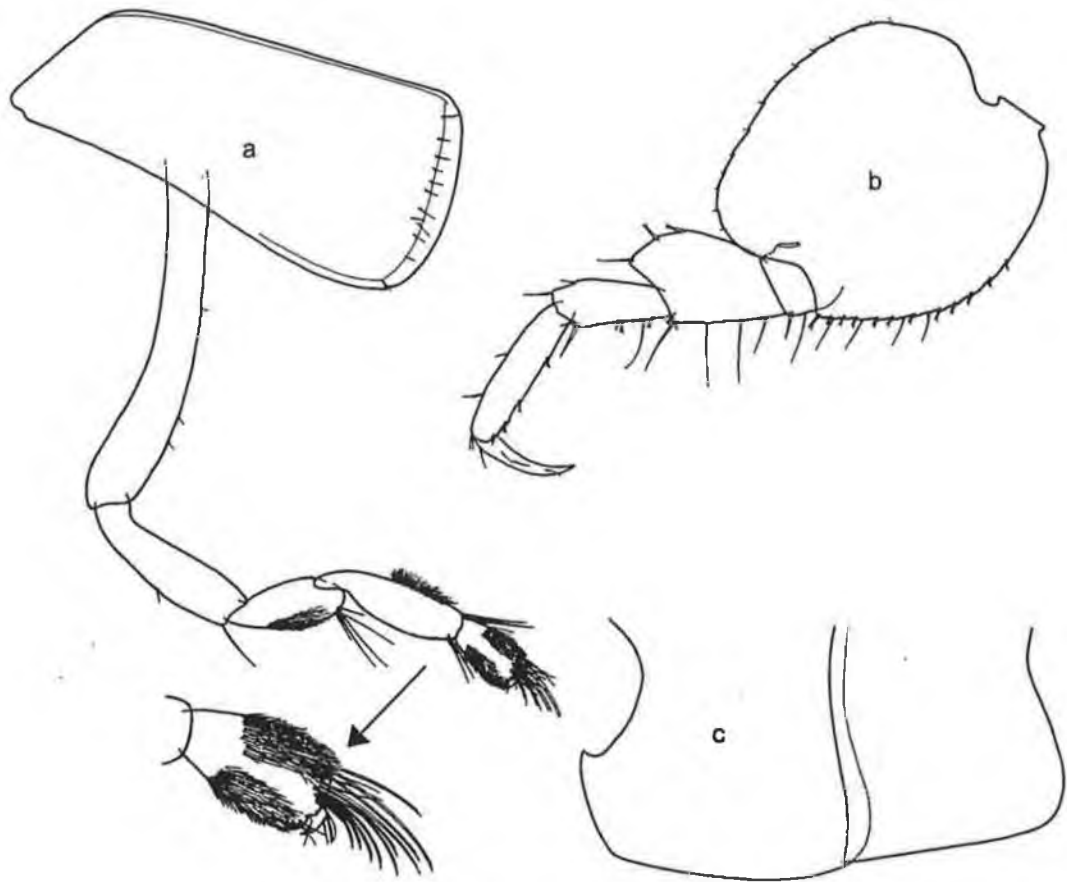


Figure 56: *Lysianassa plumose* Boeck, 1871. Female. (a) gnathopod 2; (b) pereopod 6; (c) epimeron 3, 2. [After: Diviacco & Ruffo, 1989].

Lysianella dellavallei Stebbing, 1906

Fig. 57

Anonyx petalocerus Della Valle, 1893: 816, pl. 61, figs 1-9. (not *Lysianella petalocera* Sars, 1882).

Lysianella dellavallei Stebbing, 1906: 32. – Ruffo, 1971: 108, figs 3-4. – Diviacco & Ruffo, 1989: 509, fig. 347. – Barnard & Karaman, 1991: 499.

Type material. LECTOTYPE: MSNV, Reg. no. MVR-Cr 171, slides 1233-1234.

Type locality. Napoli.

Material examined. Della Valle, 1893: 816, pl. 61, figs 1-9; Stebbing, 1906: 32; Ruffo, 1971: 108, figs 3-4; Diviacco & Ruffo, 1989: 509, fig. 347.

Description. Antenna 1 shorter than antenna 2. Antenna 2 between 40 to 60% of body length; peduncle article 4 inflated; calceoli present. Eyes large, suboval. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, subequal in length to propodus; propodus margins subparallel, palm slightly acute; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, slightly cleft.

Length. 5 mm.

Distribution. Mediterranean.

Depth. Infralittoral to circalittoral.

Ecology. Found on coralline and muddy bottoms.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli absent.

Length. 4–5 mm.

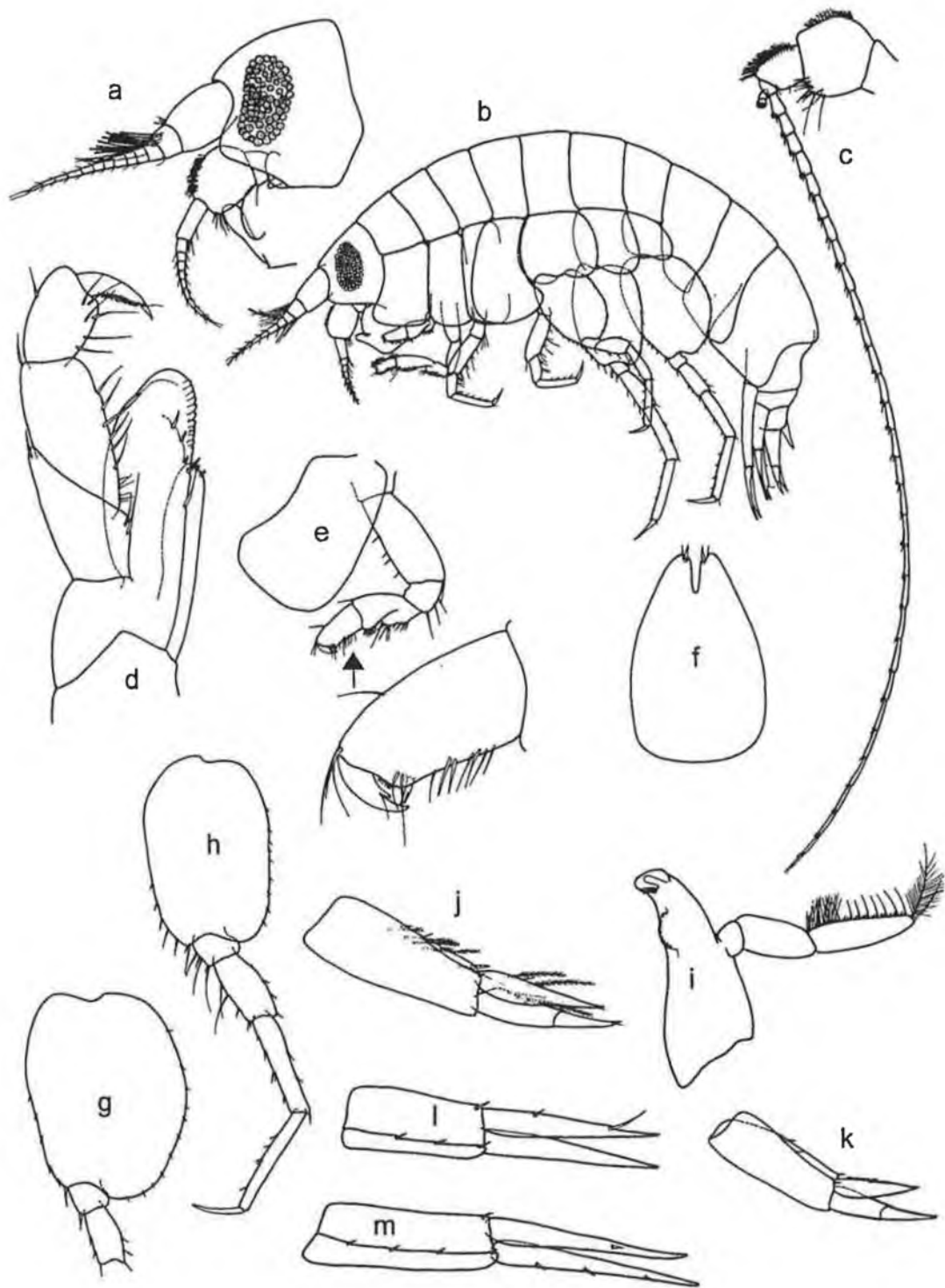


Figure 57: *Lysianella dellavallei* Stebbing, 1906. (a) head, female; (b) entire, female; (c) antenna 2, male; (d) maxilliped; (e) gnathopod 1; (f) telson; (g) pereopod 7; (h) pereopod 6; (i) mandible; (j) uropod 3, male; (k) uropod 3, female; (l) uropod 2; (m) uropod 1. [After: Diviacco & Ruffo, 1989].

Lysianella petalocera G.O. Sars, 1882

Fig. 58

Lysianella petalocera G.O. Sars, 1882: 78, pl. 3, fig. 3. – G.O. Sars, 1895: 51, pl. 18, fig. 2. – Della Valle, 1893: 797, pl. 61, fig. 9. – Stebbing, 1906: 31. – Barnard & Karaman, 1991: 499.

Type material. Unknown.

Type locality. Lyngdalsfjord, south Norway.

Material examined. G.O. Sars, 1895: 51, pl. 18, fig. 2; Della Valle, 1893: 797, pl. 61, fig. 9; Stebbing, 1906: 31.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate. Antenna 2 peduncle article 4 inflated; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subquadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm slightly acute to acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus. Pereopod 5 coxa equilobate; basis distinctly longer than broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami subequal, inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, entire.

Length. 3.5 mm.

Distribution. Koster Channel, Norway.

Depth. Circalittoral, or bathyal.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Lateral cephalic lobes subacute.

Length. 5 mm.

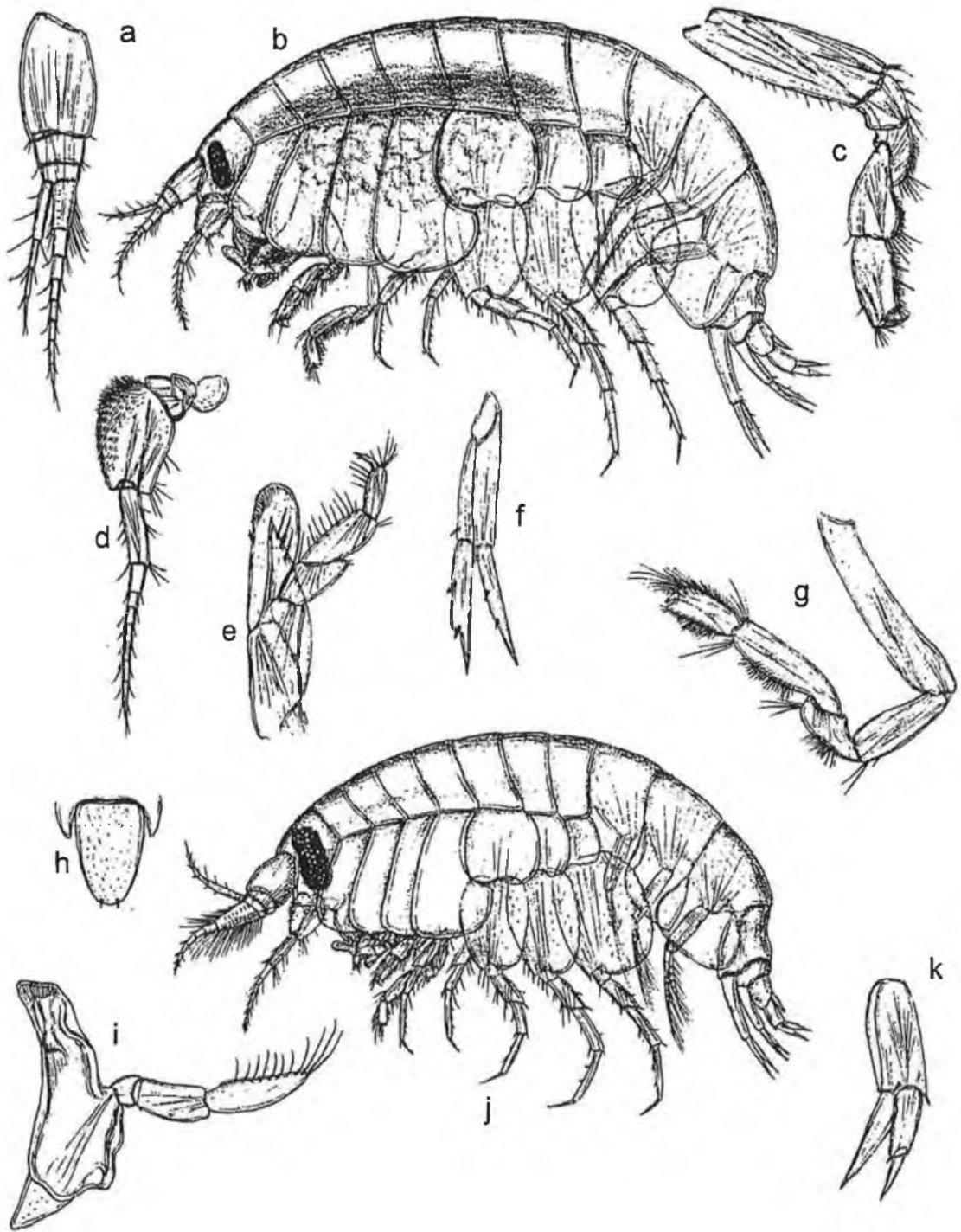


Figure 58: *Lysianella petalocera* G.O. Sars, 1882. (a) antenna 1, female; (b) entire, female; (c) gnathopod 1; (d) antenna 2; (e) maxilliped; (f) uropod 2; (g) gnathopod 2; (h) telson; (i) mandible; (j) entire, male; (k) uropod 3. [After: Sars, 1895].

Menigrates maslovi Bryazgin, 1974

Fig. 59

Menigrates maslovi Bryazgin, 1974: 1527, fig. 3. – Barnard & Karaman, 1991: 500.

Type material. HOLOTYPE: ZIL? Accession No. 61226; male, 13 mm

Type locality. Barents Sea (73°22'N, 18°59'E).

Material examined. Bryazgin, 1974: 1527, fig. 3.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner produced, forming a small spine. Uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending slightly past article 1 of outer ramus. Telson distinctly longer than broad, emarginate to very slightly cleft.

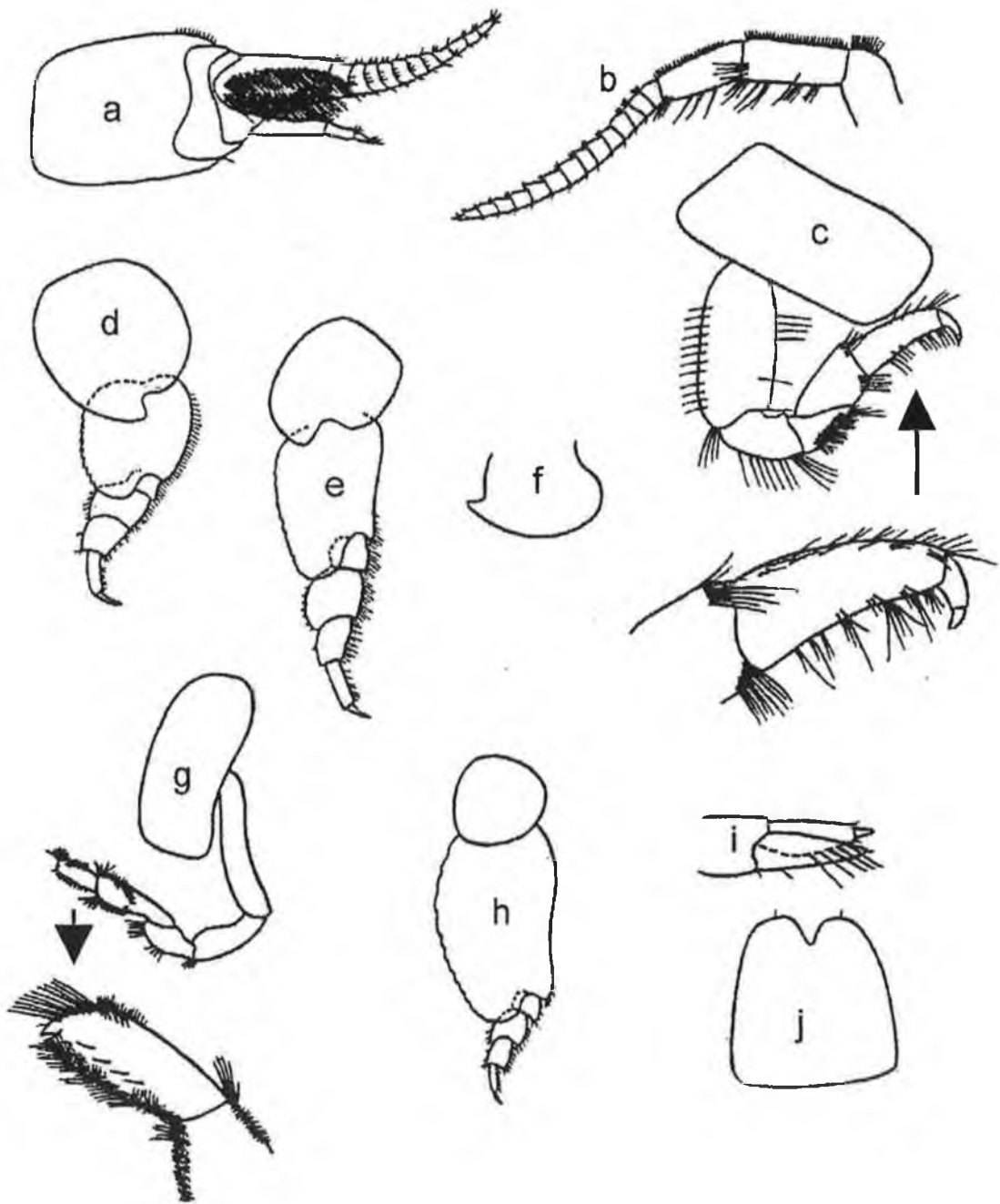
Length. 13 mm.

Distribution. Norwegian and Arctic Seas, from Vardö to Skagerrak.

Depth. Infralittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent.



**Figure 59: *Menigrates maslovi* Bryazgin, 1974. (a) antenna 1; (b) antenna 2; (c) gnathopod 1; (d) pereopod 5; (e) pereopod 6; (f) epimeron 1; (g) gnathopod 2; (h) pereopod 7; (i) uropod 3; (j) telson.
[After: Bryazgin, 1974].**

Menigrates obtusifrons (Boeck, 1861)

Fig. 60

Anonyx obtusifrons Boeck, 1861: 643.

Menigrates obtusifrons. – Boeck, 1871: 114. – G.O. Sars, 1891: 111, pl. 38. – Stebbing, 1906: 48. – Chevreux & Fage, 1925: 56. – Lincoln, 1979a: 92, fig. 37a-i. – Barnard & Karaman, 1991: 500, figs 86E, 89I, 90M, 92U.

Type material. Unknown.

Type locality. Unknown.

Material examined. G.O. Sars, 1891: 111, pl. 38; Stebbing, 1906: 48; Chevreux & Fage, 1925: 56; Lincoln, 1979a: 92, fig. 37a-i.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 quite elongate. Calceoli present on both antennae. Eyes large, reniform. Lateral cephalic lobes subacute to acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple to very weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins tapering, palm extremely acute. Gnathopod 2 subchelate; carpus longer than propodus. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 without dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending just as far as article 1 of outer ramus. Telson subequal in length and breadth, slightly to moderately cleft.

Length. 13 mm.

Distribution. Skagerrak; North Sea; Norwegian Sea; Arctic Seas; British Isles; Guernsey.

Depth. Infralittoral to circalittoral.

Female (sexually dimorphic characters)

Calceoli absent from antennae.

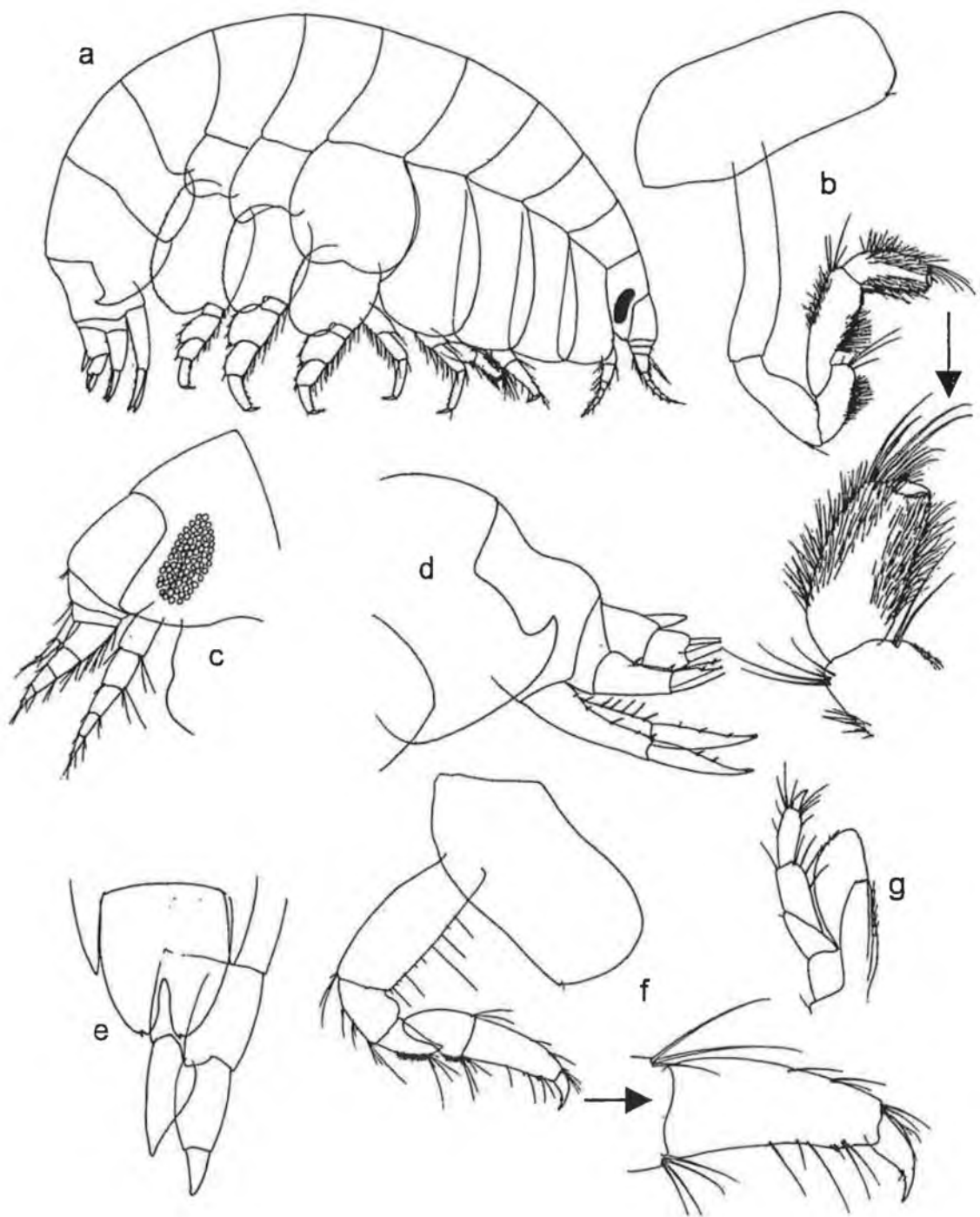


Figure 60: *Menigrates obtusifrons* (Boeck, 1861) Female. (a) entire; (b) gnathopod 2; (c) head and antennae; (d) epimeron 3 and urosome; (e) telson and uropod 3; (f) gnathopod 1; (g) maxilliped. [After: Lincoln, 1979a].

Menigratopsis svennilssoni Dahl, 1945

Fig. 61

Menigratopsis svennilssoni Dahl, 1945: 229–235, figs 1-4. – Barnard & Karaman, 1991: 501.

Type material. HOLOTYPE: ZML Accession No. L916/3700

Type locality. Off Hellebaek, in the Sound (Öresund) between Denmark and Sweden; 40m.

Material examined. Dahl, 1945: 229–235, figs 1-4.

Based on mature female, male unknown.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Eyes present, but invisible in preserved specimens. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins tapering. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 basis distinctly longer than broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending only as far as article 1 of outer ramus. Telson distinctly longer than broad, moderately to deeply cleft.

Length. 4 mm.

Distribution. Öresund; North Sea.

Depth. Infralittoral to circalittoral.

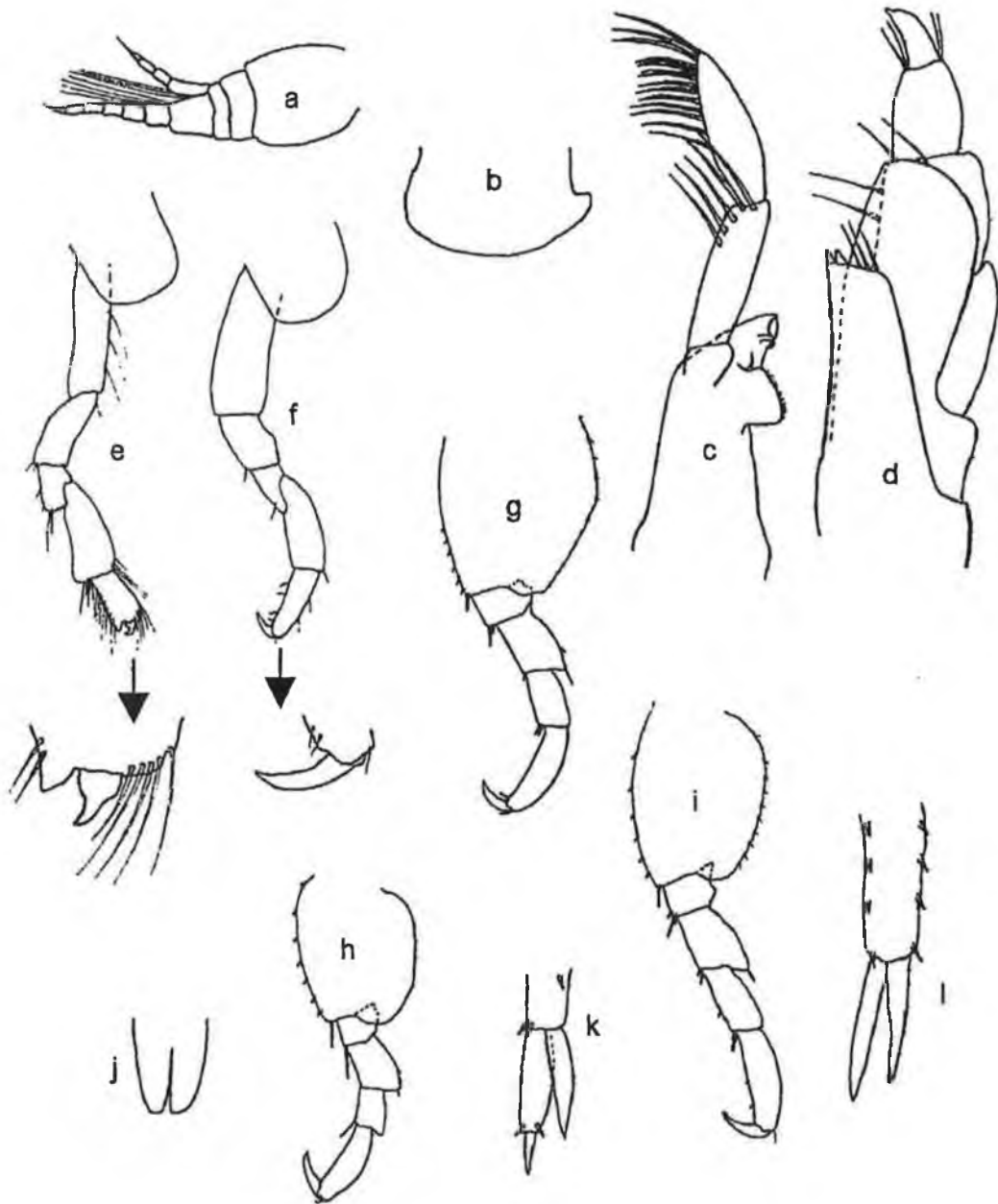


Figure 61: *Menigratopsis svennilssoni* Dahl, 1945. Female. (a) antenna 1; (b) epimeron 3; (c) mandible; (d) maxilliped; (e) gnathopod 2; (f) gnathopod 1; (g) pereopod 7; (h) pereopod 5; (i) pereopod 6; (j) telson; (k) uropod 3; (l) uropod 1. [After: Dahl, 1945].

Metacyphocaris helgae Tattersall, 1906

Fig. 62

Metacyphocaris helgae Tattersall, 1906: 29, pl. 3, fig. 1; pl. 4, figs 1-14. – Stephensen, 1923b: 54. – Schellenberg, 1926a: 216, figs 26c, 27. – K.H. Barnard, 1932: 37, fig. 5. – Thorsteinson, 1941: 60, pl. 3, figs 31-38. – Gurjanova, 1962: 78, fig. 14. – Hurley, 1963: 22, fig. 3. – Barnard & Karaman, 1991: 502, fig 88B.

Type material. SYNTYPE: NHML Reg. No. 1911: 11: 8: 13692

Type locality. 40 miles NW of Eagle Island, Co. Mayo, Ireland.

Material examined. Tattersall, 1906: 29, pl. 3, fig. 1; pl. 4, figs 1-14.

Description. Rostrum pronounced. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2; accessory flagellum rudimentary. Antenna 2 less than 40% of body length; calceoli absent. Eyes apparently absent. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 simple to weakly subchelate; coxa reduced, subequal to coxa 2; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; coxa strongly shortened; carpus longer than propodus; dactylus minute. Pereopods 3 and 4 propodus very robust with convex margins. Pereopod 5 coxa produced into a posterior lobe; basis just slightly more long than broad; propodus robust with convex margins. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner subquadrate to slightly rounded. Urosomite 1 without dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal, inner ramus strongly shortened, barely 25% as long as outer ramus. Telson more than twice as long as broad, slightly cleft.

Length. 11 mm.

Distribution. Cosmopolitan.

Depth. Bathyal to abyssal.

Ecology. Pelagic.

Remarks. Tattersall (1909) notes that the strong prehensile limbs in this species are probably for clinging to other pelagic animals on which it is parasitic.

Female (sexually dimorphic characters)

Not differing significantly to male.

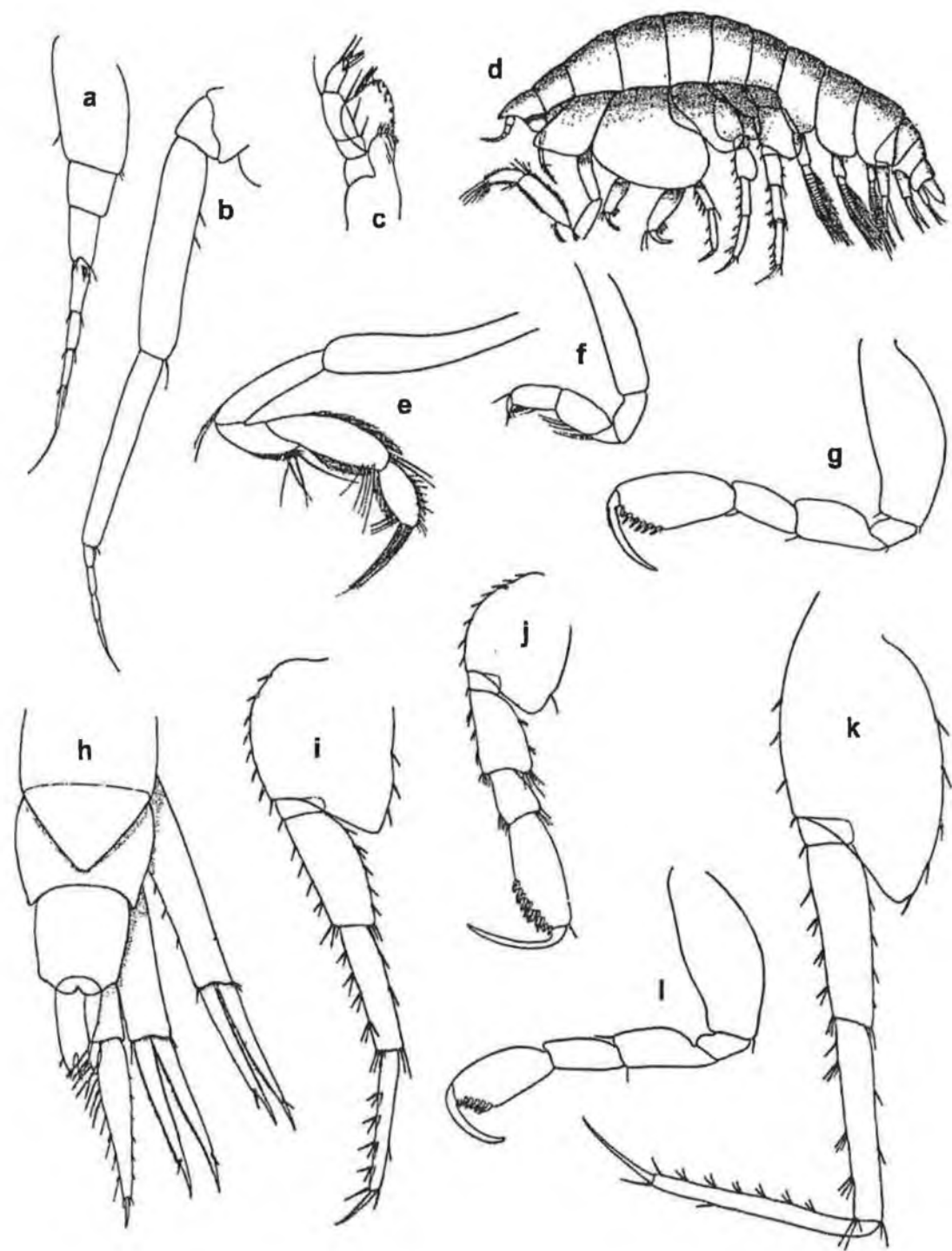


Figure 62: *Metacyphocaris helgae* Tattersall, 1906. Male. (a) antenna 1; (b) antenna 2; (c) maxilliped; (d) entire; (e) gnathopod 2; (f) gnathopod 1; (g) pereopod 4; (h) urosome, uropods 1-3 and telson; (i) pereopod 6; (j) pereopod 5; (k) pereopod 7; (l) pereopod 3. [After: Tattersall, 1906].

Metambasia faeroensis Stephensen, 1923

Fig. 63

Metambasia faeroensis Stephensen, 1923b: 76, figs 15–16. – Barnard & Karaman, 1991: 503.

Type material. PARATYPES: Male & Female. ZMUC CRU-6388.
SYNTYPES: ZMUC CRU-6389/ CRU-6390.

Type locality. Thor St.78, 12–5–1904. 61°7'N, 9°30'W; 835 m.

Material examined. ZMUC CRU-6388; Stephensen, 1923b: 76, figs 15–16.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 extremely elongate; accessory flagellum forming cap, partially covering callynophore. Antenna 2 between 60 to 99% of body length, peduncle article 3 quite inflated; calceoli present. Eyes apparently absent. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium short; carpus very long, distinctly longer than propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression and rounded keel. Uropods 1 and 2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami slightly unequal and fringed with long, plumose setae, inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Length. 7–8 mm.

Distribution. Northwest Atlantic Ocean; Faeroe Islands.

Depth. Bathyal (835–900 m).

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate. Calceoli absent. Uropod 3 rami more or less subequal and lacking long, plumose setae of the male.

Length. 8 mm.

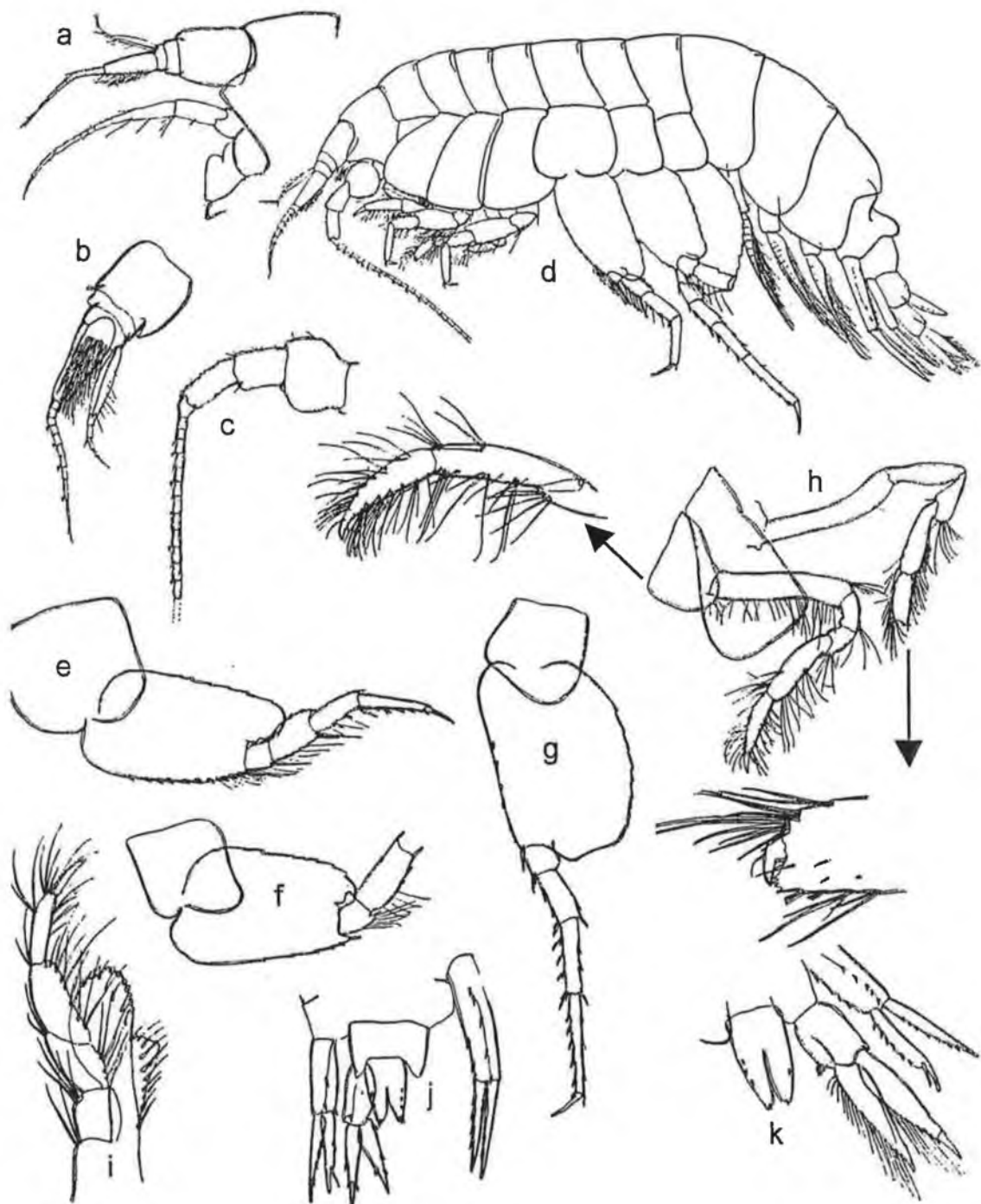


Figure 63: *Metambasia faeroensis* Stephensen, 1923. (a) head and antennae, female; (b) antenna 1, male; (c) antenna 2, male; (d) entire, male; (e) pereopod 5; (f) pereopod 6; (g) pereopod 7; (h) gnathopods 1 and 2; (i) maxilliped; (j) urosome, uropods 1-3 and telson, female; (k) urosome, uropods 2-3 and telson, male.

[After: Stephensen, 1923].

Nannonyx goesi (Boeck, 1871)

Fig. 64

Orchomene goesi Boeck, 1871: 116. – Boeck, 1872: 177, pl. 4, fig. 5.

Nannonyx goesi. – G.O. Sars, 1890: 72, pl. 24, fig. 3. – Della Valle, 1893: 794. – Stebbing, 1906: 36. – Chevreux & Fage, 1925: 38, fig. 18. – Lincoln, 1979a: 66, fig. 23a- e, fig. 24a- d. – Costello *et al.*, 1989: 34. – Barnard & Karaman, 1991: 504, figs 89R, 90X, 91K, 92W, 95F.

Type material. SYNTYPES: ZMO Reg. No. F13230.

Type locality. Haugesund, Norway.

Material examined. G.O. Sars, 1890: 72, pl. 24, fig. 3; Stebbing, 1906: 36; Chevreux & Fage, 1925: 38, fig. 18; Lincoln, 1979a: 66, fig. 23a- e, fig. 24a- d.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2; calceoli absent. Eyes large, suboval. Lateral cephalic lobes broadly rounded. Mouthparts forming a conical bundle. Maxilliped palp article 4 rudimentary; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 minutely subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering, propodus palm acute, densely setose; dactylus well developed. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner slightly acute. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami distinctly unequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal, inner ramus not extending past article 1 of outer ramus. Telson entire.

Length. 4 mm.

Distribution. Northeast Atlantic; North Sea.

Depth. Infralittoral to circalittoral.

Female (sexually dimorphic characters)

Not differing significantly to male.

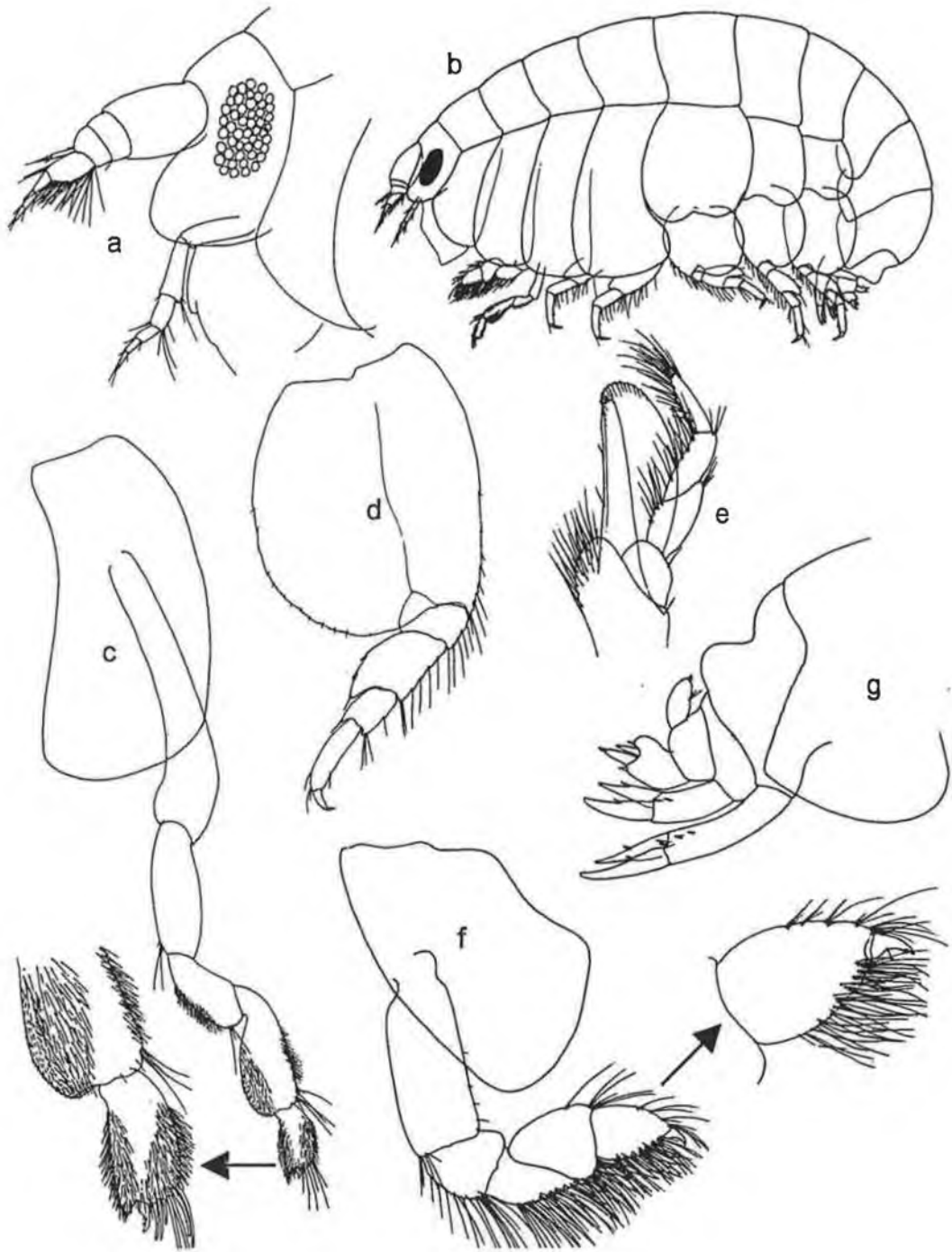


Figure 64: *Nannonyx goesi* (Boeck, 1871). Female. (a) head and antennae; (b) entire; (c) gnathopod 2; (d) pereopod 7; (e) maxilliped; (f) gnathopod 1; (g) epimeron 1 and urosome. [After: Lincoln, 1979a].

Nannonyx propinquus Chevreux, 1911

Fig. 65

Nannonyx propinquus Chevreux, 1911: 155, fig.1, pl. 6, figs 1-8. – Chevreux & Fage, 1925: 37, figs 16-17. – Macquart-Moulin, 1968: 311. – Diviacco & Ruffo, 1989: 511, fig. 348. – Barnard & Karaman, 1991: 504.

Type material. Unknown.

Type locality. Annaba.

Material examined. Chevreux, 1911: 155, fig.1, pl. 6, figs 1-8; Chevreux & Fage, 1925: 37, figs 16-17; Diviacco & Ruffo, 1989: 511, fig. 348.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2; calceoli absent. Eyes large, suboval. Lateral cephalic lobes rounded. Mouthparts forming a conical bundle. Maxilliped palp article 4 rudimentary; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 minutely subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into an anterior lobe; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami distinctly unequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal, with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, entire.

Length. 2.5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral.

Female (sexually dimorphic characters)

Not differing significantly to male.

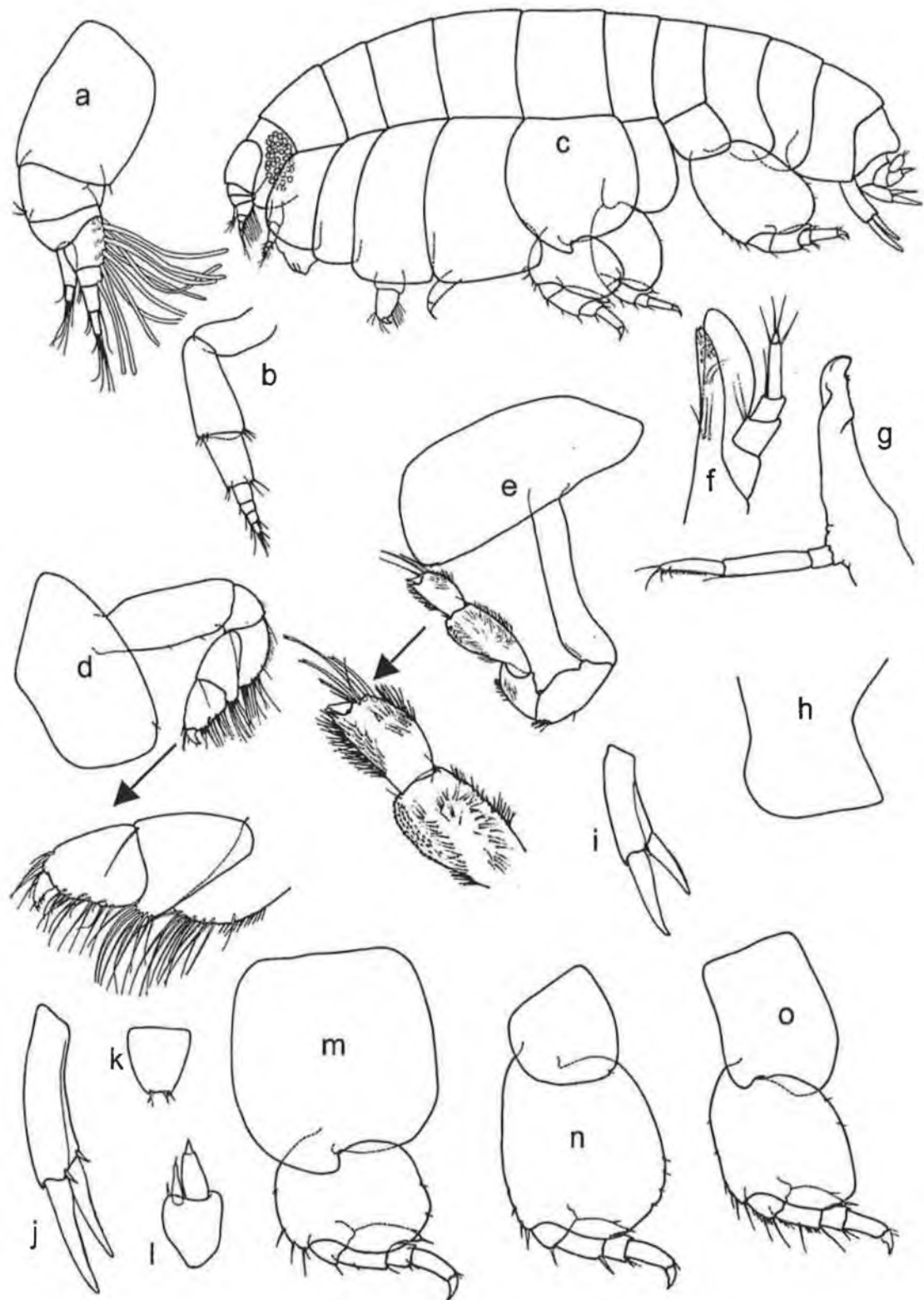


Figure 65: *Nannonyx propinquus* Chevreaux, 1911. Female. (a) antenna 1; (b) antenna 2; (c) entire; (d) gnathopod 1; (e) gnathopod 2; (f) maxilliped; (g) mandible; (h) epimeron 3; (i) uropod 2; (j) uropod 1; (k) telson; (l) uropod 3; (m) pereopod 5; (n) pereopod 7; (o) pereopod 6. [After: Diviacco & Ruffo, 1989].

Nannonyx spinimanus Walker, 1895

Fig. 66

Nannonyx spinimanus Walker, 1895: 292, pl. 18, figs 1-11, pl. 19, fig. 6. – Stebbing, 1906: 35. – Chevreux & Fage, 1925: 38, fig. 19. – Lincoln, 1979a: 66, fig. 23f-i, fig. 24e-h. – Barnard & Karaman, 1991: 504.

Type material. SYNTYPES: NHML Reg. No. 1914: 3: 31: 9; NHML Reg. No. 1907: 4: 8: 5; NHML Reg. No. 1908: 3: 10: 8

Type locality. Menai Strait, North Wales.

Material examined. Stebbing, 1906: 35; Chevreux & Fage, 1925: 38, fig. 19; Lincoln, 1979a: 66, fig. 23f-i, fig. 24e-h.

Description. Antenna 1 subequal to antenna 2; flagellum article i distinctly elongate; calceoli absent. Eyes large, suboval. Lateral cephalic lobes broadly rounded. Mouthparts forming a conical bundle. Maxilliped palp article 4 rudimentary; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 minutely subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins tapering. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a slight anterior lobe; basis about as long as broad.

Epimeron 3 posterodistal corner slightly acute, posterior margin serrated. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal but with inner ramus extending slightly past article 1 of outer ramus. Telson entire.

Length. 4.5 mm.

Distribution. Northeast France and British Isles.

Female (sexually dimorphic characters)

Not differing significantly to male.

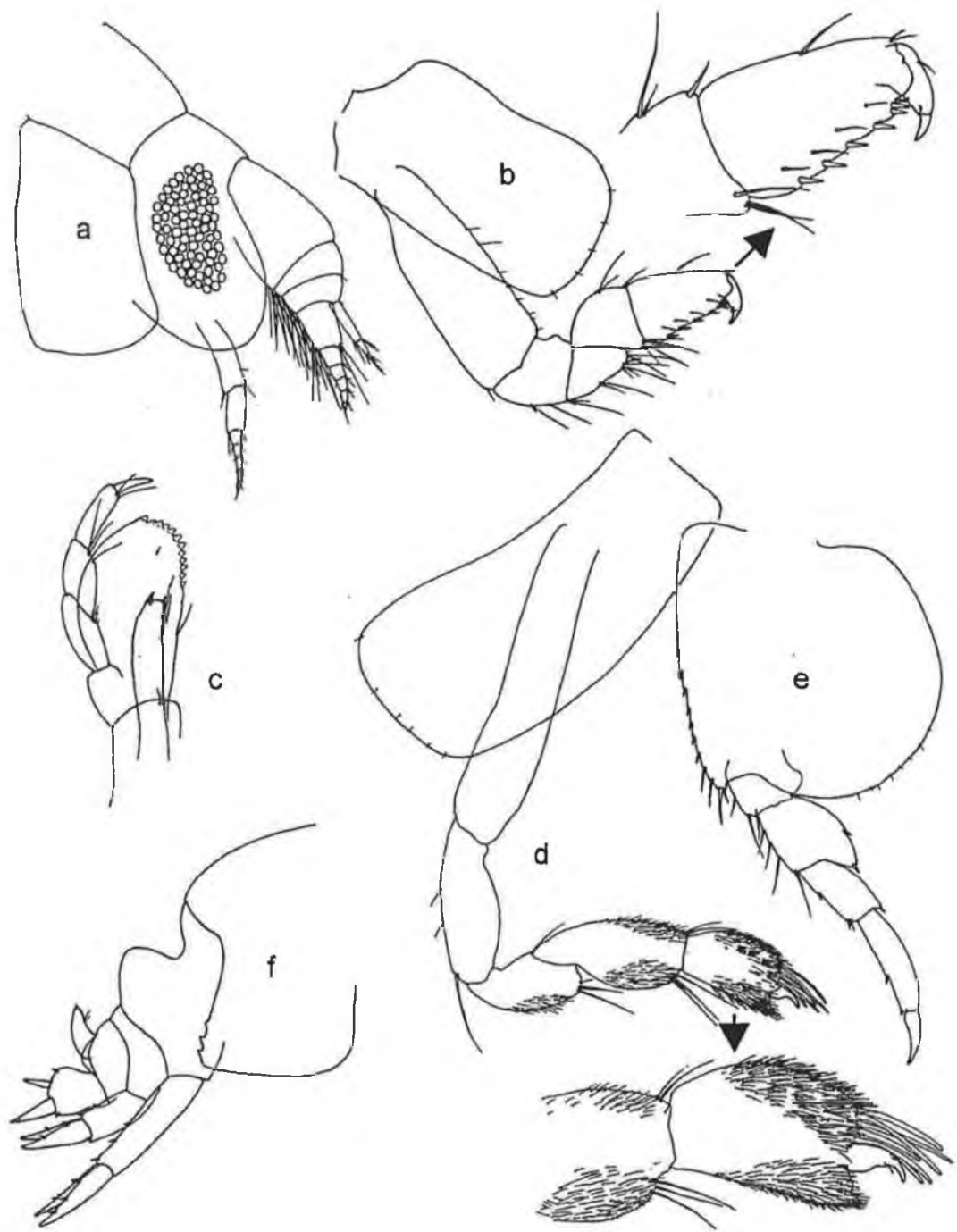


Figure 66: *Nannonyx spinimanus* Walker, 1895. (a) head and antennae; (b) gnathopod 1; (c) maxilliped; (d) gnathopod 2; (e) pereopod 7; (f) epimeron 3 and urosome.
 [After: Lincoln, 1979a].

Normanion abyssi Chevreux, 1903

Fig. 67

Normanion abyssi Chevreux, 1903: 82, fig. 1a-f. – Chevreux, 1935: 33, pl. 6, fig. 3. – Diviacco & Vader, 1988: 118. – Diviacco & Ruffo, 1989: 513, fig. 349. – Barnard & Karaman, 1991: 505.

Type material. Unknown.

Type locality. Off Monaco.

Material examined. Chevreux, 1903: 82, fig. 1a-f; Diviacco & Vader, 1988: 118; Diviacco & Ruffo, 1989: 513, fig. 349.

Description based on female, male unknown.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli absent. Eyes apparently absent. Maxilliped palp article 4 rudimentary; inner plate very long and slender, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, slightly tapering anterodistally, rounded distally; ischium elongate, more than twice as long as broad; carpus short, distinctly shorter than propodus; propodus broader than long, palm transverse and smooth; dactylus inner margin not serrated. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner rounded. Urosomite 1 with slight dorsal depression. Uropods 1 - 3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 1-articulate. Telson subequal in length and breadth, entire.

Length. 3 mm.

Distribution. Mediterranean.

Depth. Abyssal.

Remarks. This species is still known from the type material only.

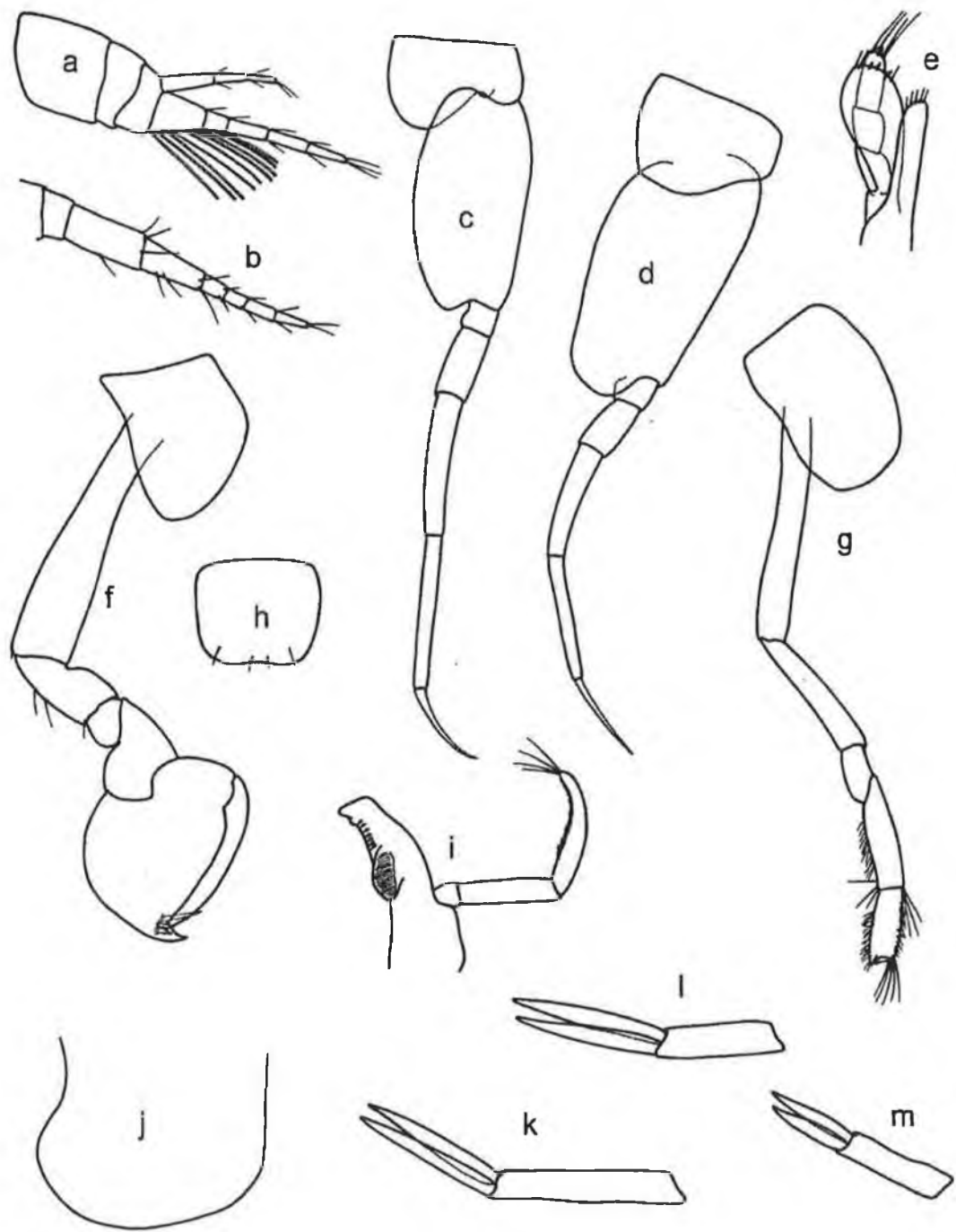


Figure 67: *Normanion abyssi* Chevreux, 1903. Female. (a) antenna 1; (b) antenna 2; (c) pereopod 6; (d) pereopod 7; (e) maxilliped; (f) gnathopod 1; (g) gnathopod 2; (h) telson; (i) mandible; (j) epimeron 3; (k) uropod 1; (l) uropod 2; (m) uropod 3.

[After: Diviacco & Ruffo, 1989].

Normanion amblyops G.O. Sars, 1895

Fig. 68

Normanion amblyops G.O. Sars, 1895: 674, suppl. pl. 1, fig. 1. – Barnard and Karaman, 1991: 505.

Normanion quadrimanus. – Stebbing, 1906: 42 (in part).

Type material. SYNTYPES: 5 specimens in alcohol, 4—5.5 mm, NHML 1911. 11. 8. 12768—12772.

Type locality. Rødbjerget, Trondhjemsfjord. 366—549 m (200—300 fathoms).

Material examined. Syntypes, 5 specimens in alcohol, 4—5.5 mm, from Trondhjemsfjord, NHML 1911.11.8:12768—12772; ZMO F10526, 2 specimens on slides, 5—5.5 mm.

Description. Lateral cephalic lobes subquadrate. Eyes present. Antenna 1 more or less subequal to antenna 2; flagellum 7-articulate, flagellum article 1 distinctly elongate; calynophore present; accessory flagellum 3-articulate. Antenna 2 flagellum 6-articulate; calceoli absent. Mandible palp attached proximal to molar. Maxilliped palp 4-articulate, article 4 rudimentary, palp reaching well beyond tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus subequal in length to propodus; propodus broader than long, palm transverse, smooth and striated, and posterodistally delimited by 2 robust setae and a central spine. Gnathopod 2 minutely chelate; carpus twice as long as propodus. Pereopods 3 and 4 with short dactyls. Coxa 5 produced into a posterior lobe; pereopod 5 basis almost twice as long as broad, produced well beyond ischium; dactylus extremely long and slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis almost twice as long as broad, produced beyond ischium. Pereopod 7 basis longer than broad, not produced beyond ischium.

Pleonites 1-3 with very slight dorsal depression; epimeron 1 anterodistal corner subquadrate; epimeron 3 posterodistal corner rounded. Urosomite 1 with distinct dorsal depression, distally followed by a rounded dorsal carina. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus longer than outer ramus; uropod 3 rami subequal.

Distribution. Norwegian Sea. Approximately 360—550 m.

Female (sexually dimorphic characters)

Not differing significantly from male.

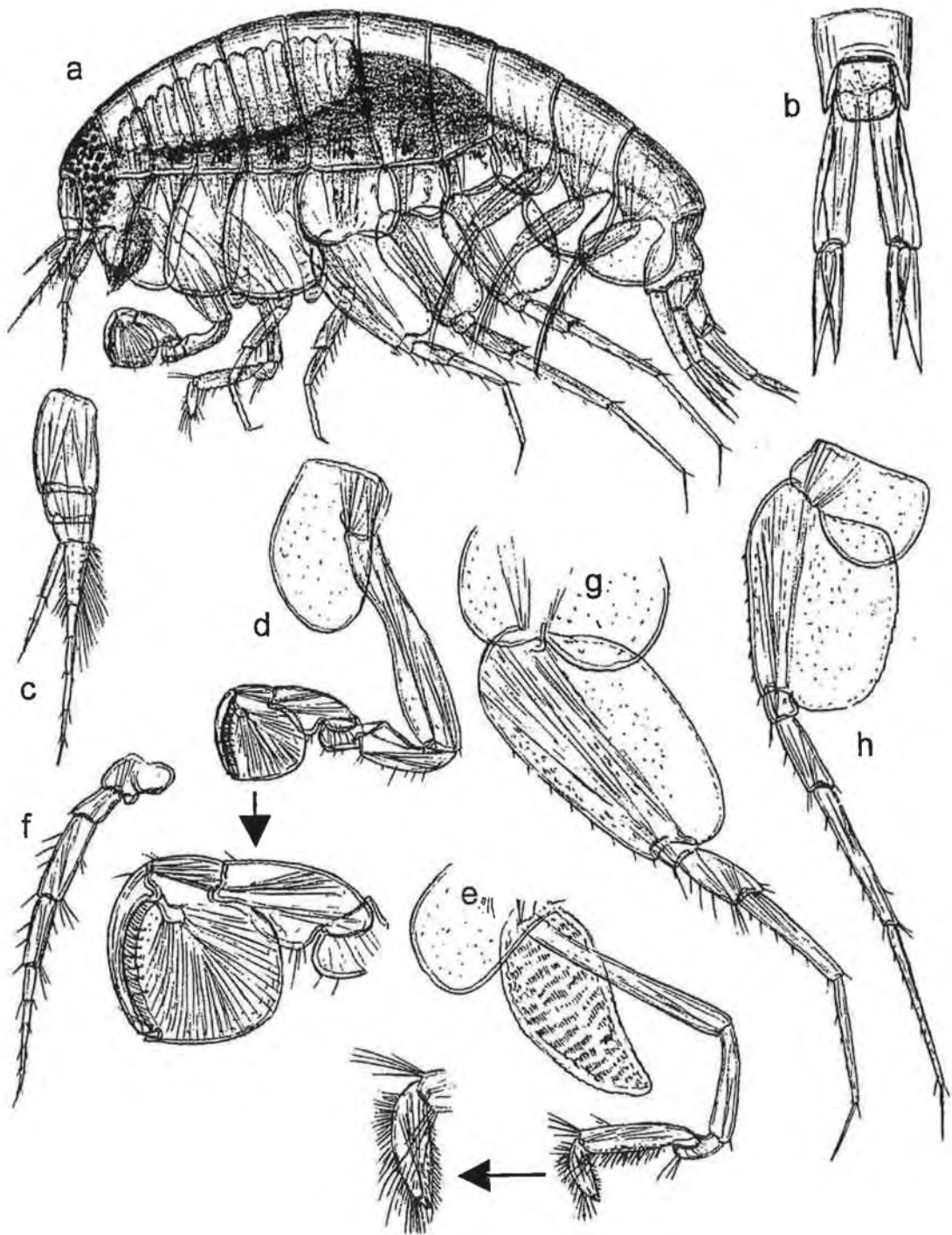


Figure 68: *Normanion amblyops* G.O. Sars, 1895. Female. (a) entire; (b) uropod 3 and telson; (c) antenna 1; (d) gnathopod 1; (e) gnathopod 2; (f) antenna 2; (g) pereopod 5; (h) pereopod 7. [After: G.O. Sars, 1895].

Normanion chevreuxi Diviacco & Vader, 1988

Fig. 69

Normanion chevreuxi Diviacco and Vader, 1988: 118, figs 1-2. – Diviacco and Ruffo, 1989: 514, fig. 350.

Normanion quadrimanus. – Chevreux, 1920: 75, fig. 1. – Chevreux and Fage, 1925: 35, figs 14-15. – Ledoyer, 1968, 180. – Bellan-Santini and Ledoyer, 1973: 920. – Ledoyer, 1977: 379, fig. 19A. – Barnard and Karaman, 1991: 505.

Non *Opis quadrimana* Bate and Westwood, 1868: 503.

Type material. HOLOTYPE: Ovigerous female, 3 mm, MSNV No. MVR-Cr 218, slides 774—777.

Type locality. Marseille.

Material examined. Holotype, 1 specimen on a slide, 3 mm, from Marseille, 90 m, dendritic bottom, MSNV 774—777; 1 specimen in alcohol, 2.5 mm, from Marseille, 80 m, MSNV FVP 25; 2 specimens in alcohol, both 3 mm, from Marseille, 90 m, dendritic bottom, MSNV FVP 33.

Description. Lateral cephalic lobes subacute. Eyes present. Antenna 1 subequal to antenna 2, flagellum 6-articulate, article 1 slightly longer than article 2; calynophore present; accessory flagellum 4-articulate. Antenna 2 flagellum 4-articulate; calceoli absent. Mandible palp attached proximal to molar. Maxilliped palp 3-articulate, palp reaching to tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus more or less subequal in length to propodus; propodus slightly longer than broad, palm transverse, denticulate, and posterodistally delimited by 2 robust setae. Gnathopod 2 minutely chelate; carpus twice as long as propodus. Pereopods 3–4 dactylus small. Coxa 5 produced into a posterior lobe; pereopod 5 basis twice as long as broad, produced beyond ischium; dactylus extremely long and slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis twice as long as broad, not produced beyond ischium. Pereopod 7 basis subrectangular, slightly longer than broad, and not produced beyond ischium.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, with inner ramus longer than outer ramus; uropod 3 rami subequal. Telson emarginate.

Distribution. Mediterranean and Atlantic coast of France (Brittany). 35—130 m.

Female (sexually dimorphic characters)

Not differing significantly to male.

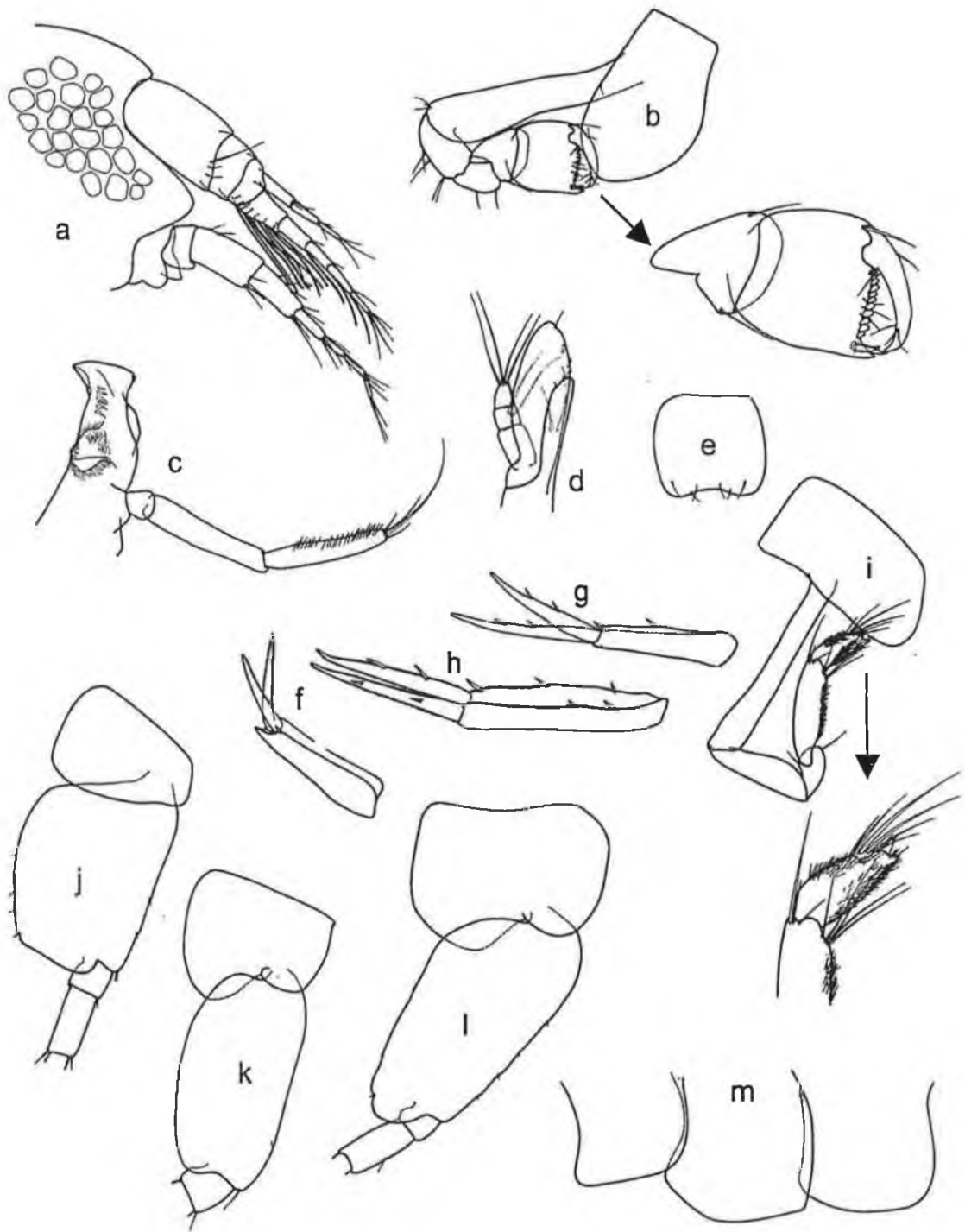


Figure 69: *Normanion chevreuxi* Diviacco & Vader, 1988. Female. (a) head and antennae; (b) gnathopod 1; (c) mandible; (d) maxilliped; (e) telson; (f) uropod 3; (g) uropod 2; (h) uropod 1; (i) gnathopod 2; (j) pereopod 7; (k) pereopod 6; (l) pereopod 5; (m) epimeral plates 1-3.
 [After: Diviacco & Ruffo, 1989].

Normanion quadrimanus (Bate & Westwood, 1868)

Fig. 70

Opis quadrimana Bate and Westwood, 1868: 503.

Normania quadrimana Boeck, 1871: 120. – G.O. Sars, 1895: 33, pl. 13, fig. 1.

Normanion quadrimanus. – Stebbing, 1906: 42 (in part). – Lincoln, 1979: 44, fig. 13 (in part). – ?Costello *et al.*, 1989: 34. – Barnard and Karaman, 1991: 505.

Normanion sarsi Stebbing, 1906: 42.

Type material. TYPE: NHML 1911. 11. 8. 654.

Type locality. Banffshire, Scotland.

Material examined. TYPE NHML 1911. 11. 1. 654, 3.5 mm from Banffshire, Scotland; ZMO F10523, 2 specimens on slides, 3–3.5 mm; ZMO F13172, 15 specimens in alcohol, 2–4 mm, both from Trondhjemsfjord.

Description. Lateral cephalic lobes subquadrate. Eyes present. Antenna 1 subequal to antenna 2, flagellum approximately 5-articulate, article 1 distinctly elongate; callynophore present; accessory flagellum 3-articulate. Antenna 2 flagellum 4-articulate; calceoli absent. Mandible palp attached proximal to molar. Maxilliped palp 3-articulate, reaching to tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus shorter than propodus; propodus subequal in length and breadth, palm transverse, smooth and striated, and posterodistally delimited by 2 robust setae and a central spine; inner margin of dactylus may be smooth or having small, blunt denticulations. Gnathopod 2 minutely chelate; carpus twice as long as propodus. Pereopods 3–4 dactylus small. Coxa 5 produced into a posterior lobe; pereopod 5 basis almost twice as long as broad, produced beyond ischium; dactylus extremely long and slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis longer than broad, not produced beyond ischium. Pereopod 7 basis subrectangular, longer than broad, and not produced beyond ischium.

Epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus much longer than outer ramus; uropod 3 rami distinctly unequal, inner ramus shorter than outer ramus. Telson slightly emarginate.

Distribution. Northeast Atlantic, from the west coast of Scotland and the Norwegian Sea.

Depth. 20–565 m.

Female (sexually dimorphic characters)

Not differing significantly from male.

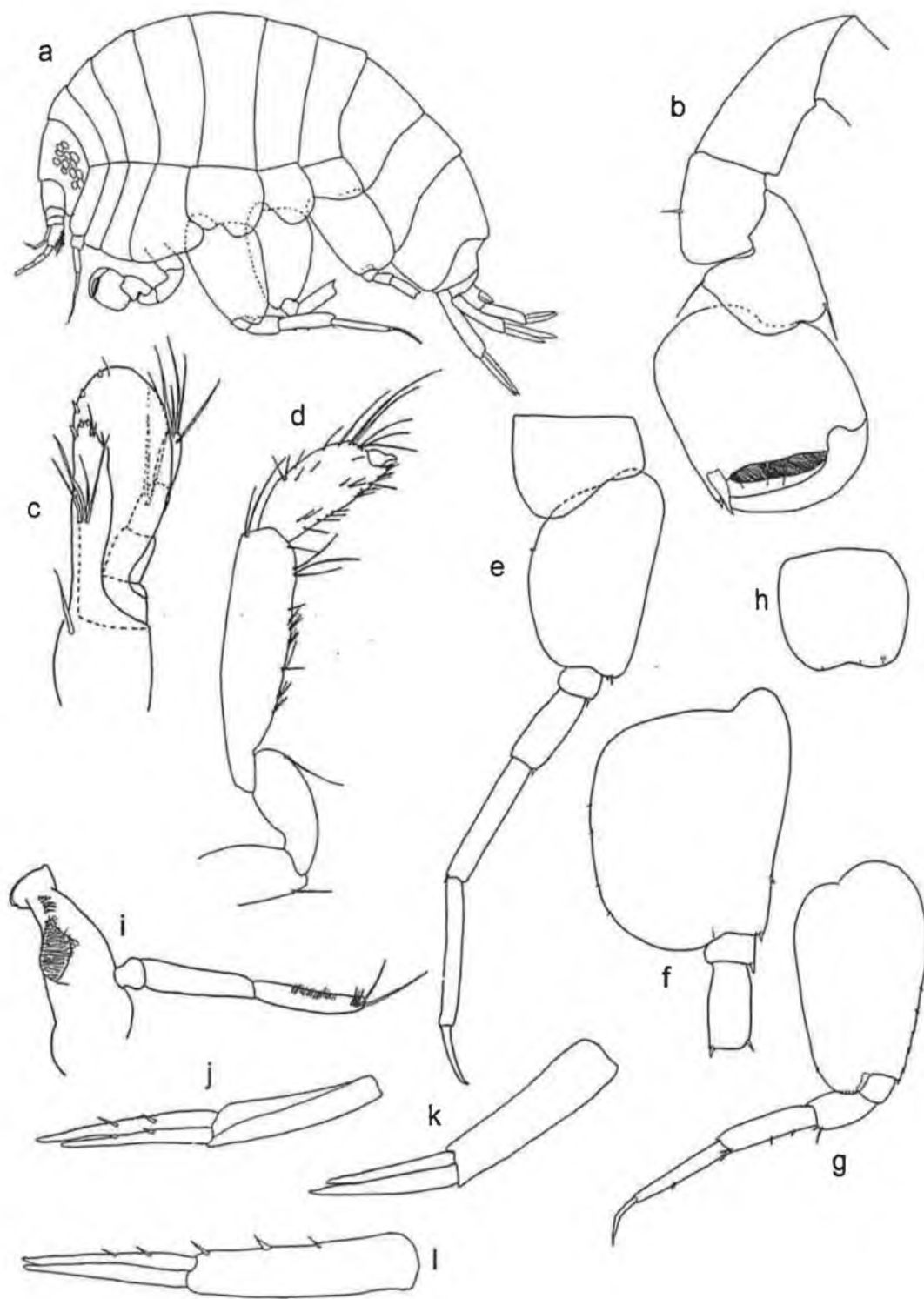


Figure 70: *Normanion quadrimanus* (Bate & Westwood, 1868). (a) entire; (b) gnathopod 1; (c) maxilliped; (d) gnathopod 2; (e) pereopod 6; (f) pereopod 7; (g) pereopod 5; (h) telson; (i) mandible; (j) uropod 2; (k) uropod 3; (l) uropod 1. [Illustrations by author]

Normanion ruffoi Diviacco & Vader, 1988

Fig. 71

Normanion ruffoi Diviacco and Vader, 1988: 122, figs 3—5. — Diviacco and Ruffo, 1989: 514, figs 351-352.

?*Normanion sarsi*. — Ledoyer, 1977: 381, fig 19B.

Normanion quadrimanus. — ?Costello *et al.*, 1989: 34.

Type material. HOLOTYPE: Ovigerous female, 3.5 mm, MSNV No. 766-769.

Type locality. Marseille.

Material examined. Holotype, female, 3.5 mm, from Marseille, 180-360 m, bathyal mud, MSNV No. 766—769; 8 specimens, 2.5—5 mm, from Trondhjemsfjord, ZMO F13172; 2 specimens, 2.5—3 mm, from 52°49'N 11°40'W, 158.4 m, coarse sand and shells, collected by N.M Kilgallen.

Description. Lateral cephalic lobes subquadrate. Eyes present. Antenna 1 slightly shorter than antenna 2, flagellum 5-articulate, article 1 slightly longer than article 2; callynophore present; accessory flagellum 3-articulate. Antenna 2 flagellum 3-articulate; calceoli absent. Mandible palp attached proximal to molar. Maxilliped palp 3-articulate, reaching to tip of inner plate.

Gnathopod 1 subchelate; coxa 1 slightly shorter than coxa 2, rounded distally; ischium elongate, more than twice as long as broad; carpus shorter than propodus; propodus subequal in length and breadth, palm transverse, smooth and striated, and posterodistally delimited by 2 robust setae and a central spine; inner margin of dactylus may be smooth or having small, blunt denticulations. Gnathopod 2 minutely chelate; carpus almost twice as long as propodus. Pereopods 3—4 dactylus small. Coxa 5 produced into a posterior lobe; pereopod 5 basis twice as long as broad, produced beyond ischium; dactylus extremely long and slender. Coxa 6 produced into a posterior lobe; pereopod 6 basis twice as long as broad, not produced beyond ischium. Pereopod 7 basis subrectangular, slightly longer than broad, not produced beyond ischium.

Epimeron 1 anterodistal corner quadrate; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus much longer than outer ramus; uropod 3 rami subequal. Telson entire.

Distribution. Widespread from the Mediterranean Sea, west coast of Ireland, and to the Norwegian Sea.

Depth. 120—360 m.

Female (sexually dimorphic characters)

Not differing significantly from male.

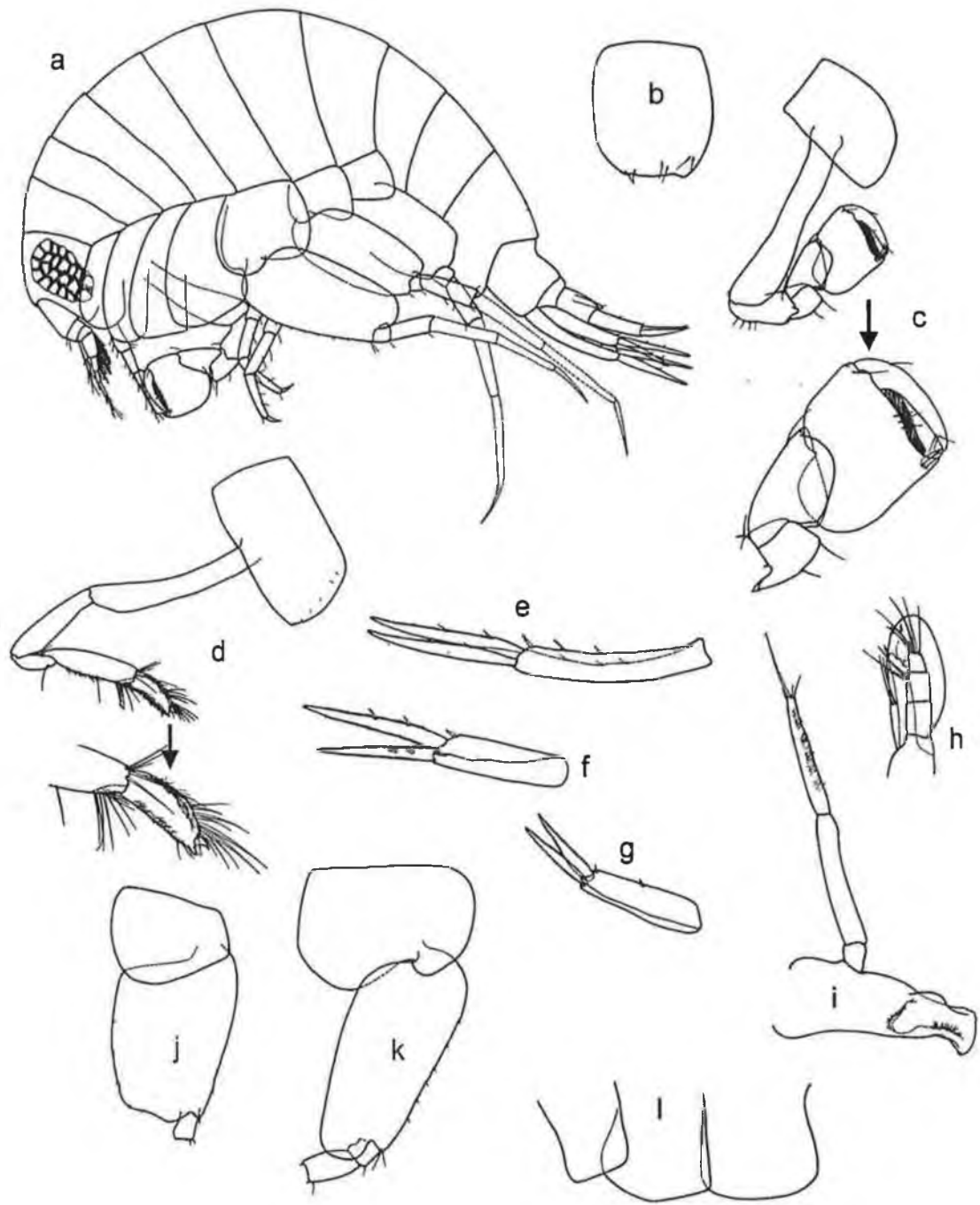


Figure 71: *Normanion ruffoi* Diviacco & Vader, 1988. Female. (a) entire; (b) telson; (c) gnathopod 1; (d) gnathopod 2; (e) uropod 1; (f) uropod 2; (g) uropod 3; (h) maxilliped; (i) mandible; (j) pereopod 7; (k) pereopod 5; (l) epimeron 1-3. [After: Diviacco & Ruffo, 1989].

Onesimoides mediterraneus Bellan-Santini, 1974

Fig. 72

Onesimoides mediterraneus Bellan-Santini, 1974: 7, figs 4-6. – Bellan-Santini, 1985: 274. – Diviacco & Ruffo, 1989: 517, fig. 353. – Barnard & Karaman, 1991: 506.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 252, slides 3428-3429. PARATYPE: MSNV Reg. no. MVR-Cr 252, in alcohol.

Type locality. Off Corsica (42°40'30"N, 8°29'00"E).

Material examined. Diviacco & Ruffo, 1989: 517, fig. 353.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate; accessory flageillum forming a cap, partially covering callynophore. Calceoli absent. Eyes apparently absent. Lateral cephalic lobes narrowly rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa 5 produced into a slight anterior lobe; basis distinctly longer than broad.

Epimeron 3 posterodistal corner quadrate to slightly acute. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, 3 rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson subequal in length and breadth, entire.

Length. 5 mm.

Distribution. Mediterranean endemic.

Depth. Bathyal to abyssal.

Female (sexually dimorphic characters)

Lateral cephalic lobes more rounded than male. Gnathopod 1 chelate, propodus palm slightly obtuse.

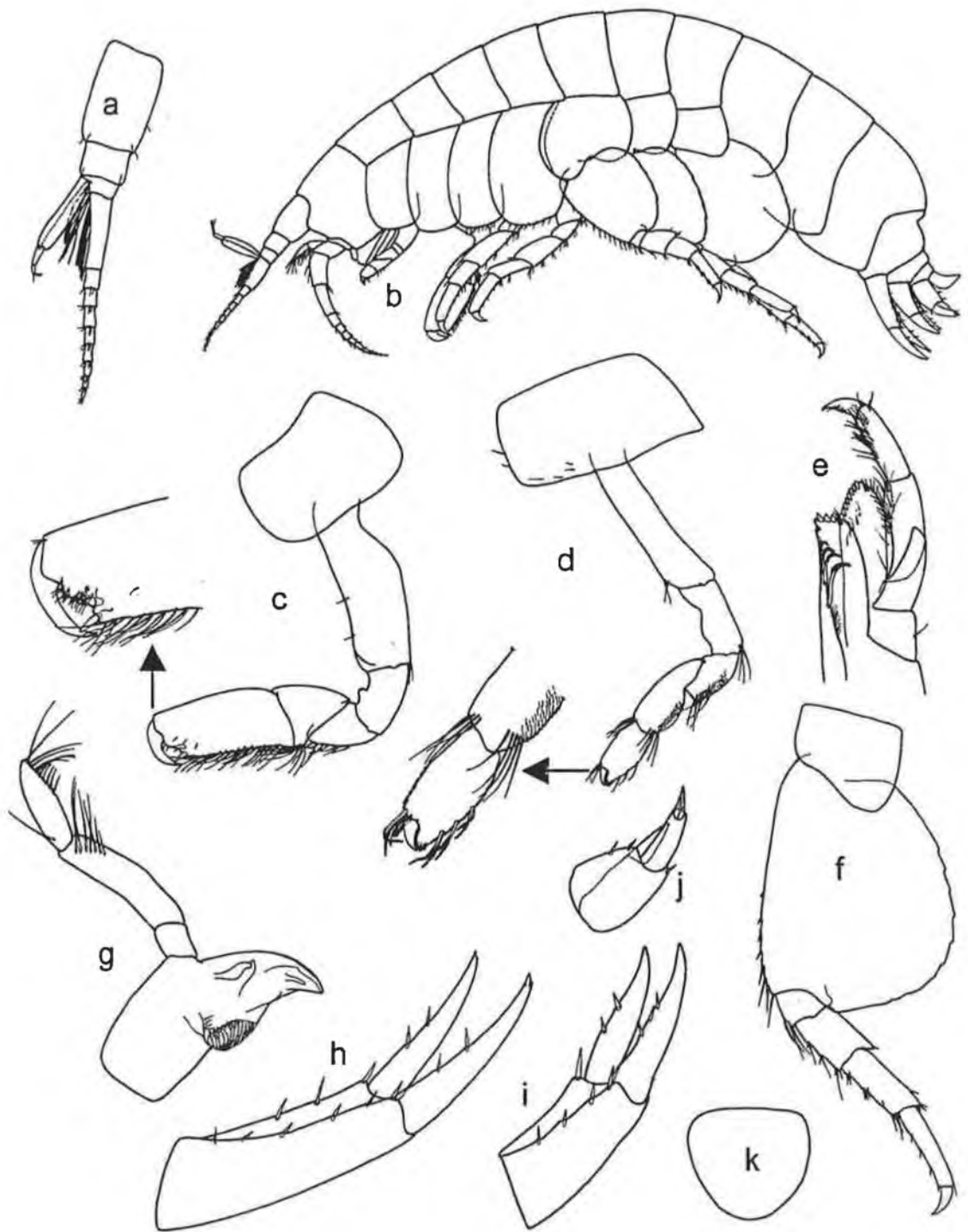


Figure 72: *Onesimoides mediterraneus* Bellan-Santini, 1974. (a) antenna 1, male; (b) entire, male; (c) gnathopod 1; (d) gnathopod 2; (e) maxilliped; (f) pereopod 7; (g) mandible; (h) uropod 1, female; (i) uropod 2, female; (j) uropod 3, female; (k) telson.

[After: Diviacco & Ruffo, 1989].

Onisimus platus (Krøyer, 1845)

Fig. 73

Anonyx platus Krøyer, 1845: 629.

Onesimus platus. – Boeck, 1872 & 76: 164. – G.O. Sars, 1895: 107, pl. 37, fig. 1.

Onisimus platus. – Boeck, 1871: 112. – Stebbing, 1894: 10. – Stebbing, 1906: 26. – Stephensen, 1913: 122. – Stephensen, 1923b: 46, chart 8. – Shoemaker, 1930b: 6, figs 4-5. – Gurjanova, 1962: 60, fig. 3. – Lowry & Stoddart, 1993: 169.

Boeckosimus platus. – J.L. Barnard & Karaman, 1991: 472.

Type material. SYNTYPE: ZMUC CRU-7807 (as *Anonyx platus*).

Type locality. Unknown.

Material examined. G.O. Sars, 1895: 107, pl. 37, fig. 1; – Stebbing, 1906: 26; – Stephensen, 1923b: 46, chart 8; Gurjanova, 1962: 60, fig. 3.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins subparallel, palm slightly acute to acute. Gnathopod 2 slightly chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, slightly cleft.

Length. 8 mm.

Distribution. Bohuslän, Haugesund, Arctic Seas, Jan Mayen, Iceland.

Female (sexually dimorphic characters)

Antenna 1 slightly shorter than antenna 2. Antenna 2 less than 40% of body length. Calceoli absent.

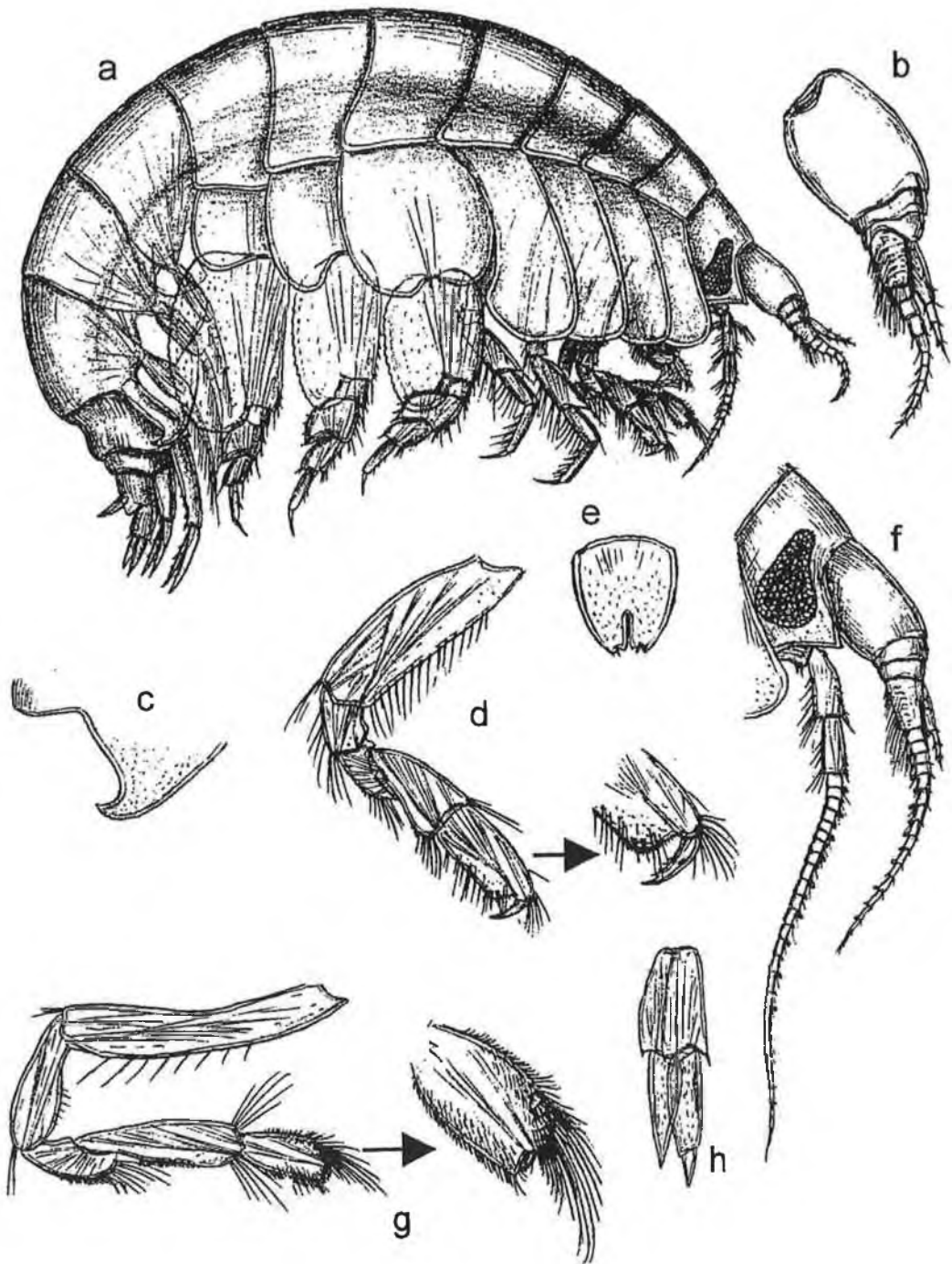


Figure 73: *Onisimus platus* (Krøyer, 1845). (a) entire, female; (b) antenna 1; (c) epimeron 3; (d) gnathopod 1; (e) telson; (f) head and antennae, male; (g) gnathopod 2; (h) uropod 3.
[After: Sars, 1891].

Opisa eschrichtii (Krøyer, 1842)

Fig. 74

Opis eschrichtii Krøyer, 1842: 149.

Opis typica Krøyer, 1846: 46.

Opisa eschrichtii. – Boeck, 1876: 190. – G.O. Sars, 1890: 36, pl. 14. – Stebbing, 1906: 20. – Stephensen, 1923b: 43. – Shoemaker, 1930b: 6. – Lincoln, 1979a: 48, fig. 15. – Barnard & Karaman, 1991: 506, figs 90Q, 92G, 95O.

Type material. SYNTYPE: ZMUC CRU-1865.

Type locality. Unknown.

Material examined. G.O. Sars, 1890: 36, pl. 14; Stebbing, 1906: 20; Stephensen, 1923b: 43; Lincoln, 1979a: 48, fig. 15.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 chelate; coxa large, about as long as coxa 2, slightly tapering anterodistally, rounded distally; ischium short; carpus compressed, distinctly shorter than propodus; propodus broader than long, palm obtuse, not denticulate; dactylus inner margin not serrated. Gnathopod 2 subchelate; carpus almost twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1 and 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 7–8 mm.

Distribution. Skagerrak, North Norway, Arctic Seas, Iceland, Faeroe Islands, Ireland.

Depth. Circalittoral to bathyal.

Ecology. Stephensen (1923) suggested that this species may be parasitic or semi-parasitic on fishes, based on evidence of a single specimen found on a cod off the Faeroes.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent.

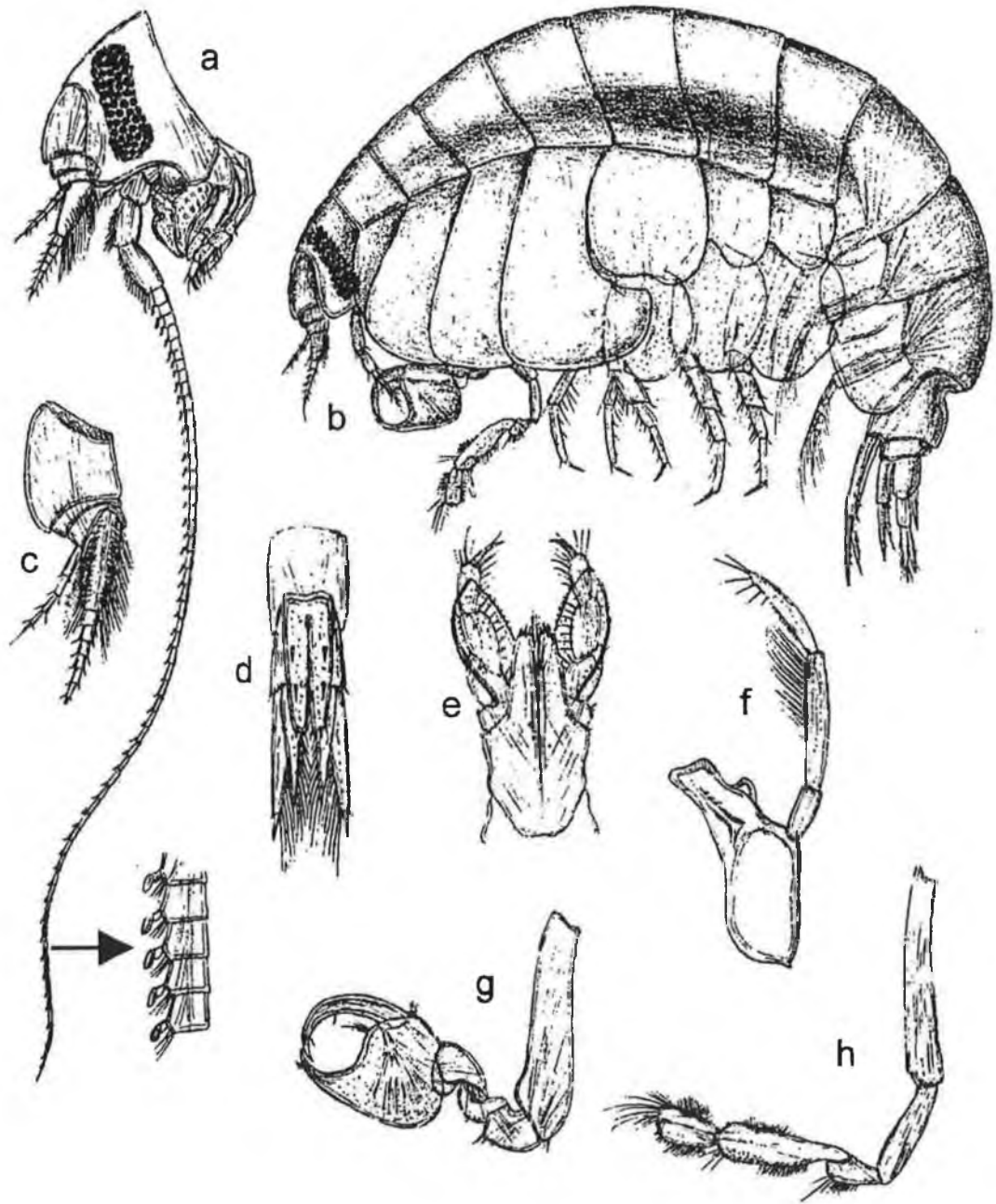


Figure 74: *Opisa eschrichtii* (Krøyer, 1842). (a) head and antennae, male; (b) entire, female; (c) antenna 1, male; (d) uropod 3 and telson; (e) maxilliped; (f) mandible; (g) gnathopod 1; (h) gnathopod 2. [After: Sars, 1891].

Orchomene amblyops G.O. Sars, 1895

Fig. 75

Orchomene amblyops G.O. Sars, 1895: 65, pl. 25, fig. 1. – Stebbing, 1906: 46. – Stephensen, 1923b: 67. – Barnard & Karaman, 1991: 508, fig. 89H.

Type material. SYNTYPES: NHML Reg. No. 1911: 11: 8: 13087-13096 (however, see remarks below).

Type locality. Trondjemsfjord.

Material examined. G.O. Sars, 1895: 65, pl. 25, fig. 1; Stebbing, 1906: 46; Stephensen, 1923b: 67.

Description based on female, male unknown.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate (not quite as long as remaining article combined); calceoli absent. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with a slighty concave anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm transverse. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner quadrate, posterior margin serrated. Urosomite 1 with dorsal depression, followed by a rounded dorsal carina. Uropods 1 - 2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal, with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Length. 8 mm.

Distribution. Skagerrak, Norwegian Sea, off Faeroe Islands.

Depth. Circalittoral to bathyal.

Remarks. According to Thurston and Allen (1969) the absence of a date on the label of the specimens in the NHML prevents absolute certainty as to their type status.

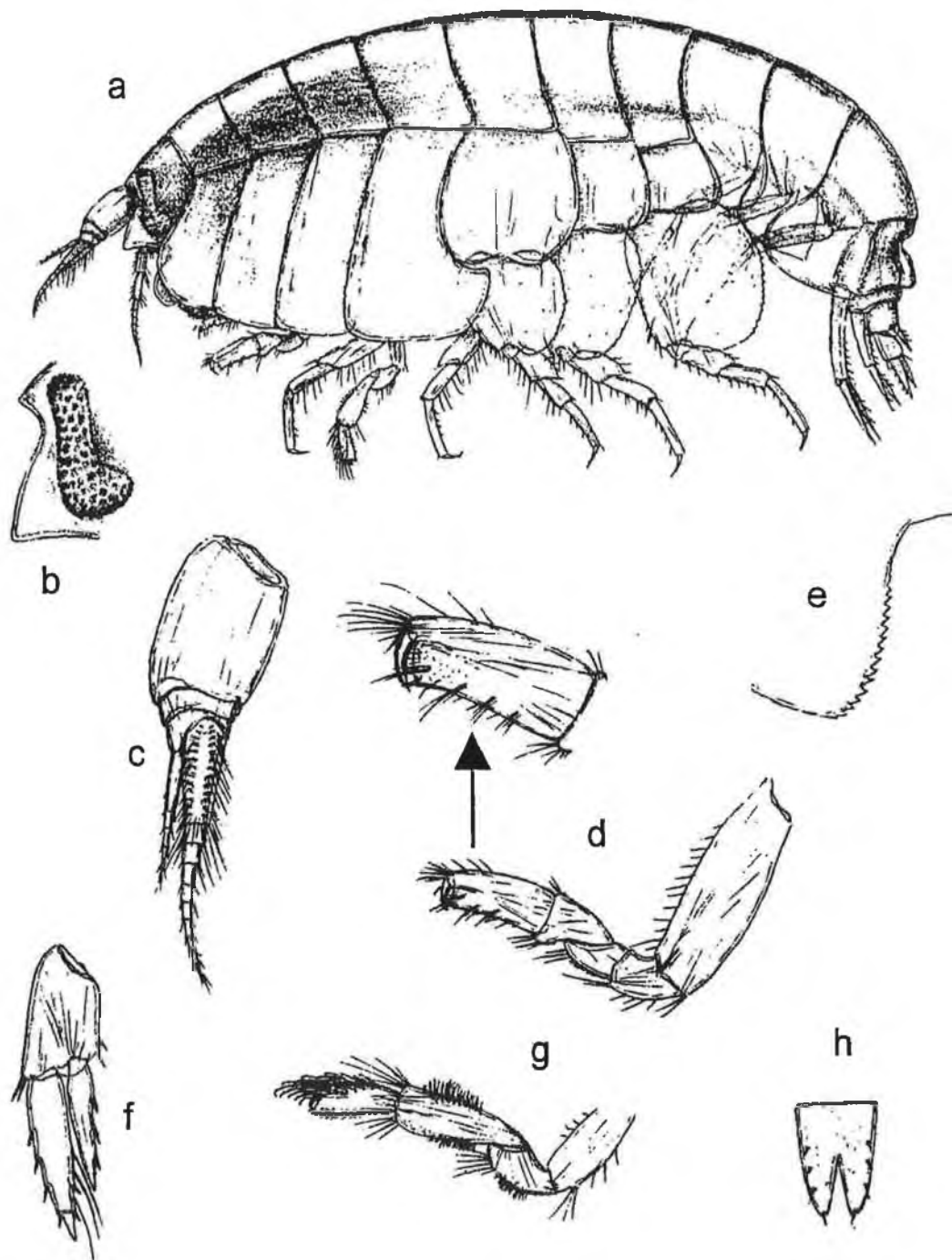


Figure 75: *Orchomene amblyops* G.O. Sars, 1895. (a) entire, female; (b) head; (c) antenna 1; (d) gnathopod 1; (e) epimeron 3; (f) uropod 3; (g) gnathopod 2; (h) telson.

[After: Sars, 1895].

Orchomene crispatus (Goës, 1866)

Fig. 76

Lysianassa crispatus Goës, 1866: 3, fig. 3.

Orchomene crispatus. – G.O. Sars, 1895: 63, pl. 23, fig. 2. – Barnard & Karaman, 1991: 508.

Orchomene crispate. – Stebbing, 1906: 46.

Orchomene (crispata Goes?). – Stephensen, 1923b: 67.

Type material. Probably lost.

Type locality. ?Spitzbergen.

Material examined. G.O. Sars, 1895: 63, pl. 23, fig. 2; Stephensen, 1923b: 67; Stebbing, 1906: 46.

Description based on mature female, male unknown.

Description. Antenna 1 slightly shorter than, or subequal to antenna 2; peduncle article 1 very elongate, more than twice as long as broad; flagellum article 1 slightly longer than article 2; accessory flagellum present. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with slightly concave anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus palm transverse; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded or slightly acute, posterior margin serrated. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with 3 inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Length. 12 mm.

Distribution. Norwegian Sea, off south Iceland.

Depth. Bathyal.

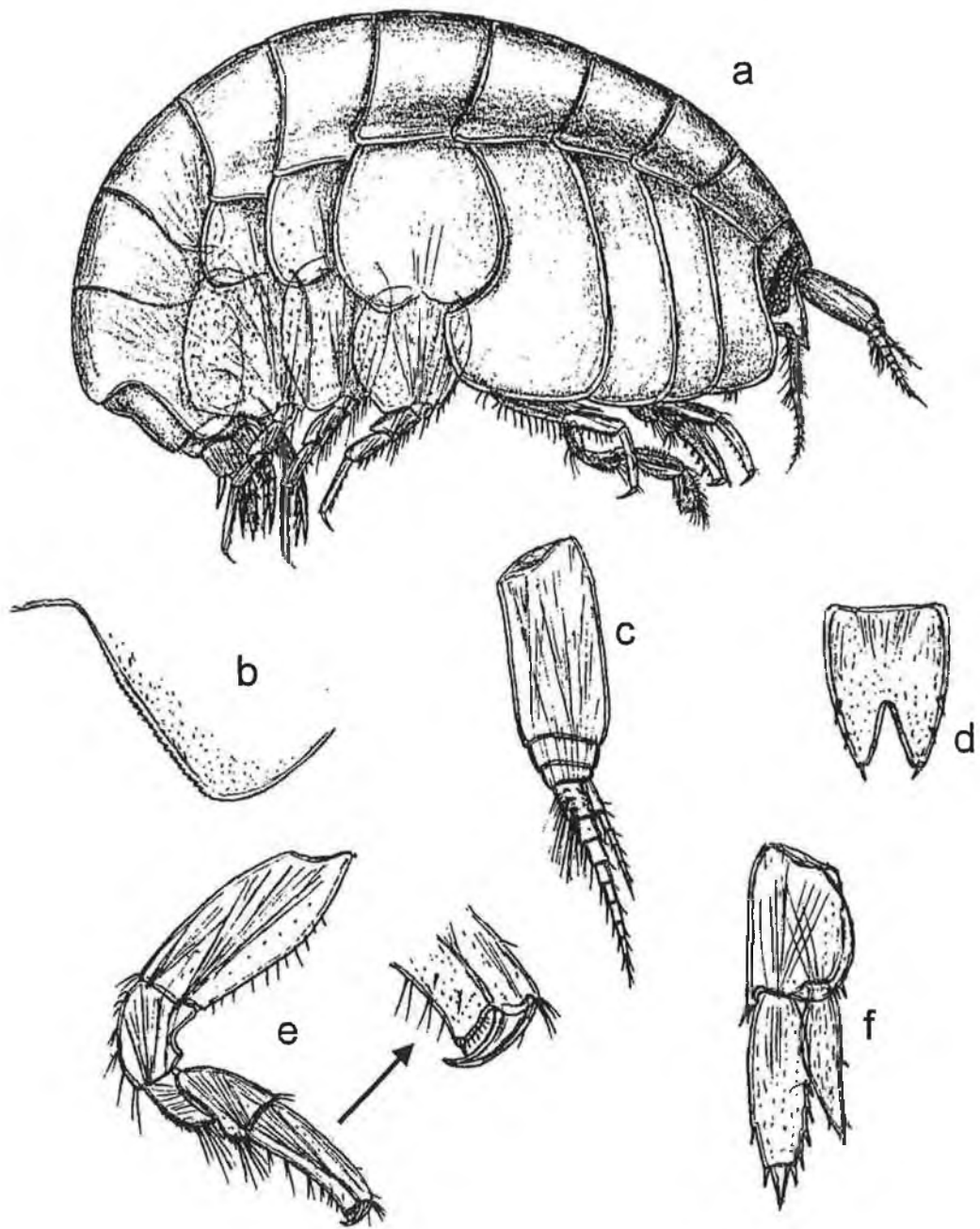


Figure 76: *Orchomene crispatus* (Goës, 1866). Female. (a) entire; (b) epimeron 3; (c) antenna 1; (d) telson; (e) gnathopod 1; (f) uropod 3. [After: G.O. Sars, 1891].

Orchmene grimaldii Chevreux, 1890

Fig. 77

Orchomene Grimaldii Chevreux, 1890: 164.

Orchomene grimaldii. – G. Karaman, 1973: 128, figs 12-13. – Diviacco & Ruffo, 1989: 530, fig. 354. – Barnard & Karaman, 1991: 508.

Orchomene humilis. – Bellan-Santini, 1974: 13, fig. 7.

Type material. Unknown.

Type locality. Off Monaco.

Material examined. G. Karaman, 1973: 128, figs 12-13; Diviacco & Ruffo, 1989: 530, fig. 354.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate; accessory flagellum present. Calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus palm transverse to slightly acute. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 basis about as long as broad.

Epimeron 3 posterodistal corner acute, posterior margin smooth. Urosomite 1 with dorsal depression followed by a rounded hump. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, emarginate.

Length. 3 mm.

Distribution. Mediterranean endemic.

Depth. Circalittoral to abyssal.

Female (sexually dimorphic characters)

Calceoli absent. Lateral cephalic lobes subacute, slightly more rounded than male.

Pleon Telson subequal in length and breadth, entire to slightly emarginate.

Length. 3.5–4 mm.

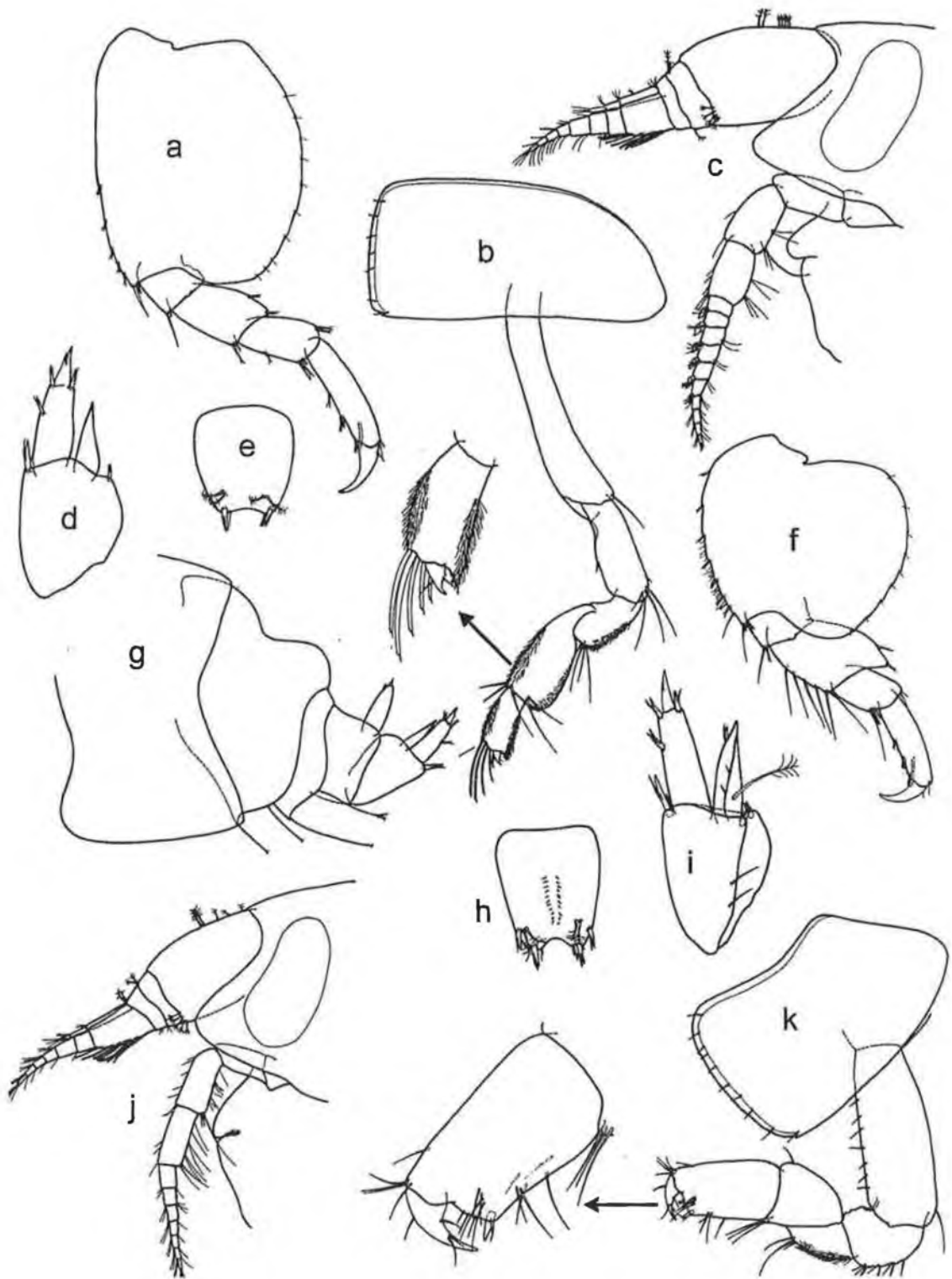


Figure 77: *Orchomene grimaldii* Chevreux, 1890. (a) pereopod 7; (b) gnathopod 2; (c) head and antennae, male; (d) uropod 3, female; (e) telson, female; (f) pereopod 5; (g) epimeron 3 and urosome, female; (h) telson, male; (i) uropod 3, male; (j) head and antennae, female; (k) gnathopod 1. [After: Diviacco & Ruffo, 1989].

Orchomene humilis (Costa, 1853)

Fig. 78

Lysianassa humilis Costa, 1853b: 172. – A. Costa, 1857: 187, pl. 1, fig. 6.
Anonyx humilis + *Anonyx Goëssii*. – Della Valle, 1893: 817, 920, pl. 26, figs 32-37.
Orchomene Batei G.O. Sars, 1882: 81. – G.O. Sars, 1890: 60, pl. 22.
Orchomene hanseni Meinert, 1890: 154, pl. 1, figs 18 – 24.
Orchomene humilis. – Chevreux, 1925: 285. – Chevreux & Fage, 1925: 59, figs 45-46. – Cecchini & Parenzan, 1935: 166, fig. 10. – G. Karaman, 1973: 139, fig. 18. – Oleröd, 1975: 207, figs 32-43, 60. – Lincoln, 1979a: 70, fig. 25h-k, fig. 26a-d. – Costello *et al.*, 1989: 34. – Diviacco & Ruffo, 1989: 521, figs 355-356. – Barnard & Karaman, 1991: 508. – Dauvin & Sorbe, 1995: 456.

Type material. Probably lost.

Type locality. Napoli.

Material examined. G.O. Sars, 1890: 60, pl. 22; Chevreux & Fage, 1925: 59, figs 45-46; G. Karaman, 1973: 139, fig. 18; Lincoln, 1979a: 70, fig. 25h-k, fig. 26a-d; Diviacco & Ruffo, 1989: 521, figs 355-356.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate (not quite as long as remaining articles combined). Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus compressed, distinctly shorter than propodus; propodus palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute, posterior margin weakly serrated. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson more than twice as long as broad, slightly cleft.

Length. 5–6.5 mm.

Distribution. Northeast Atlantic (from southern Norway to Canary Islands), Mediterranean.

Depth. Infralittoral to circalittoral.

Ecology. According to Diviacco & Ruffo (1989) this species is found 'among various algae, in *Posidonia* and *Zostera* beds, on coralline bottoms, often in association with sponges, ascidians and bryzoans'.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Lateral cephalic lobes rounded. Telson distinctly longer than broad.

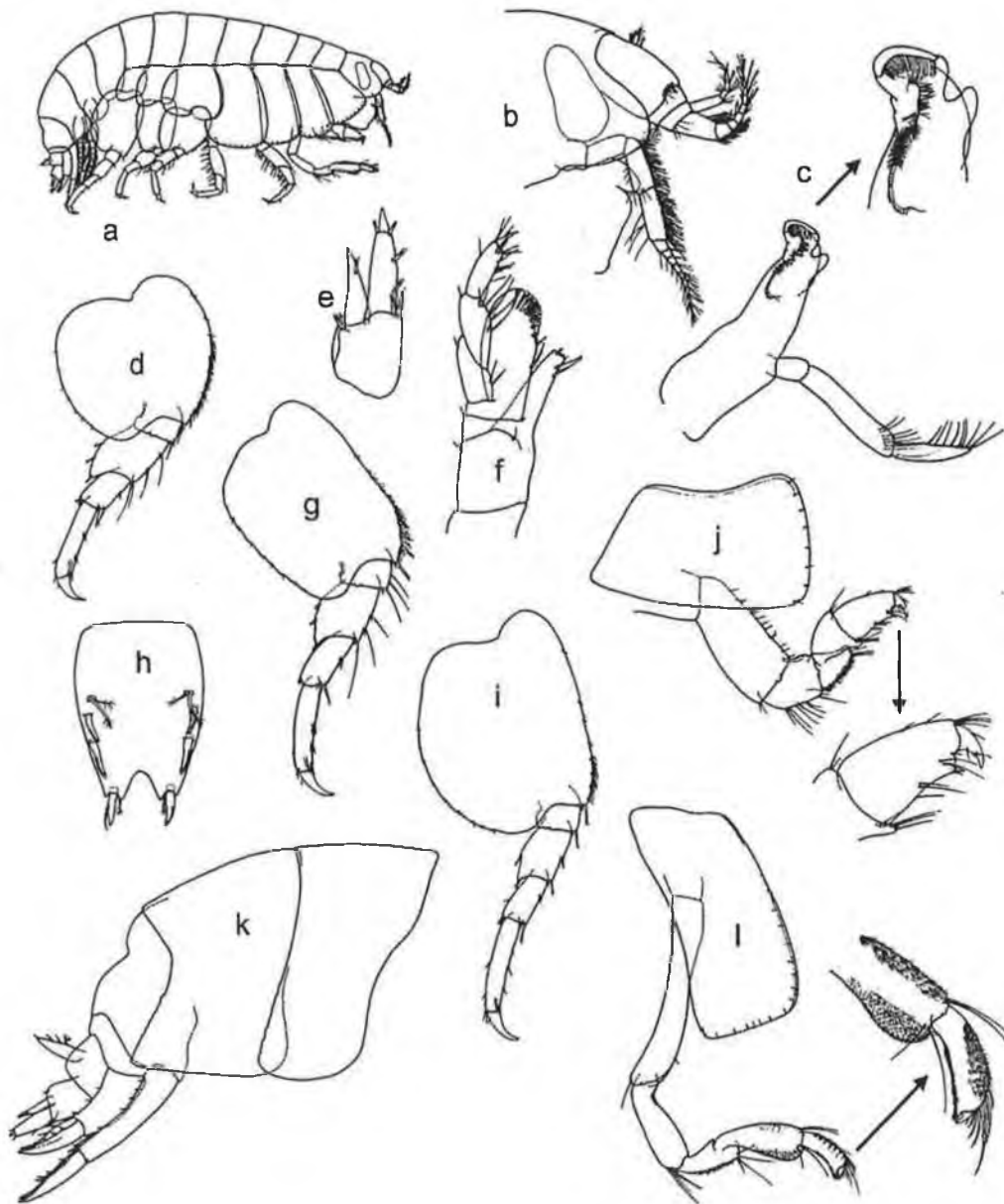


Figure 78: *Orchomene humilis* (Costa, 1853). Female. (a) entire; (b) head and antennae; (c) mandible; (d) pereopod 5; (e) uropod 3; (f) maxilliped; (g) pereopod 6; (h) telson; (i) pereopod 7; (j) gnathopod 1; (k) epimeron 2-3, urosome; (l) gnathopod 2.

[After: Diviacco & Ruffo, 1989].

Orchomene macroserratus Shoemaker, 1930

Fig. 79

Orchomene macroserrata Shoemaker, 1930b: 13, figs 8-9. – Gurjanova, 1962: 149, fig. 40. – Bryazgin, 1974: 1573.

Orchomene macroserratus. – Barnard & Karaman, 1991: 509.

Type material. HOLOTYPE: USNM, Cat. No. 35774.

Type locality. Bay of Fundy, near Grand Manan.

Material examined. Shoemaker, 1930b: 13, figs 8-9; Gurjanova, 1962: 149, fig. 40.

Description based on mature female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2; accessory flagellum present. Antenna 2 less than 40% of body length. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus compressed, distinctly shorter than propodus; propodus palm transverse; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner acute, posterior margin serrated. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Length. 8 mm.

Distribution. North Atlantic.

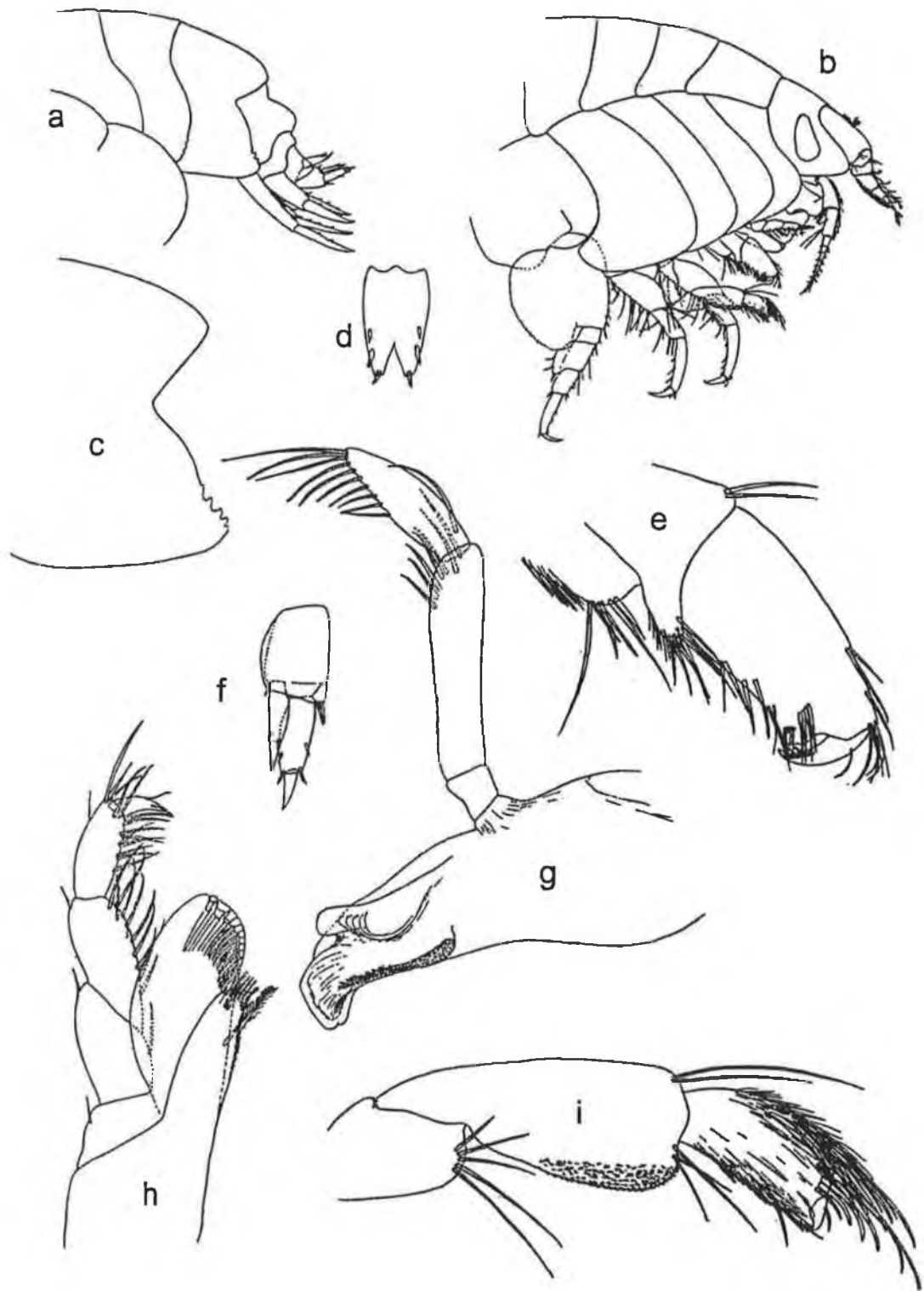


Figure 79: *Orchomene macroserratus* Shoemaker, 1930. Female. (a) pleosome; (b) head, antennae, and pereopods 1-5; (c) epimeron 3; (d) telson; (e) gnathopod 1; (f) uropod 3; (g) mandible; (h) maxilliped; (i) gnathopod 2. [After: Shoemaker, 1930b].

Orchomene massiliensis Ledoyer, 1977

Fig. 80

Orchomene massiliensis Ledoyer, 1977: 382, fig. 20. – Diviaco & Ruffo, 1989: 523, fig. 357.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 256, slides 489-491.
PARATYPE: MSNV Reg. no. MVR-Cr 256, in alcohol.

Type locality. Marseille.

Material examined. Diviaco & Ruffo, 1989: 523, fig. 357.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate; accessory flagellum present. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus compressed, distinctly shorter than propodus; propodus margins tapering slightly, palm slightly acute; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 basis about as long as broad.

Epimeron 3 posterodistal corner acute, posterior margin serrated. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson more than twice as long as broad, emarginate or slightly cleft.

Length. 4.5 mm.

Distribution. Mediterranean endemic.

Depth. Circalittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent. Telson distinctly longer than broad, emarginate.

Length. 5.5 mm.

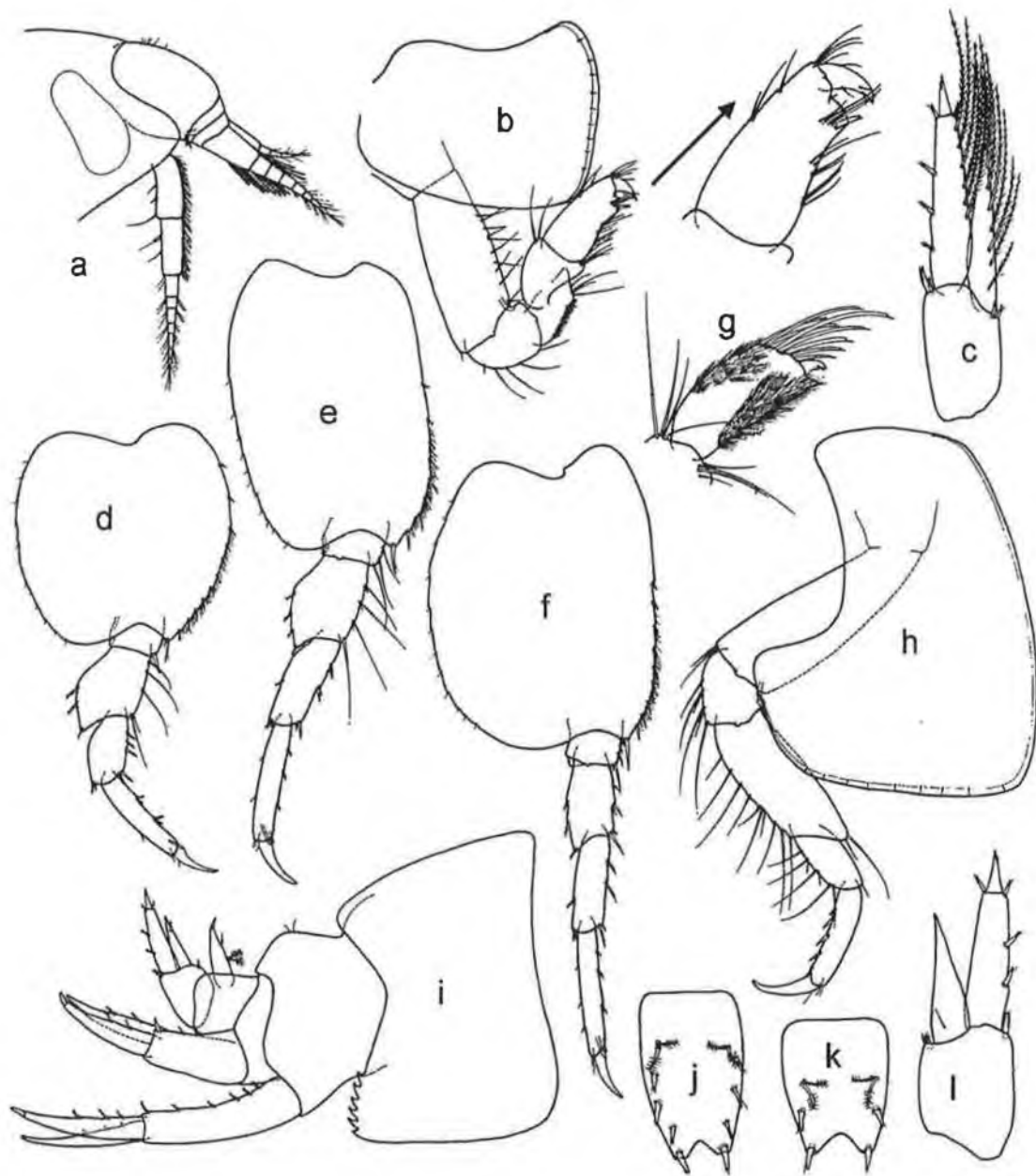


Figure 80: *Orchomene massiliensis* Ledoyer, 1977. (a) head and antennae, female; (b) gnathopod 1; (c) uropod 3, male; (d) pereopod 5; (e) pereopod 6; (f) pereopod 7; (g) gnathopod 2 propodus; (h) pereopod 4; (i) epimeron 3 and urosome; (j) telson, male; (k) telson, female; (l) uropod 3, female. [After: Diviacco & Ruffo, 1989].

Orchomene pectinatus G.O. Sars, 1882

Fig. 81

Orchomene pectinatus G.O. Sars, 1882: 80, pl. 3, fig. 5. – G.O. Sars, 1895: 64, pl. 23, fig. 3. – Gurjanova, 1951: 205, fig. 74. – Gurjanova, 1962: 147. – Barnard & Karaman, 1991: 509. – Dauvin & Sorbe, 1995: 456.

Type material. SYNTYPES: ZMO Reg. Nos F1767, F1768, F13207.

Type locality. Unknown.

Material examined. G.O. Sars, 1895: 64, pl. 23, fig. 3; Gurjanova, 1962: 147.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; epistome projecting anteriorly, greatly rounded.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded to acute, posterior margin serrated. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Distribution. Norwegian Sea, Arctic Sea, Iceland.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent.

Length. 12 mm.

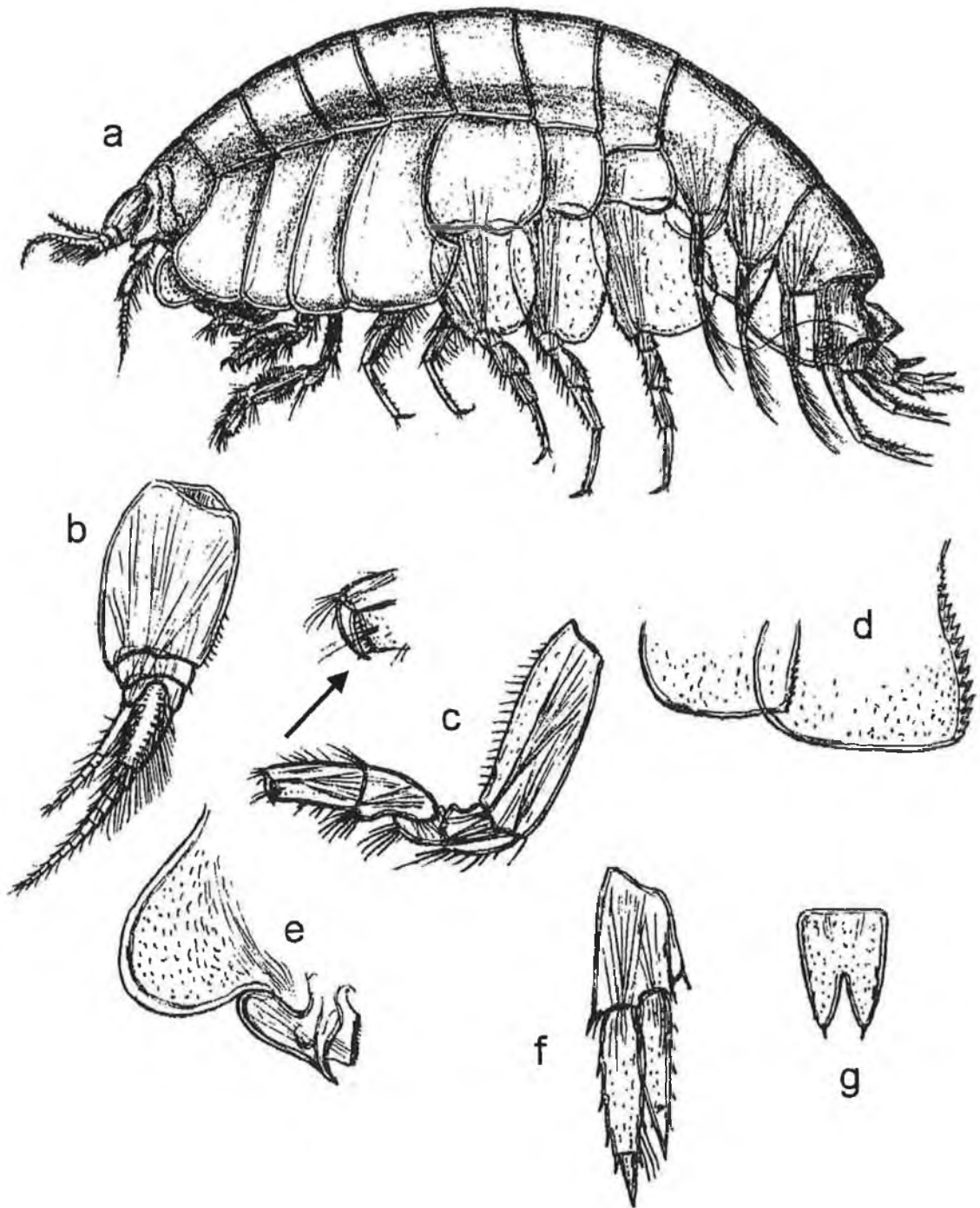


Figure 81: *Orchomene pectinatus* G.O. Sars, 1882. Female. (a) entire; (b) antenna 1; (c) gnathopod 1; (d) epimeron 2-3; (e) epistome; (f) uropod 3; (g) telson. [After: Sars, 1891].

Orchomene serratus Boeck, 1861

Fig. 82

Anonyx serratus Boeck, 1861: 641. – Della Valle, 1893: 819.

Orchomene serratus. – Boeck, 1871: 35. – Boeck, 1872: 172, pl. 5, fig. 2. – G.O. Sars, 1895: 62, pl. 23, fig. 1, suppl. pl. IV, fig. 1. – Barnard & Karaman, 1991: 509.

Orchomene serrata. – Stebbing 1906: 44. – Stephensen, 1923b: 66.

Type material. SYNTYPES: ZMO Reg. No. F13118/ F13120 (as *Anonyx serratus*).

Type locality. Unknown.

Material examined. Della Valle, 1893: 819; G.O. Sars, 1895: 62, pl. 23, fig. 1, suppl. pl. IV, fig. 1; Stebbing 1906: 44; Stephensen, 1923b: 66.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 subequal to body length. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with slightly concave anterior margin; ischium short; carpus compressed, distinctly shorter than propodus; propodus palm transverse to slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Pereopod 7 basis posterior margin slightly serrated.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute, posterior margin serrated. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, uropod 3 rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Length. 6–10 mm.

Distribution. Norwegian Sea, Arctic Sea, Iceland, Faeroes.

Depth. Circalittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 2 less than 40 % of body length; calceoli absent. Lateral cephalic lobes subacute.

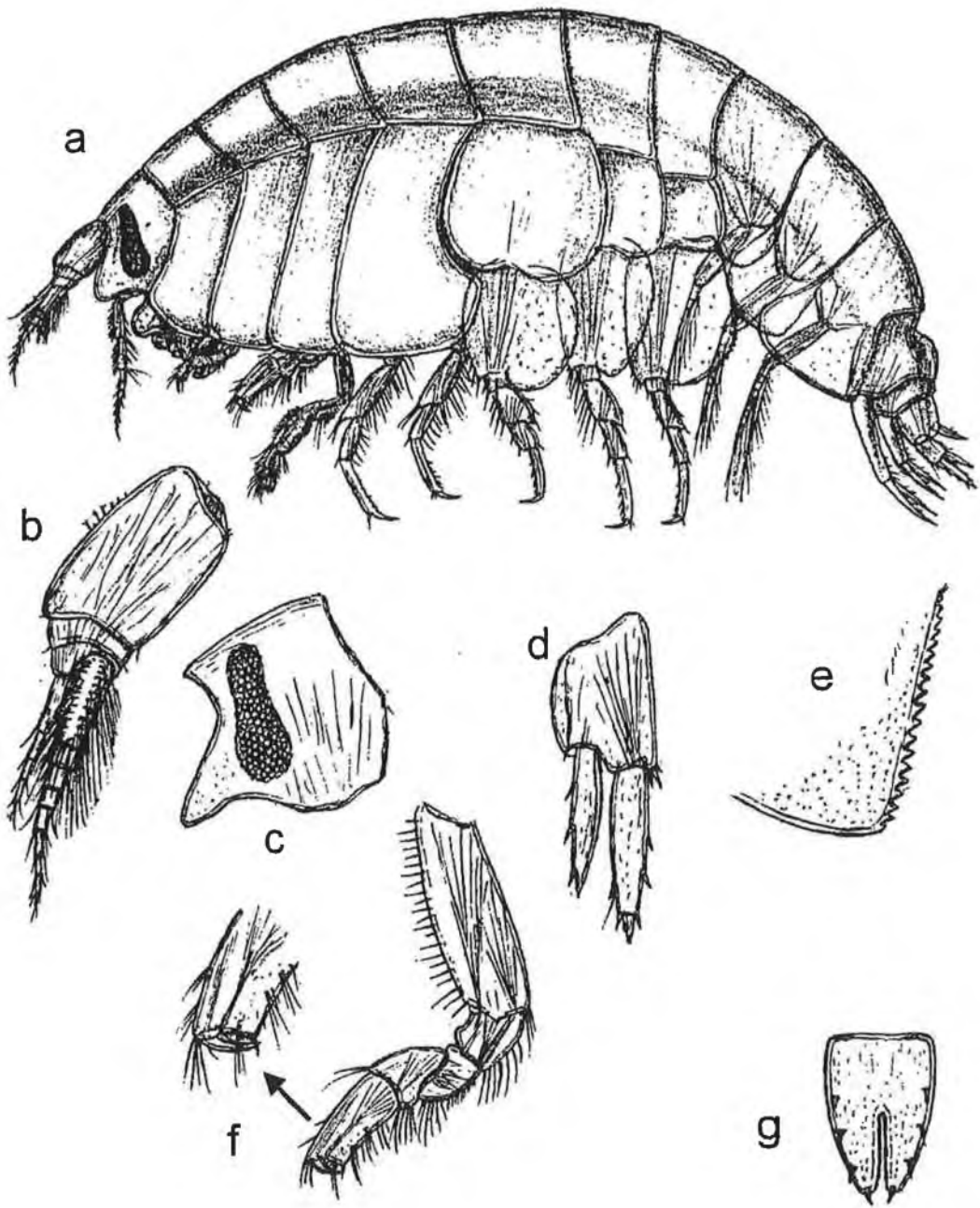


Figure 82: *Orchomene serratus* Boeck, 1861. (a) entire, female; (b) antenna 1, female; (c) head, male; (d) uropod 3, female; (e) epimeron 3; (f) gnathopod 1; (g) telson.

[After: G.O. Sars, 1891].

Orchomene similis Chevreux, 1912

Fig. 83

Orchomene similis Chevreux, 1912: 283, fig. 1. – Chevreux & Fage, 1925: 60, fig. 47.
– Diviacco & Ruffo, 1989: 525, fig. 358. – Barnard & Karaman, 1991: 509.

Type material. Unknown.

Type locality. Coast of Brittany.

Material examined. Chevreux & Fage, 1925: 60, fig. 47; Diviacco & Ruffo, 1989: 525, fig. 358.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 as long as or longer than body, calceoli present. Eyes large, suboval. Lateral cephalic lobes acute. Epistome projecting acutely forward. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with slightly concave anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus palm transverse to slightly acute; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 basis about as long as broad.

Epimeron 3 posterodistal corner acute, posterior margin smooth. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, emarginate.

Length. 3 mm.

Distribution. Atlantic Ocean (coast of Brittany), Mediterranean.

Depth. Infralittoral.

Ecology. Found on sandy bottoms.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent. Lateral cephalic lobes subacute. Telson subequal in length and breadth, entire.

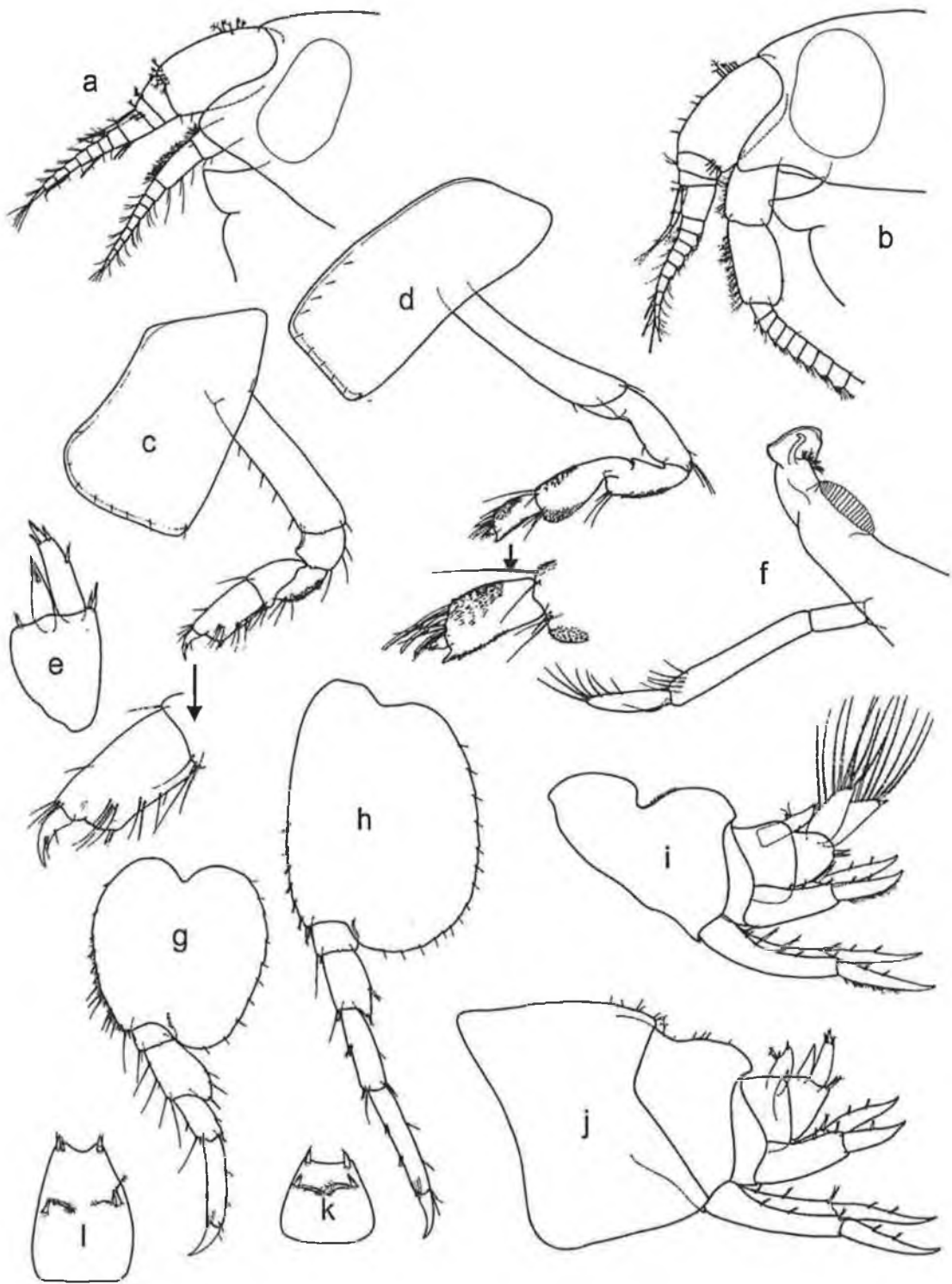


Figure 83: *Orchomene similis* Chevreux, 1912. (a) head, antennae, and epistome, female; (b) head, antennae, and epistome, male; (c) gnathopod 1; (d) gnathopod 2; (e) uropod 3, female; (f) mandible; (g) pereopod 5; ; (h) pereopod 7; (i) urosome, male; (j) epimeron and urosome, female; (k) telson, female; (l) telson, male.

[After: Diviacco & Ruffo, 1989].

Orchomenella commensalis Chevreux & Fage, 1925

Fig. 84

Orchomenella commensalis Chevreux & Fage, 1925: 72, fig. 63.

Orchomene commensalis. – Barnard & Karaman, 1991: 508.

Type material. Unknown.

Type locality. Grandcamp-les-Bains.

Material examined. Chevreux & Fage, 1925: 72, fig. 63.

Description based on mature female, male unknown.

Description. Antenna 1 slightly shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus palm transverse to slightly acute; dactylus well developed. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into an anterior lobe; basis about as long as broad.

Epimeron 3 posterodistal corner rounded or acute, posterior margin smooth. Uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 3.5 mm.

Ecology. In the original description of this species by Chevreux & Fage (1925), the authors mention that the type of this specimen was found in the shell of the common whelk, *Buccinum undatum* L., inhabited by a hermit crab, *Pagurus bernhardus* (L.).

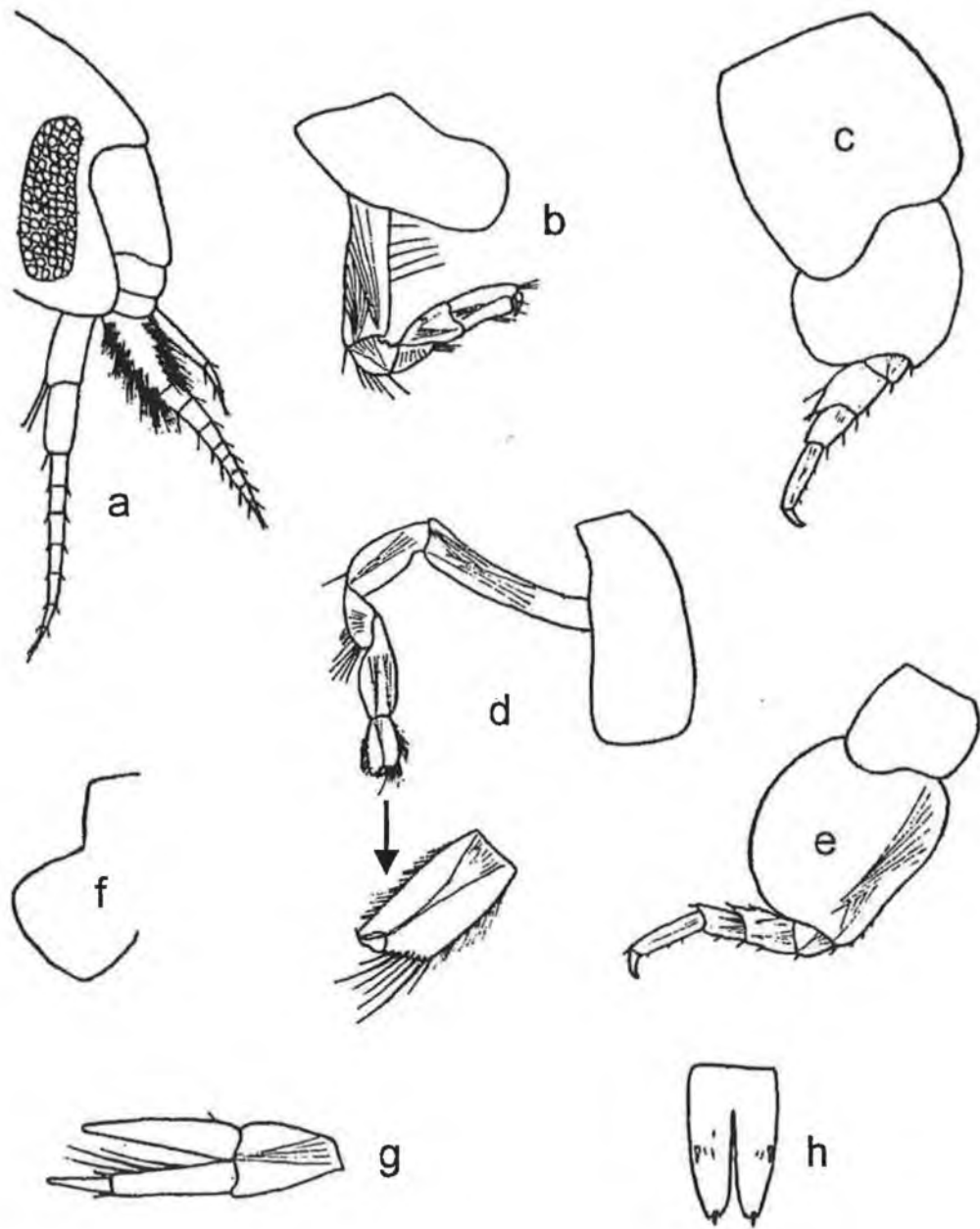


Figure 84: *Orchomenella commensalis* Chevreux & Fage, 1925. Female. (a) head and antennae; (b) gnathopod 1; (c) pereopod 5; (d) gnathopod 2; (e) pereopod 7; (f) epimeron 3; (g) uropod 3; (h) telson. [After: Chevreux & Fage, 1925].

Orchomenella crenata Chevreux & Fage, 1925

Fig. 85

Orchomenella crenata Chevreux & Fage, 1925: 71, figs 60-61. – Chevreux, 1925: 288. – Reid, 1951: 195.

Orchomenella nana. – Diviacco & Ruffo, 1989: 525, fig. 359 (in part).

Orchomene crenatus. – Barnard & Karaman, 1991: 508.

Type material. Presumed lost.

Type locality. Villefranche.

Material examined. MOM 37 3149; Chevreux, 1925: 288; Chevreux & Fage, 1925: 71, figs 60-61; Diviacco & Ruffo, 1989: fig. 359 (in part); Female, 3 mm, Irish Sea (52°37.78'N 06° 04.70' W), 23 m.

Description based on female, male unknown.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate. Calceoli absent. Eyes large, suboval. Lateral cephalic lobes narrowly rounded to subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus palm acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a slight posterior lobe; basis distinctly longer than broad.

Epimeron 3 posterodistal corner acute, with 2 distinct notches on posterior margin. Urosomite 1 with dorsal depression and rounded carina. Uropods 1-2 rami subequal; uropod 2 inner ramus with slight marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson longer than broad, deeply cleft.

Length. 2.5 mm.

Distribution. Mediterranean; Atlantic coasts of France; Irish Sea; Atlantic coast of Northwest Africa.

Depth. Infralittoral.

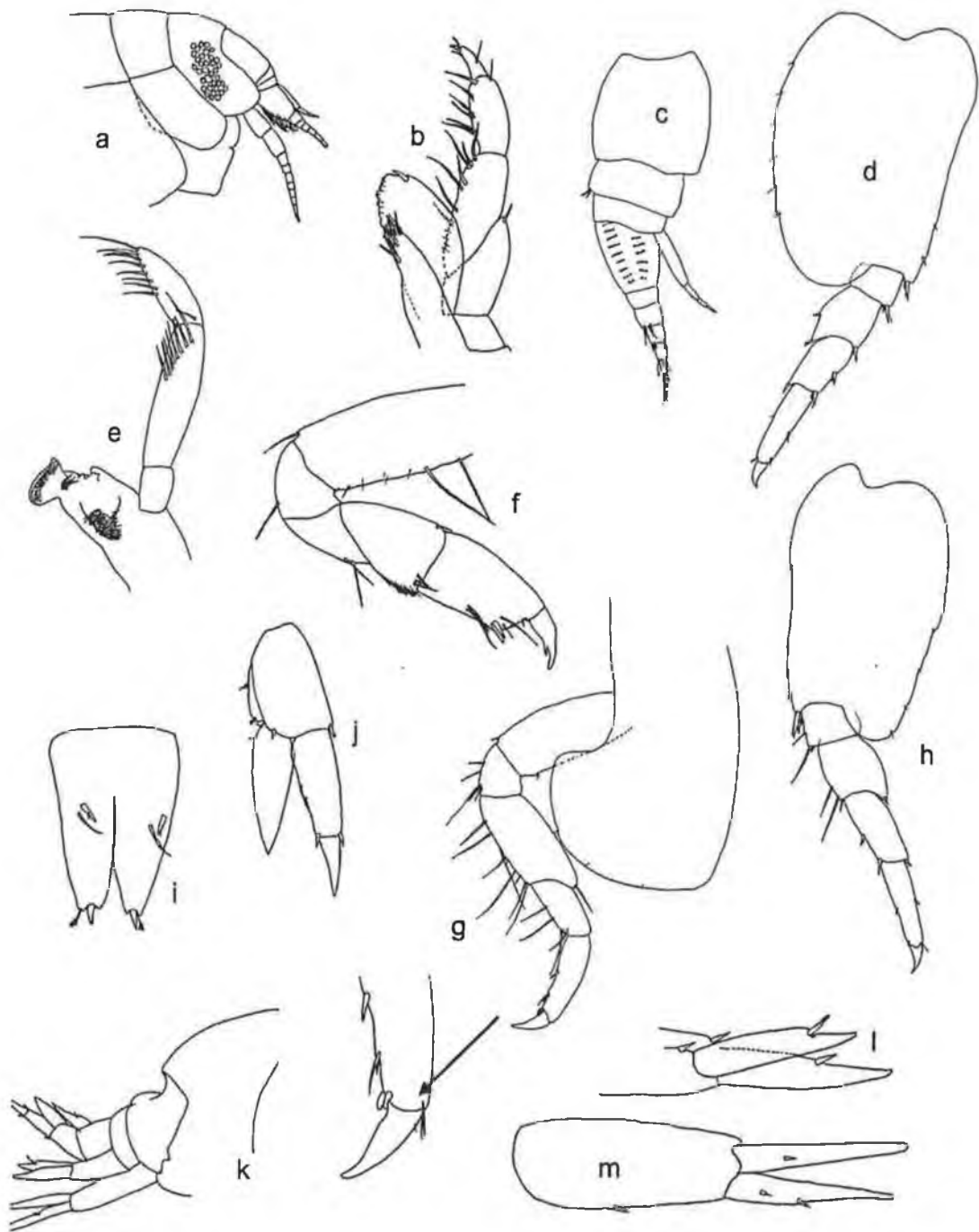


Figure 85: *Orchomenella crenata* Chevreux & Fage, 1925. Female. (a) head and antennae, (b) maxilliped; (c) antenna 1; (d) pereopod 5; (e) mandible; (f) gnathopod 1; (g) pereopod 4; (h) pereopod 6; (i) telson; (j) uropod 3; (k) epimeron 3 and urosome; (l) uropod 2; (m) uropod 1. [Illustration by author].

Orchomenella minuta (Krøyer, 1846)

Fig. 86

Anonyx minutus Krøyer, 1846: 23. – Bate & Westwood, 1861: 108, fig.

Orchomenella minuta. – G.O. Sars, 1891: 66, pl. 24, fig. 1. – Shoemaker, 1930b: 17. – Gurjanova, 1951: 284, fig. 151. – Gurjanova, 1962: 154, figs 41-43. – Bousfield, 1973: 147, pl. XLII, fig. 2.

Orchomene minuta. – Barnard & Karaman, 1991: 509, fig. 89Q.

Type material. SYNTYPE: ZMUC CRU-7320 (as *Anonyx minutus*).

Type locality. Unknown.

Material examined. ZMUC CRU-7320; G.O. Sars, 1891: 66, pl. 24, fig. 1; Gurjanova, 1962: 154, figs 41-43.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus palm slightly acute; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis about as long as broad. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin weakly serrated.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute or very slightly produced, forming a very small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Distribution. Öresund, Bohuslän, Norwegian Seas, Arctic Seas, Iceland.

Depth. Circalittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent.

Length. 6 mm.

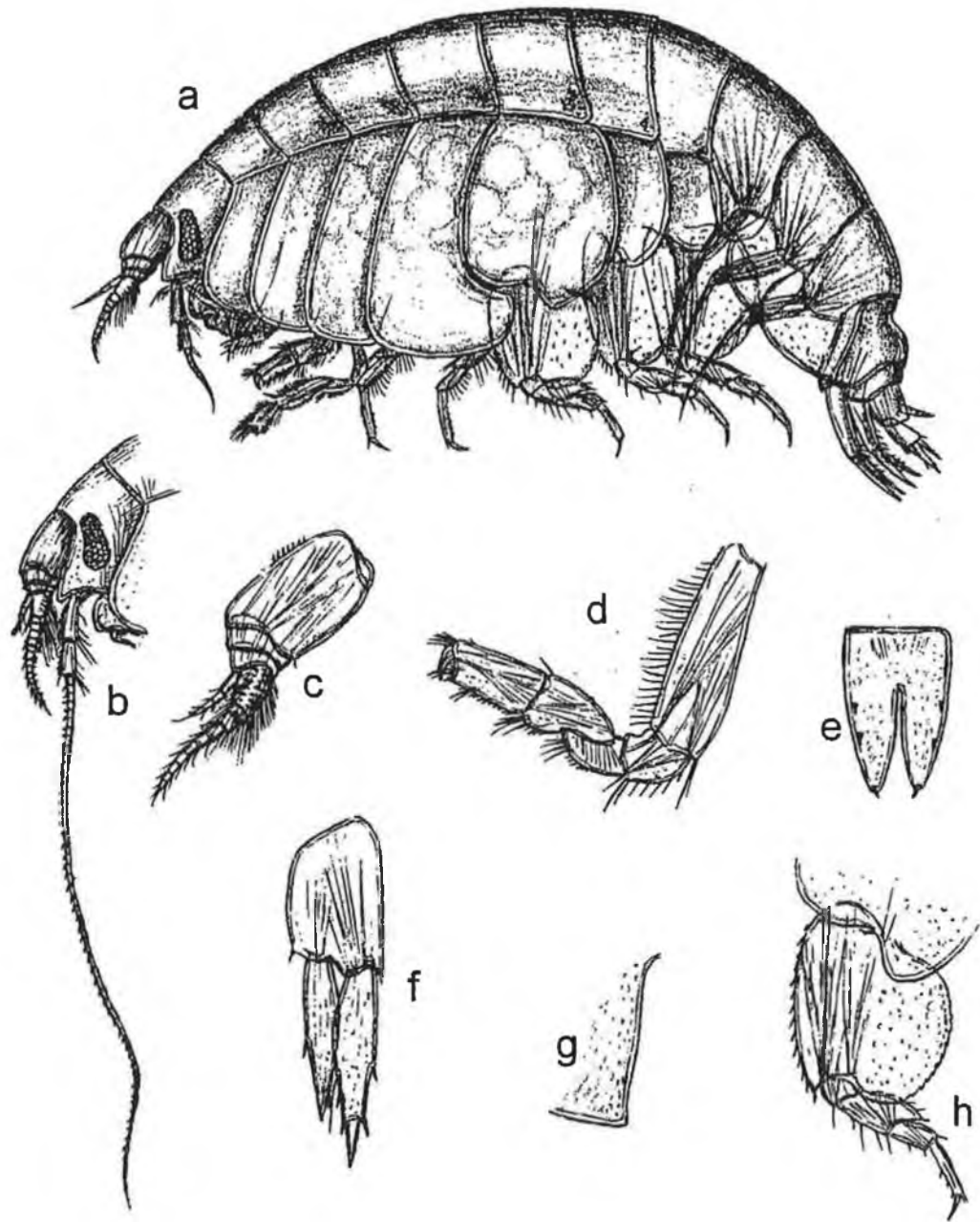


Figure 86: *Orchomenella minuta* (Krøyer, 1846). (a) entire, female; (b) head and antennae, male; (c) antenna 1; (d) gnathopod 1; (e) telson; (f) uropod 3, female; (g) epimeron 3; (h) pereopod 5. [After: G.O. Sars, 1891].

Orchomenella nana (Krøyer, 1846)

Fig. 87

Anonyx nanus Krøyer, 1846: 30.

?*Orchomenella ciliata*. – G.O. Sars, 1891: 69, pl. 25, fig. 2.

Anonyx pinguis. – (non Boeck, 1861) Della Valle, 1893: 821, pl. 28, figs 22-35.

Orchomenella nanus. – Stebbing, 1906: 81.

Orchomenella nana. – Chevreux & Fage, 1925: 71, fig. 62. – Chevreux, 1925: 288. – Reid, 1951: 195. – Diviacco & Ruffo, 1989: 525, fig. 359 (in part). – Dauvin & Sorbe, 1995: 443, 447, 449, tables 4-5, 456.

Orchomene nana. – G. Karaman, 1973: 133, figs 14-18. – Lincoln, 1979a: 70, figs 25a-g, 26e-h. – Costello *et al.*, 1989: 34. – Dauvin *et al.*, 1994: 550, table 3.

Orchomene nanus. – Barnard & Karaman, 1991: 509.

Type material. Lost (ex ZMUC CRU-7476).

Type locality. Kattegat.

Material examined. ZMUC CRU-4999; Stebbing, 1906: 81; Chevreux & Fage, 1925: 71, fig. 62; Diviacco & Ruffo, 1989: 525, fig. 359 (in part); Lincoln, 1979a: 70, figs 25a-g, 26e-h.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 as long as remaining articles combined. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus short, of subequal length to propodus; propodus palm slightly acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopods 3 and 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa produced into a slight posterior lobe; basis slightly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute, posterior margin smooth. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus with slight marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with 3 inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 3 – 4.5 mm.

Distribution. Northeast Atlantic, North Sea, Mediterranean.

Depth. Infralittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Lateral cephalic lobes rounded.

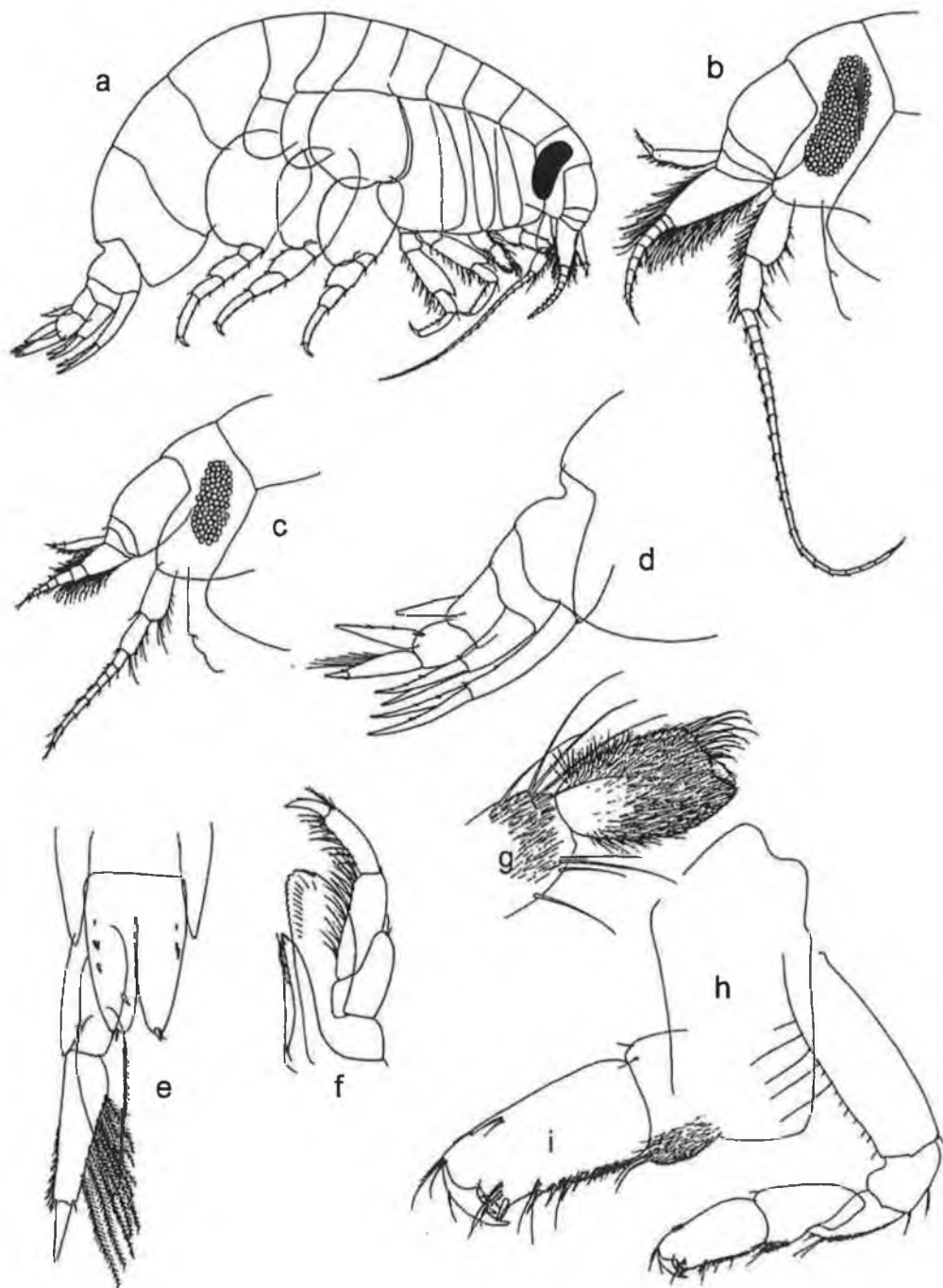


Figure 87: *Orchomenella nana* (Krøyer, 1846). (a) entire, male; (b) head and antennae, male; (c) head and antennae, female; (d) epimeron 3 and urosome; (e) telson and uropod 3; (f) maxilliped; (g) gnathopod 2; (h) gnathopod 1; (i) gnathopod 1 propodus. [After: Lincoln, 1979a].

Orchomenella obtusa (G.O. Sars, 1895)

Fig. 88

Orchomenopsis obtusa G.O. Sars, 1895: 74, 684, pl. 26, fig. 2. – Stebbing, 1906: 85.

Orchomenella obtusa. – Hurley, 1963: 10, 13.

Orchomene obtusus. – Barnard & Karaman, 1991: 509.

Orchomene obtusa. – Barnard & Karaman, 1991: fig. 89C.

Type material. ?ZMO.

Type locality. Trondjemsfjord.

Material examined. G.O. Sars, 1895: 74, 684, pl. 26, fig. 2; Stebbing, 1906: 85.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less between 40 to 60% of body length, calceoli present. Eyes large, suboval. Lateral cephalic lobes broadly rounded. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, distinctly shorter than propodus; propodus palm transverse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal. Telson more than twice as long as broad, deeply cleft.

Length. 12 mm.

Distribution. Bohuslän, Skagerrak, Norwegian Sea, off southwest Iceland(?).

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length, calceoli absent.

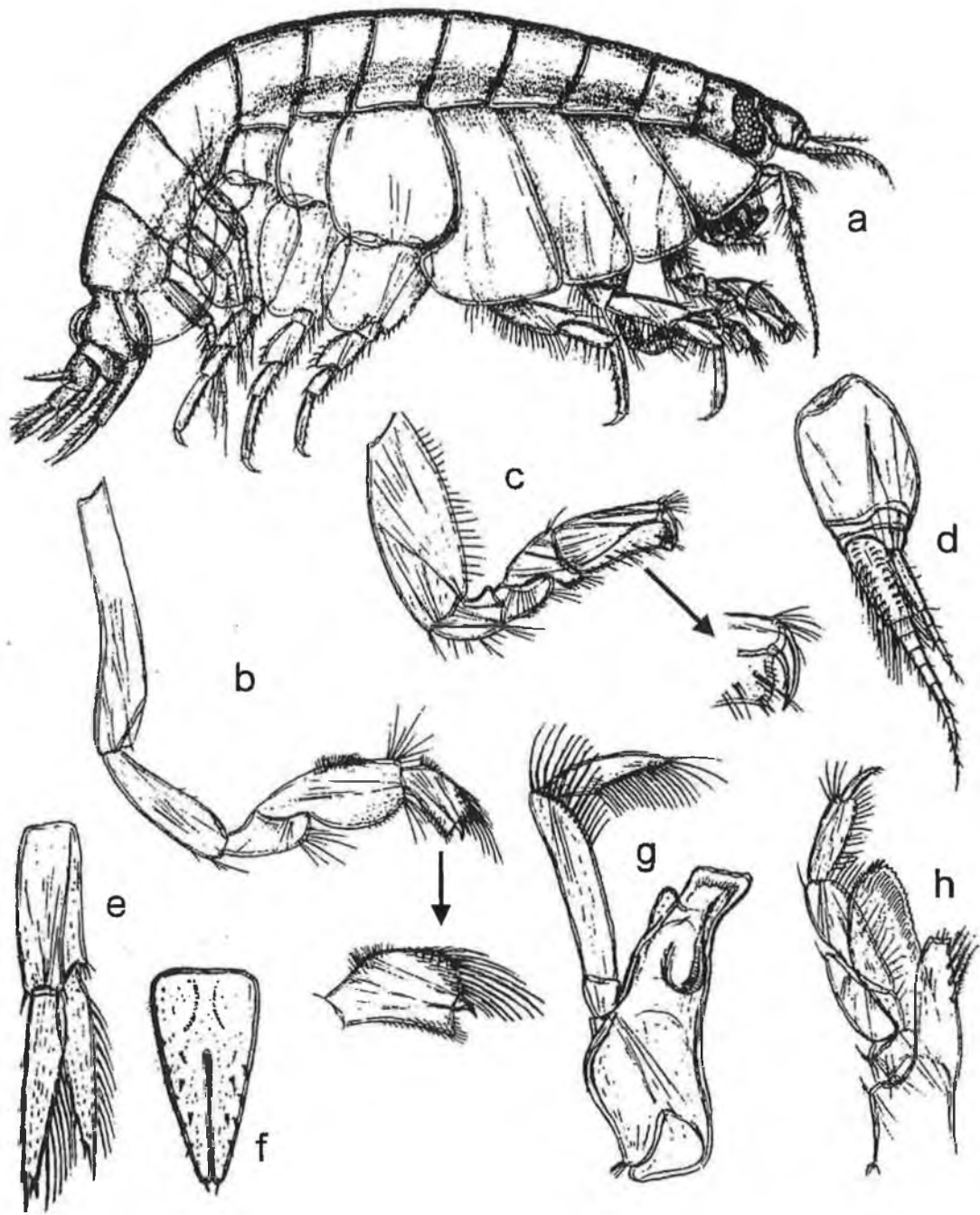


Figure 88: *Orchomenella obtusa* (G.O. Sars, 1895). Female. (a) entire; (b) gnathopod 2; (c) gnathopod 1; (d) antenna 1; (e) uropod 3; (f) telson; (g) mandible; (h) maxilliped. [After: G.O. Sars, 1895].

Orchomenella pinguis (Boeck, 1861)

Fig. 89

Orchomene pinguis Boeck, 1861: 642. – Boeck, 1871: 36. – Barnard & Karaman, 1991: 509.

Orchomenella pinguis. – G.O. Sars, 1891: 67, pl. 24, fig. 2. – Shoemaker, 1930b: 17. – Gurjanova, 1951: 282, fig. 150. – Gurjanova, 1962: 165, figs 48–49. – Bousfield, 1973: 148, pl. XLII, fig. 1.

Type material. Unknown.

Type locality. Unknown.

Material examined. MOM 373427, 60 specimens; G.O. Sars, 1891: 67, pl. 24, fig. 2; Gurjanova, 1962: 165, figs 48–49.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus compressed, distinctly shorter than propodus; propodus palm transverse. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner slightly rounded or acute. Urosomite 1 with dorsal depression, followed by a rounded dorsal carina. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction; uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, cleft to about 70%.

Distribution. Skagerrak, North Sea, Norwegian Sea, Arctic Seas, Bay of Biscay, Mediterranean(?).

Depth. Bathyal.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent. Lateral cephalic lobes subacute, much broader than male.

Length. 7.5 mm.

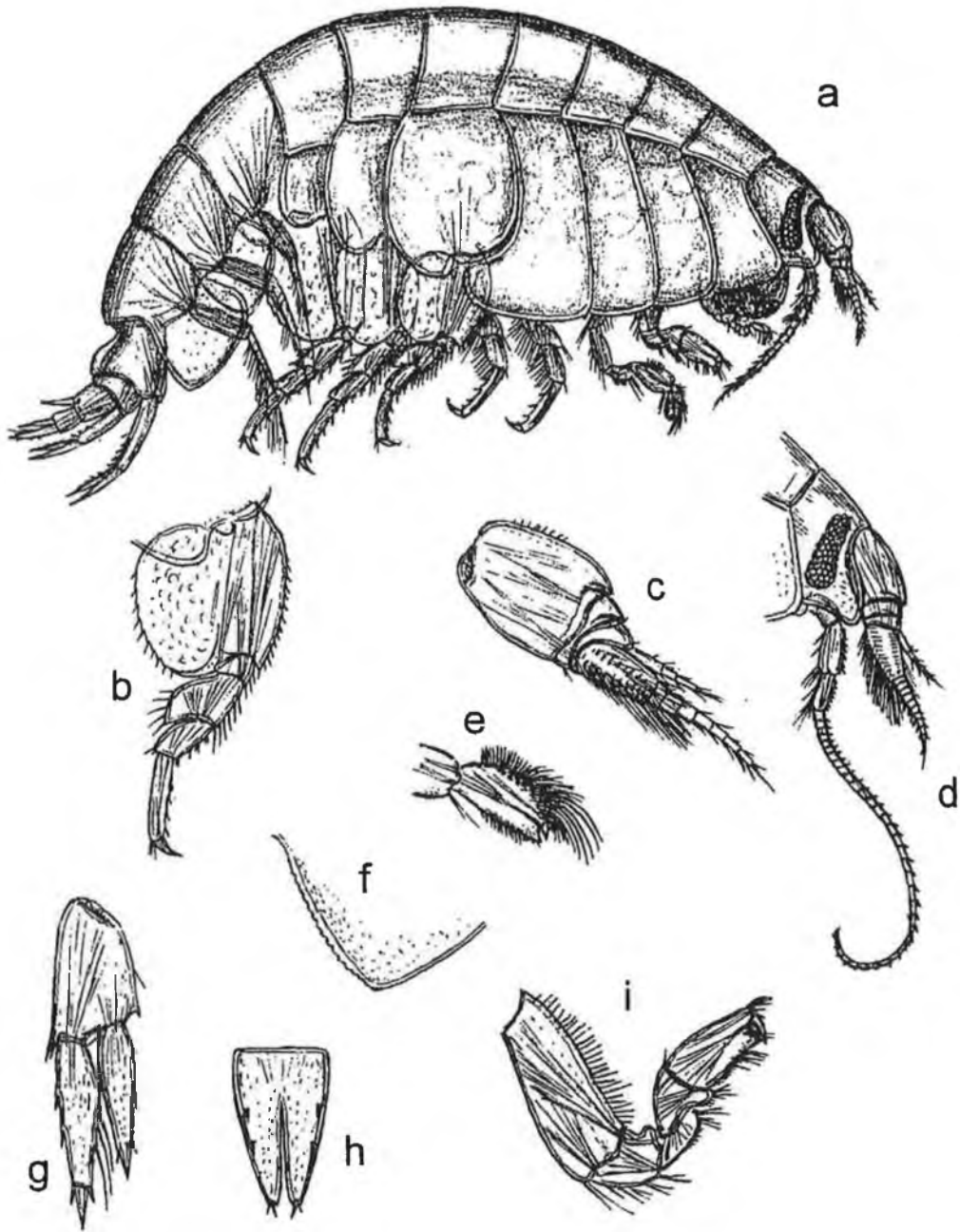


Figure 89: *Orchomenella pinguis* (Boeck, 1861). (a) entire, female; (b) pereopod 5; (c) antenna 1; (d) head and antennae, male; (e) gnathopod 2 propodus; (f) epimeron 3; (g) uropod 3; (h) telson; (i) gnathopod 1. [After: G.O. Sars, 1891].

Paracallisoma alberti Chevreux, 1903

Fig. 90

Paracallisoma alberti Chevreux, 1903: 84, figs 2-3. – Schellenberg, 1926b: 258, fig. 11. – Chevreux, 1935: pl. 1, fig. 3, pl. 9, fig. 2, pl. 16, fig. 5. – Gurjanova, 1962: 309, fig. 102. – Barnard & Karaman, 1991: 511.

Type material. MOM 37 0584, on 19 slides.

Type locality. Azores (37°52'N 27°03'E).

Material examined. Chevreux, 1903: 84, figs 2-3; Gurjanova, 1962: 309, fig. 102.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium elongate, more than twice as long as broad; carpus long, distinctly longer than propodus; dactylus rudimentary. Gnathopod 2 subchelate; carpus longer than propodus; dactylus well developed. Pereopod 5 coxa equilobate; basis distinctly longer than broad.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 13 mm.

Distribution. Cosmopolitan.

Depth. Bathyal to abyssal.

Ecology. Pelagic, bathyal-abyssal.

Remarks. The depth range for this species is unclear. In his original description, Chevreux (1903) lists capture depths from 2178-2660 m. Barnard & Karaman (1991) give tentative depths of ?1000-?7625 m. Gurjanova (1962) gives a depth of 1000-4400 m in the tropical parts of the Atlantic and Pacific oceans, 1150-3330 m in the Bering Sea and in the Sea of Okhotsk, near the western coast of Kamchatka, at a depth of 664 m. Thus, the species is included here due to this uncertainty regarding depth.

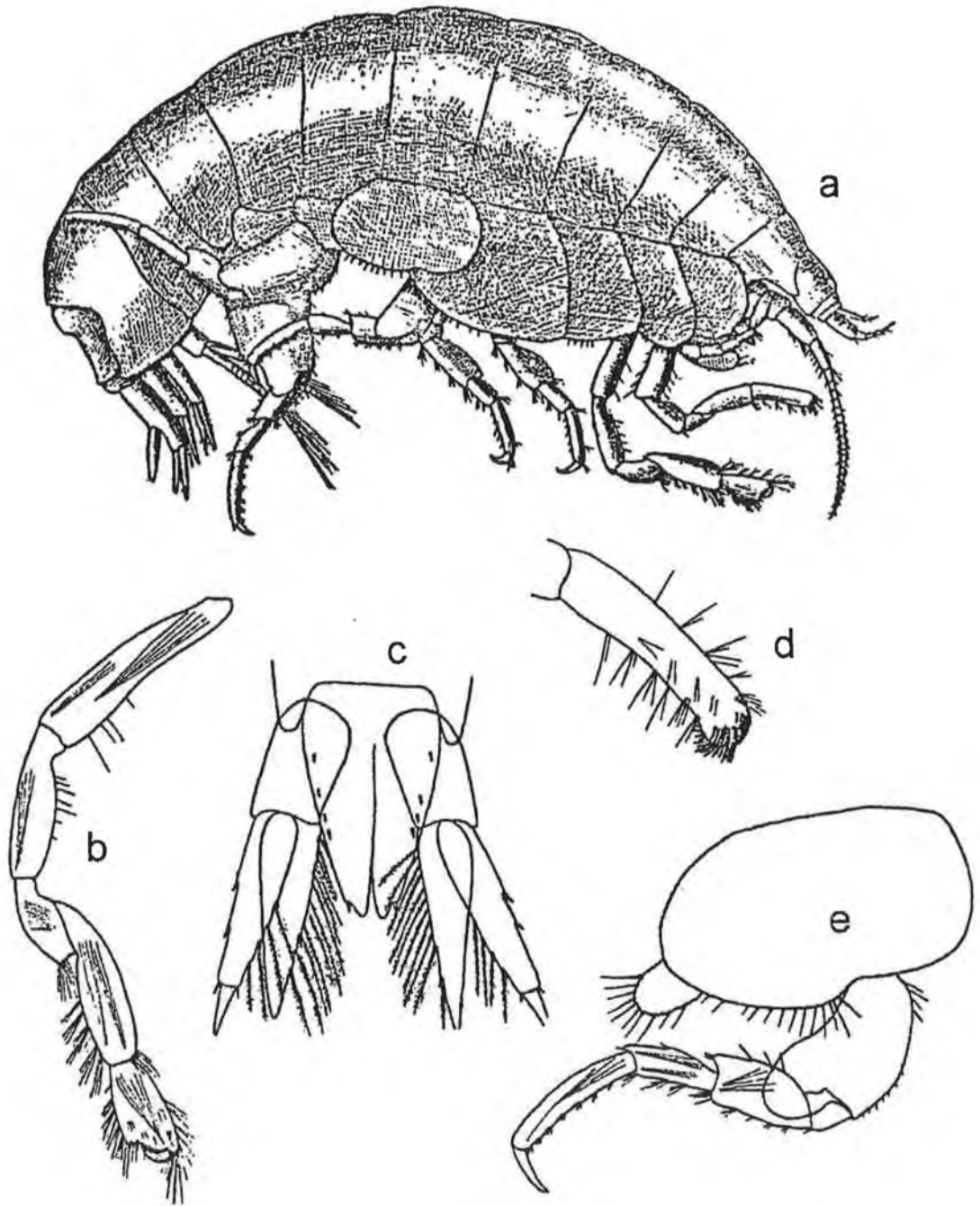


Figure 90: *Paracallisoma alberti* Chevreux, 1903. Female. (a) entire; (b) gnathopod 2; (c) uropod 3 and telson; (d) gnathopod 1 propodus; (e) pereopod 5. [After: Chevreux, 1903].

Paracentromedon crenulatum (Chevreux, 1900)

Fig. 91

Centromedon crenulatum Chevreux, 1900: 26, pl. 5, fig. 3.

Paracentromedon crenulatum. – Chevreux & Fage, 1925: 58, figs 43-44. – Bellan Santini, 1985: 275. – Diviacco & Ruffo, 1989: 528, figs 360–361.

Paracentromedon crenulatus. – Barnard & Karaman, 1991: 512, fig. 90S, 92B. – Dauvin & Sorbe, 1995: 456.

Type material. MOM 37 0097.

Type locality. Off Cape Finisterre (Atlantic Ocean)

Material examined. Chevreux, 1900: 26, pl. 5, fig. 3; Chevreux & Fage, 1925: 58, figs 43-44; Diviacco & Ruffo, 1989: 528, figs 360–361.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus palm extremely acute; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into a slight posterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe. Pereopod 7 basis posterior margin strongly serrated.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 4.5 mm.

Distribution. Atlantic Ocean (France and Spain); Mediterranean; 180–2000 m.

Depth. Circalittoral to abyssal.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent.

Length. 5.5 mm.

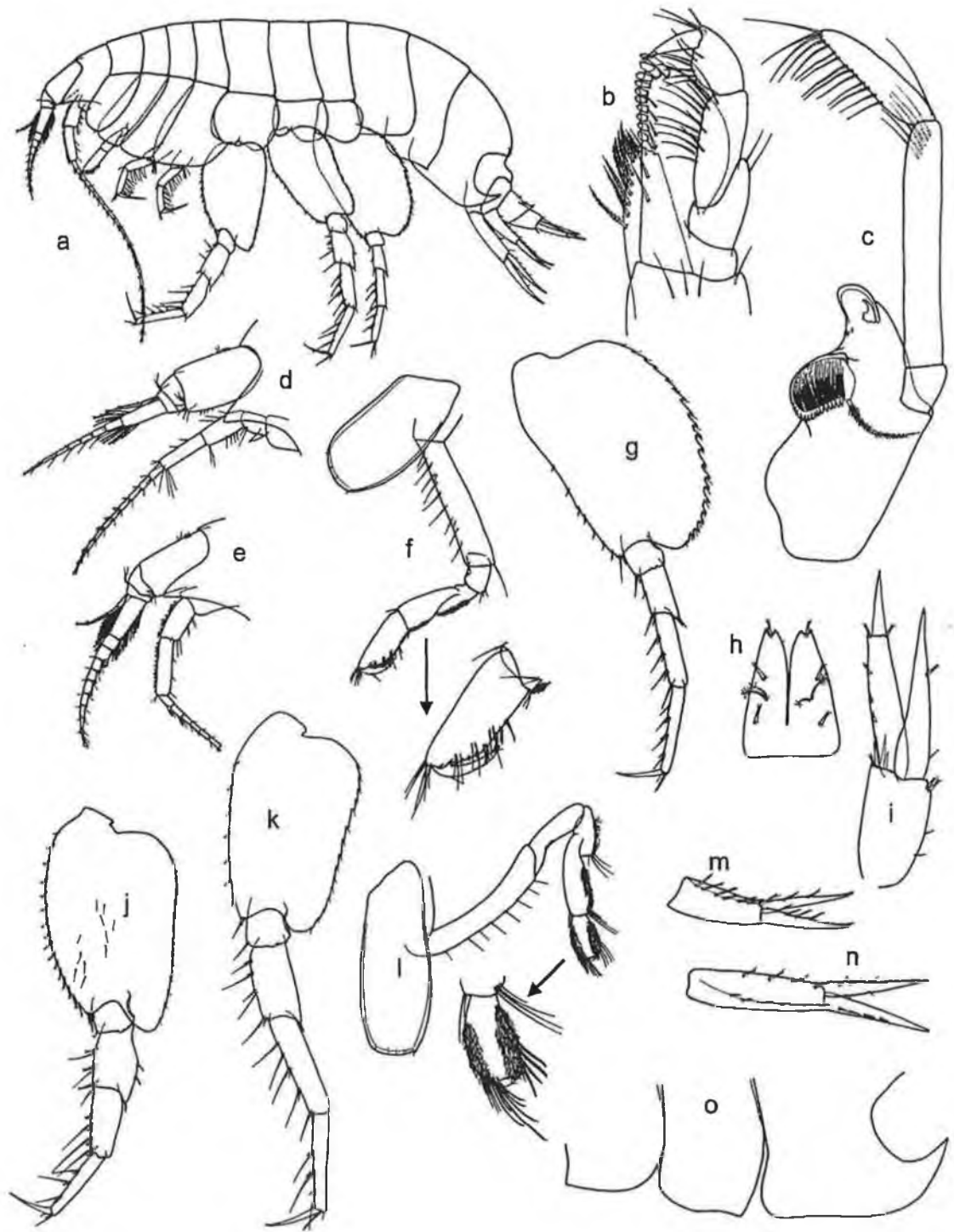


Figure 91: *Paracentromedon crenulatum* (Chevreux, 1900). (a) entire, male; (b) maxilliped; (c) mandible; (d) head and antennae, female; (e) head and antennae, male; (f) gnathopod 1; (g) pereopod 7; (h) telson; (i) uropod 3; (j) pereopod 5; (k) pereopod 6; (l) gnathopod 2; (m) uropod 2; (n) uropod 1; (o) epimeron 1-3. [After: Diviacco & Ruffo, 1989].

Parachevreuxiella lobata Andres, 1987

Fig. 92

Parachevreuxiella lobata Andres, 1987: 99, figs 1–20.

Type material. HOLOTYPE: ZMH Accession No. K 33166, female, 25 mm, 9 July 1986.

Type locality. North Atlantic, 53°03.5'N 16°36.3'W.

Material examined. Andres, 1987: 99, figs 1–20.

Description based on female, male unknown.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2; accessory flagellum absent. Calceoli absent. Eyes small, rounded or slightly subtriangular. Lateral cephalic lobes subquadrate. Maxilliped palp 1-articulate, forming a 'helmet' around the mouthparts.

Gnathopod 1 coxa reduced, significantly shorter than coxa 2, subquadrate; basis broadly expanded; ischium short; carpus short, distinctly shorter than propodus; propodus inflated, slightly longer than broad; dactylus rudimentary. Gnathopod 2 subchelate; coxa strongly shortened; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute to slightly rounded. Urosomite 1 without dorsal depression. Uropods 1-2 uniramous; uropod 3 absent. Telson absent.

Length. 24 mm.

Distribution. North East Atlantic.

Depth. Bathyal.

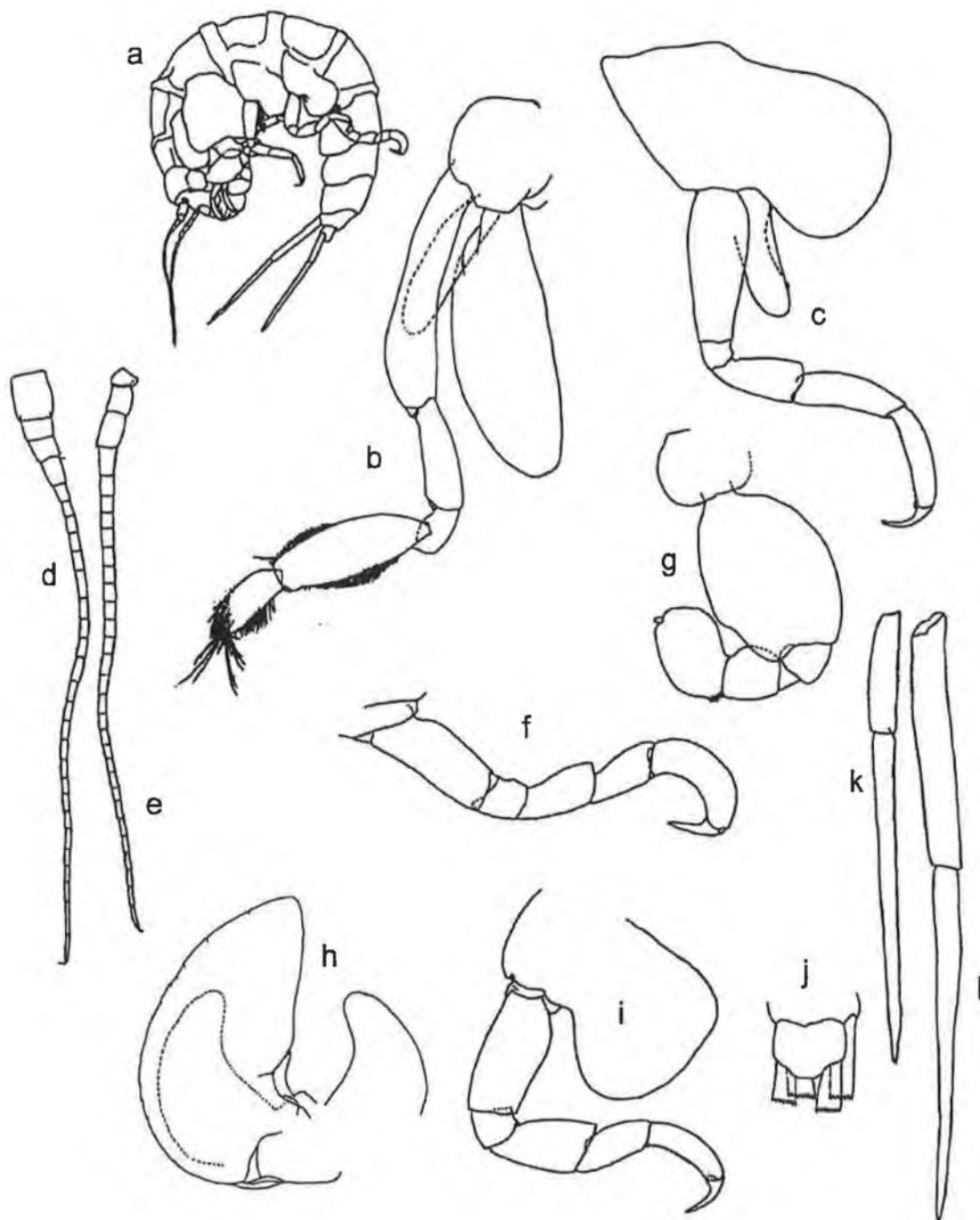


Figure 92: *Parachevreuxiella lobata* Andres, 1987. Female. (a) entire; (b) gnathopod 2; (c) pereopod 5; (d) antenna 1; (e) antenna 2; (f) pereopod 7; (g) gnathopod 1; (h) maxilliped; (i) pereopod 6; (j) urosome; (k) uropod 2; (l) uropod 3.

[After: Andres, 1987].

Paracyphocaris praedator Chevreux, 1905

Fig. 93

Paracyphocaris paraedator Chevreux, 1905b: 1, figs 1-3. – Stephensen, 1923b: 54. – Gurjanova, 1962: 71, fig. 11a-b. – Barnard & Karaman, 1991: 512, fig. 91Q.

Type material. MOM 370513, in alcohol and on 6 slides.

Type locality. Off the Azores, 46°15'N, 07°09'W.

Material examined. Chevreux, 1905b: 1, figs 1-3; Stephensen, 1923b: 54; Gurjanova, 1962: 71, fig. 11a-b.

Description based on male, female unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2; accessory flagellum rudimentary. Antenna 2 between 40 to 60% of body length; calceoli absent. Eyes apparently absent. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa reduced, subequal to coxa 2; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; coxa strongly shortened; carpus longer than propodus; dactylus minute. Pereopod 3 propodus very robust with convex margins; with blunt, locking robust setae at posterodistal corner. Pereopod 4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad; propodus robust with convex margins. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner rounded or acute. Urosomite 1 without dorsal depression. Uropods 1-2 rami subequal; uropod 3 outer ramus 2-articulate, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson more than twice as long as broad, moderately to deeply cleft.

Length. 9 mm.

Distribution. Cosmopolitan.

Depth. Infralittoral to abyssal (0–3250 m).

Ecology. Chevreux (1905b) remarks that it is probable that these amphipods are parasitic on other animals.

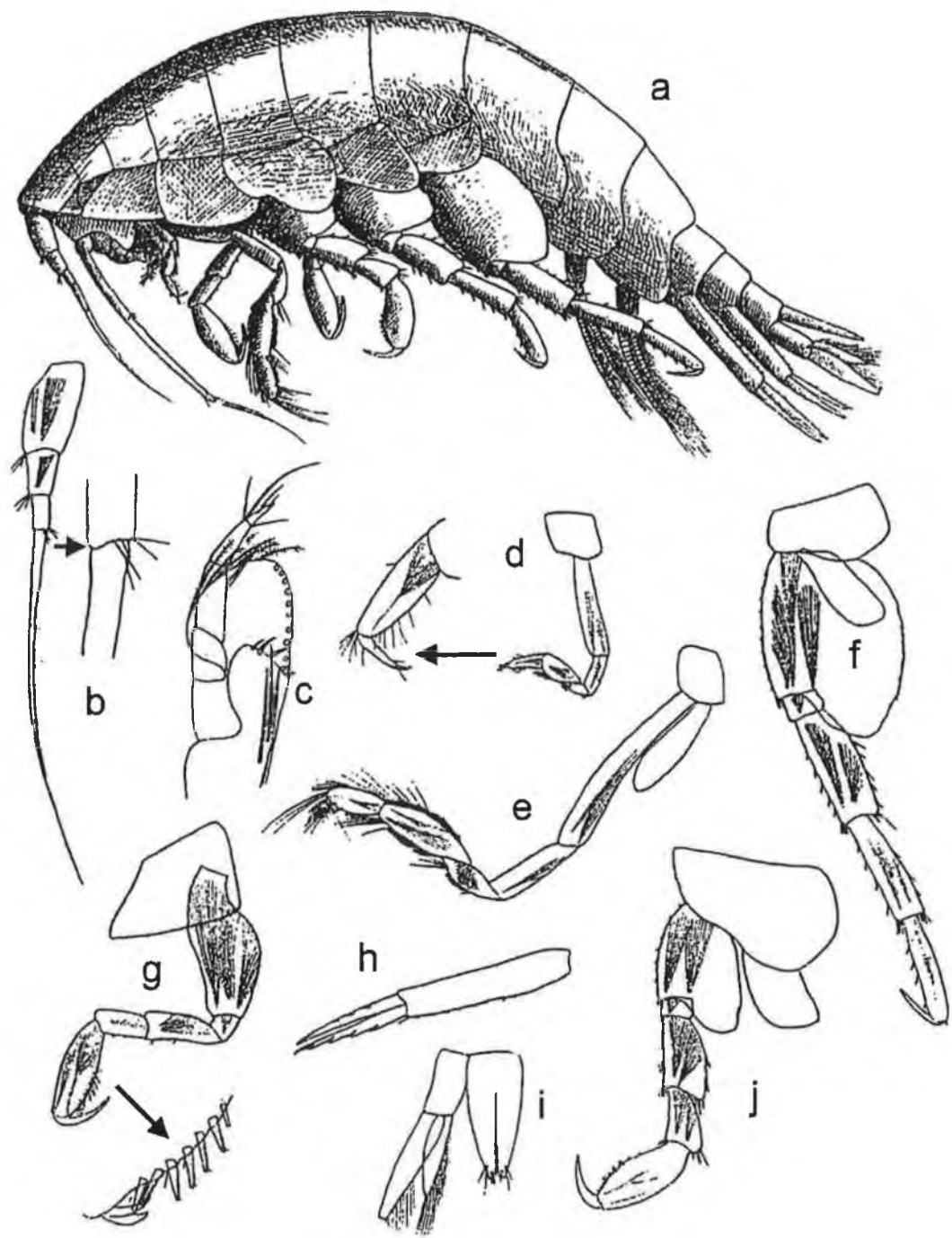


Figure 93: *Paracyphocaris praedator* Chevreux, 1905. (a) entire; (b) antenna 1; (c) maxilliped; (d) gnathopod 1; (e) gnathopod 2; (f) pereopod 7; (g) pereopod 3; (h) uropod 1; (i) uropod 3 and telson; (j) pereopod 5. [After: Chevreux, 1905b].

Pardia punctata (Costa, 1851)

Fig. 94

Callisoma punctatum Costa, 1851: 4, pl. 8, figs 4-7.

Lysianax punctatus. – Della Valle, 1893: 789, pl. 6, fig. 6; pl. 25, figs 22-32.

Lysianassa punctata. – Stebbing, 1906: 40. – Cecchini & Parenzan, 1935: 159, fig. 4.
– Barnard & Karaman, 1991: 498.

Pardia punctata. – Ruffo, 1987: 32, figs 1-3. – Diviacco & Ruffo, 1989: 531, figs 362-363.

Type material. Unknown.

Type locality. Napoli.

Material examined. Della Valle, 1893: 789, pl. 6, fig. 6; pl. 25, figs 22-32; Stebbing, 1904: 40; Diviacco & Ruffo, 1989: 531, figs 362-363.

Description based on female, mature male unknown.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli absent. Eyes large, reniform. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis about as long as broad.

Epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 1-articulate, rami distinctly unequal. Telson distinctly longer than broad, weakly emarginate.

Length. 6–7 mm.

Distribution. Atlantic Ocean (coast of Senegal); Mediterranean to 90 m.

Depth. Infralittoral to circalittoral.

Ecology. Found inside shells inhabited by hermit crabs; sometimes found in *Posidonia* beds and on corraline bottoms (Diviacco & Ruffo, 1989).

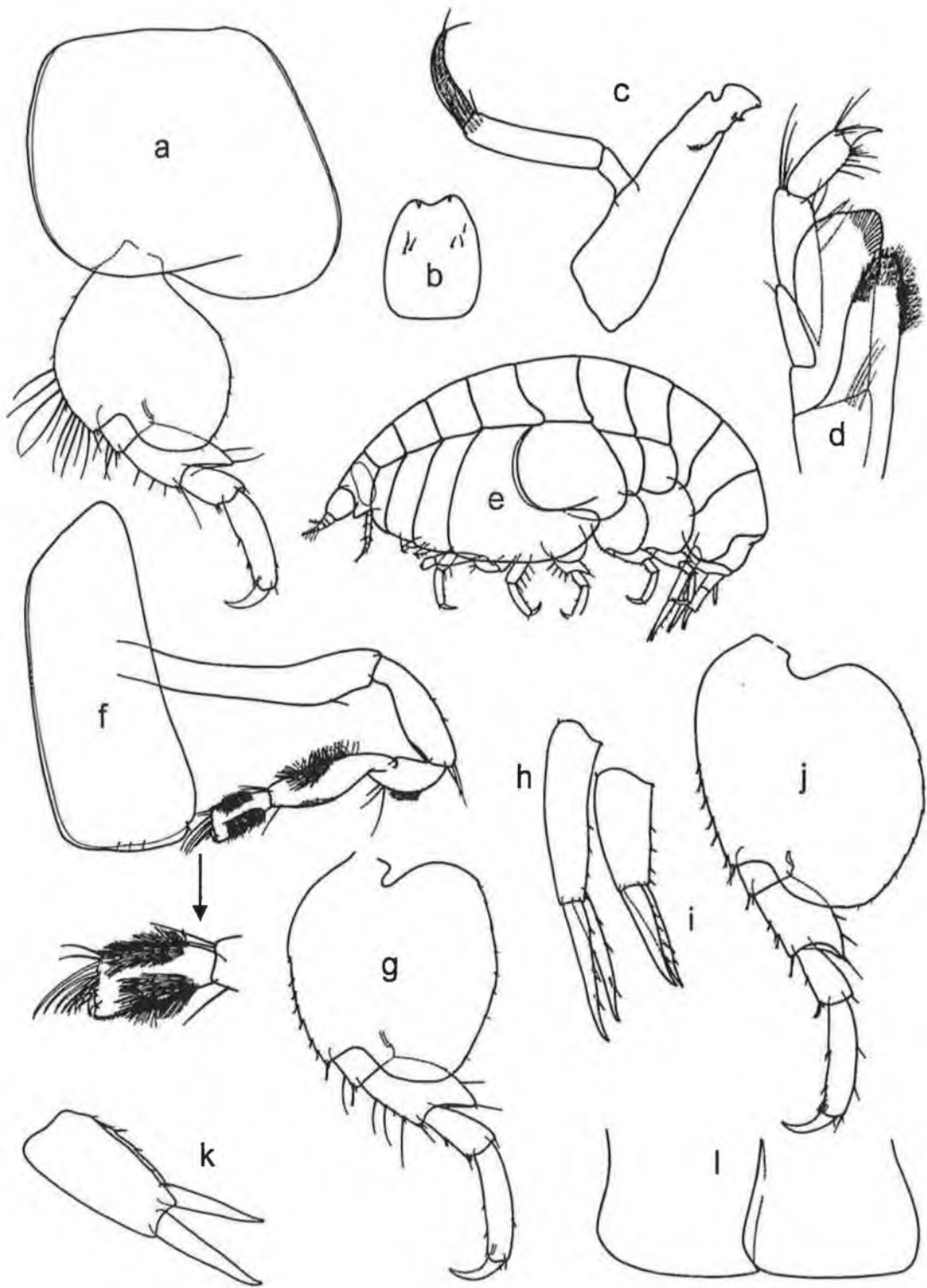


Figure 94: *Pardia punctata* (Costa, 1851). Female. (a) pereopod 5; (b) telson; (c) mandible; (d) maxilliped; (e) entire; (f) gnathopod 2; (g) pereopod 6; (h) uropod 1; (i) uropod 2; (j) pereopod 7; (k) uropod 3; (l) epimeron 2-3. [After: Diviacco & Ruffo, 1989].

Perrierella audouiniana (Bate, 1857)

Fig. 95

Lysianassa Audouiniana Bate, 1857: 138. – Bate & Westwood, 1861: 79, fig.

Lysianax audouinianus. – Walker, 1889: 203, pl. 10, figs 9-10.

Pararistias audouinianus. – Robertson, 1892: 201.

Perrierella crassipes Chevreux & Bouvier, 1892: 50. – Della Valle, 1893: 841.

Perrierella audouiniana. – Bonnier, 1893: 175. – G.O. Sars, 1895: 678, suppl. pl. 2, fig. 2. – Stebbing, 1906: 41. – Chevreux & Fage, 1925: 34, figs 12-13. – Cecchini & Parenzan, 1935: 155, fig. 1. – Ruffo, 1946: 50. – G. Karaman, 1973: 141. – Lincoln, 1979a: 46, fig. 14. – Costello *et al.*, 1989: 35. – Diviacco & Ruffo, 1989: 533, fig. 364. – Barnard & Karaman, 1991: 518, fig. 91A. – Dauvin *et al.*, 1994: 550, table 3.

Type material. HOLOTYPE: NHML Reg. No. 1952: 5: 7: 1.

Type locality. Plymouth Sound.

Material examined. Bate & Westwood, 1861: 79, fig; G.O. Sars, 1895: 678, suppl. pl. 2, fig. 2; Stebbing, 1906: 41; Chevreux & Fage, 1925: 34, figs 12-13; Lincoln, 1979a: 46, fig. 14; Diviacco & Ruffo, 1989: 533, fig. 364.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli absent. Eyes large, suboval. Lateral cephalic lobes subquadrate. Maxilliped palp 3-articulate; inner plate minute, almost obsolete.

Gnathopod 1 subchelate; coxa 1 reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm extremely acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner quadrate. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, emarginate.

Length. 3 mm.

Distribution. North-east Atlantic; North Sea; Mediterranean.

Depth. Infralittoral to circalittoral.

Ecology. Inquilinous in some sponges (Costello & Myers, 1987; Costello *et al.*, 1989).

Female (sexually dimorphic characters)

Not differing significantly to male.

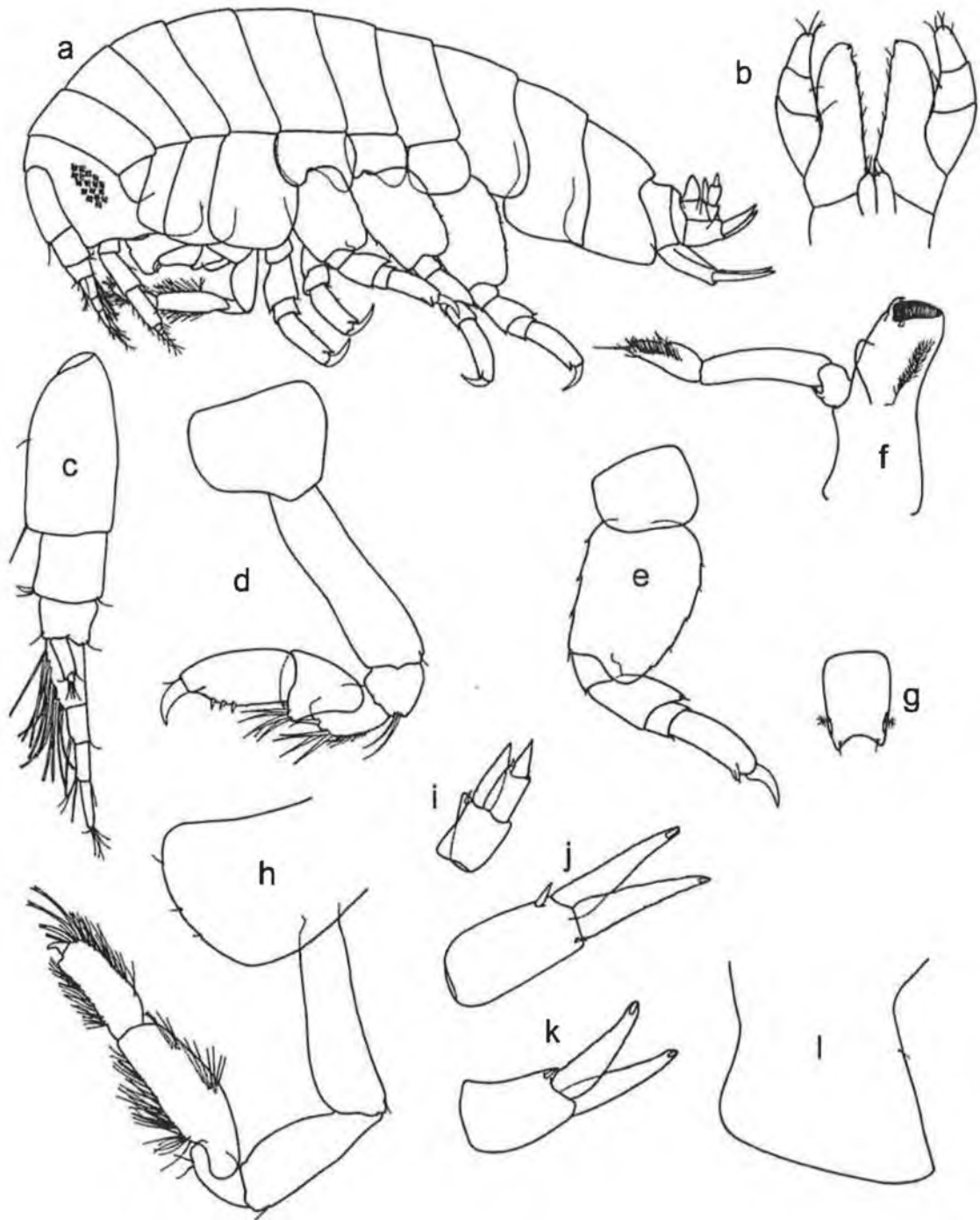


Figure 95: *Perrierella audouiniana* (Bate, 1857). Female. (a) entire; (b) maxillipeds; (c) antenna 1; (d) gnathopod 1; (e) pereopod 7; (f) mandible; (g) telson; (h) gnathopod 2; (i) uropod 3; (j) uropod 1; (k) uropod 2; (l) epimeron 3. [After: Diviacco & Ruffo, 1989].

Podoprion bolivari Chevreux, 1891

Fig. 96

Podoprion bolivari Chevreux, 1891: 6. – Stebbing, 1906: 18. – Chevreux, 1925: 284. – Chevreux & Fage, 1925: 32. – J.L. Barnard, 1969: 358. – G. Karaman, 1973: 141. – Diviacco & Ruffo, 1989: 525, figs 365-366. – Barnard & Karaman, 1991: 519. – Dauvin & Sorbe, 1995: 449, 456. – Kaim-Malka, 2004: 15 (key). – Horton, 2005: 1, 9 (key).

Type material. SYNTYPES: NHML Reg. No. 1907: 12: 2: 100-103, NMHL Reg. No. 1911: 11: 8: 13660, NHML Reg. No. 1928: 12: 1: 1602-1604.

Type locality. Vigo (Spain).

Material examined. Stebbing, 1906: 18; Chevreux & Fage, 1925: 32; Diviacco & Ruffo, 1989: 525, figs 365-366.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval (but disappearing in alcohol). Lateral cephalic lobes subquadrate to rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 chelate; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium slightly elongate; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus well developed. Pereopod 5 coxa equilobate; basis distinctly longer than broad, posterior margin strongly serrated.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 8 mm.

Distribution. Atlantic Ocean (Bay of Biscay, Spain); Mediterranean.

Depth. Infralittoral to circalittoral (12 to 120 m).

Female (sexually dimorphic characters)

Antenna 2 between 40 to 60% of body length; calceoli absent.

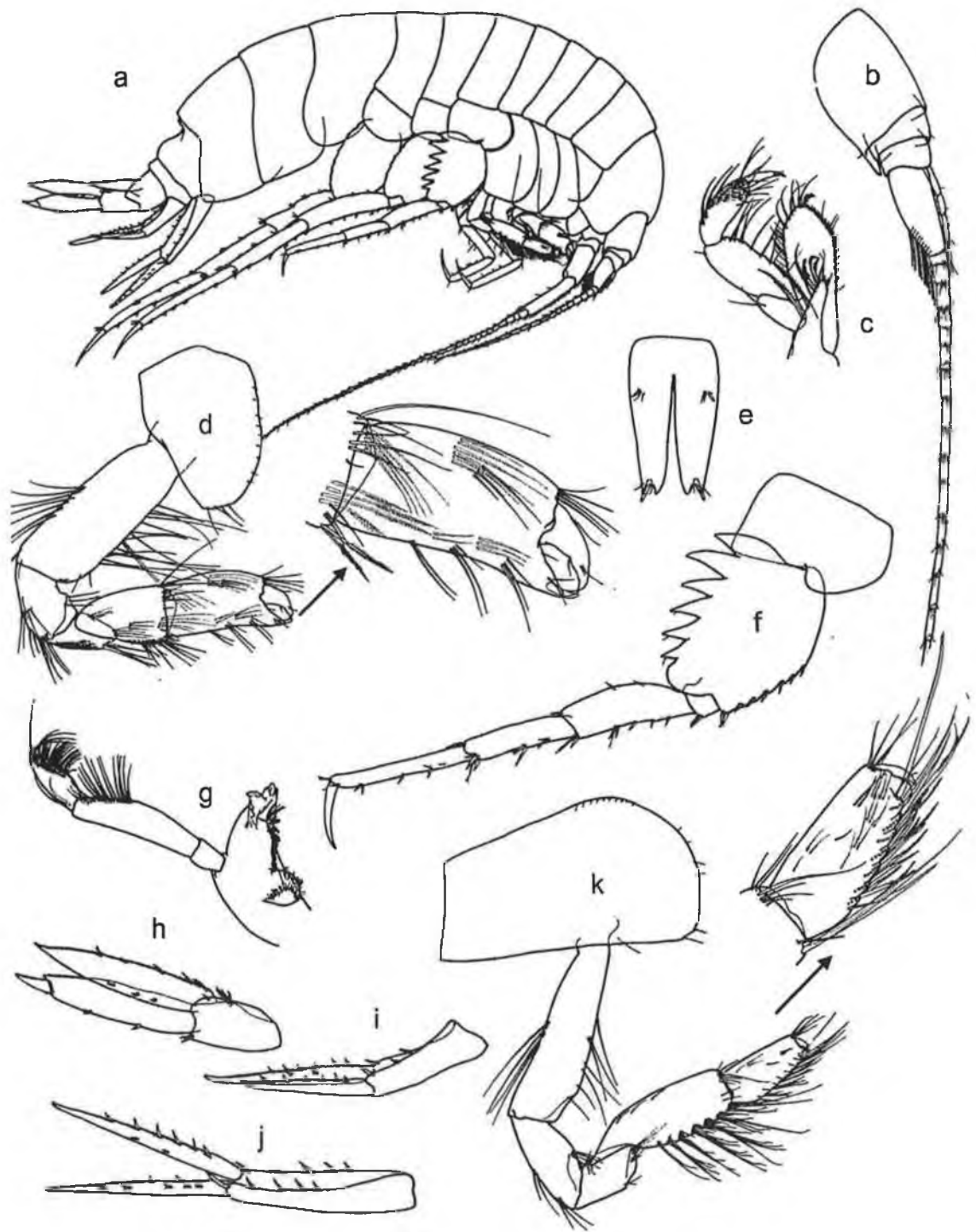


Figure 96: *Podoprion bolivari* Chevreux, 1981. Male. (a) entire; (b) antenna 1; (c) maxilliped; (d) gnathopod 1; (e) telson; (f) pereopod 5; (g) mandible; (h) uropod 3; (i) uropod 2; (j) uropod 1; (k) gnathopod 2. [After: Diviacco & Ruffo, 1989].

Podoprion mediterraneum Kaim-Malka, 2004

Fig. 97

Podoprion mediterraneum Kaim-Malka, 2004: 3, figs 1-6. – Horton, 2005: 1, 9 (key).

Type material. MSNV.

Type locality. Toulon Canyon, 500 m.

Material examined. Kaim-Malka, 2004: 3, figs 1-6.

Description based on mature female, mature male unknown.

Description. Antenna 1 shorter than antenna 2; peduncle article 1 producing distoventral spine; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli absent. Eyes apparently absent. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 chelate; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium slightly elongate; carpus long, of subequal length to propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 chelate; carpus longer than propodus; dactylus well developed. Pereopod 5 coxa produced into a posterior lobe; basis posterior margin strongly serrated. Coxa 6 equilobate.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a very small spine. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. To 16.5 mm.

Distribution. Mediterranean endemic.

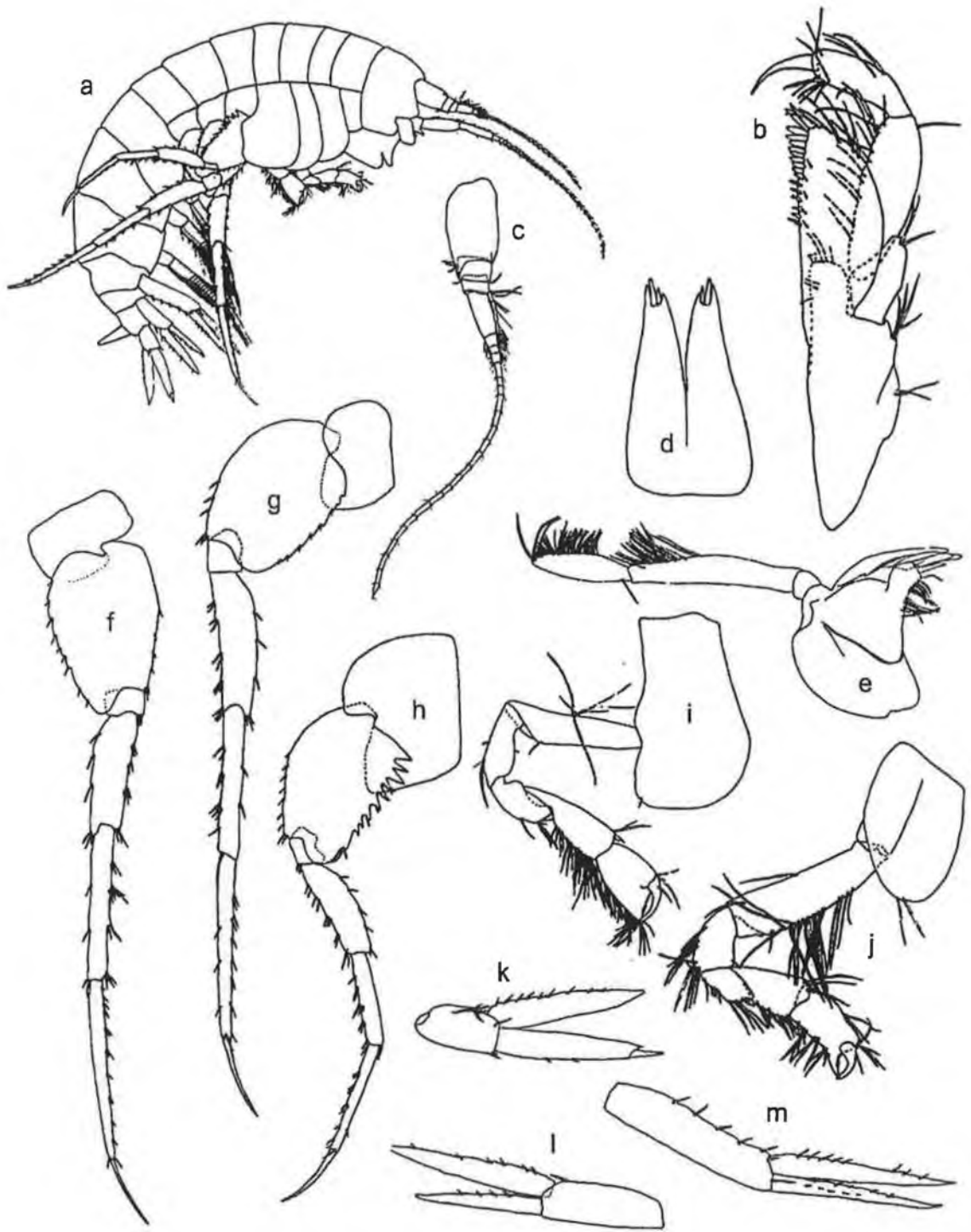


Figure 97: *Podoprion mediterraneum* Kaim-Malka, 2004. (a) entire, female; (b) maxilliped; (c) antenna 1; (d) telson; (e) mandible; (f) pereopod 7; (g) pereopod 6; (h) pereopod 5; (i) gnathopod 2; (j) gnathopod 1; (k) uropod 3; (l) uropod 2; (m) uropod 1.

[After: Kaim-Malka, 2004].

Podoprionella fissicaudata Ledoyer, 1977

Fig. 98

Podoprionella fissicaudata Ledoyer, 1977: 386, fig. 22. – Diviacco & Ruffo, 1989: 537, figs 367-368. – Barnard & Karaman, 1991: 519.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 275, slides 487-488.

Type locality. South of Ile des Embiez.

Material examined. Diviacco & Ruffo, 1989: 537, figs 367-368.

Description based on mature female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 3-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 pseudochelate (i.e. the chelation is due to a curved robust seta on posterodistal part of propodus); coxa reduced, significantly shorter than coxa 2; ischium short; carpus short, of subequal length to propodus; propodus margins subparallel, palm transverse. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad, posterior margin strongly serrated. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin strongly serrated. Pereopod 7 basis posterior margin strongly serrated.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 without dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 1-articulate, rami distinctly unequal. Telson subequal in length and breadth, emarginate or slightly cleft.

Length. 5 mm.

Distribution. Mediterranean endemic.

Depth. Circalittoral to bathyal (50-300 m).

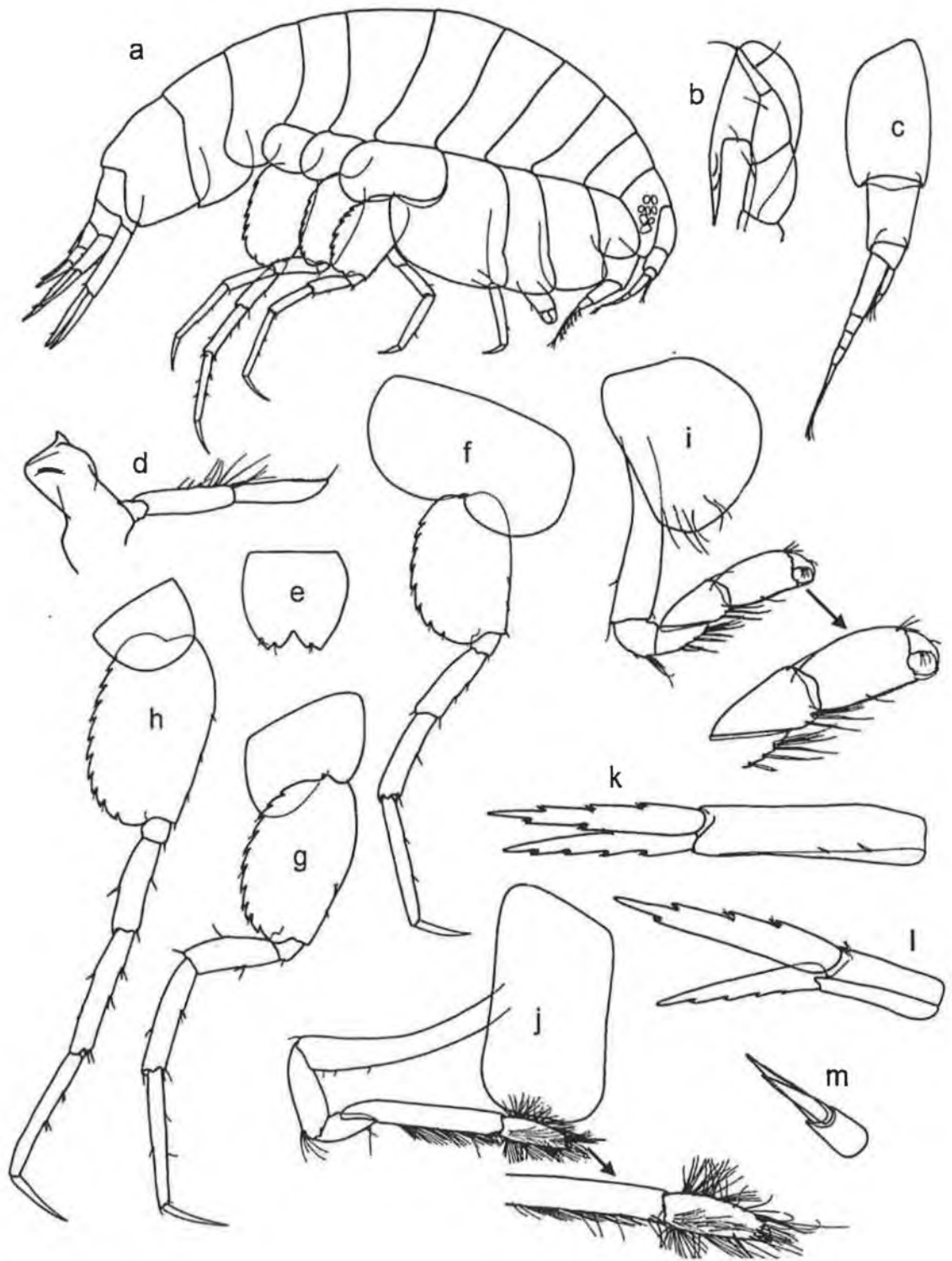


Figure 98: *Podoprionella fissicaudata* Ledoyer, 1977. Female. (a) entire; (b) maxilliped; (c) antenna 1; (d) mandible; (e) telson; (f) pereopod 5; (g) pereopod 6; (h) pereopod 7; (i) gnathopod 1; (j) gnathopod 2; (k) uropod 1; (l) uropod 2; (m) uropod 3.

[After: Diviacco & Ruffo, 1989].

Podoprionella norvegica G.O. Sars, 1895

Fig. 99

Podoprionella norvegica G.O. Sars, 1895: 687, suppl. pl. 5. – Barnard & Karaman, 1991: 519.

Type material. ?ZMO.

Type locality. Trondhjemsfjord.

Material examined. G.O. Sars, 1895: 687, suppl. pl. 5.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes narrowly rounded to subacute. Maxilliped palp 3-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 chelate; coxa reduced, significantly shorter than coxa 2, subquadrate; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa produced into a slight posterior lobe; basis distinctly longer than broad, posterior margin strongly serrated. Pereopod 6 coxa produced into a posterior lobe; basis posterior margin strongly serrated. Pereopod 7 basis posterior margin strongly serrated.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 without dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus with marginal constriction; uropod 3 outer ramus 1-articulate, rami distinctly unequal. Telson distinctly longer than broad, entire.

Distribution. Norwegian Sea; Skagerrak.

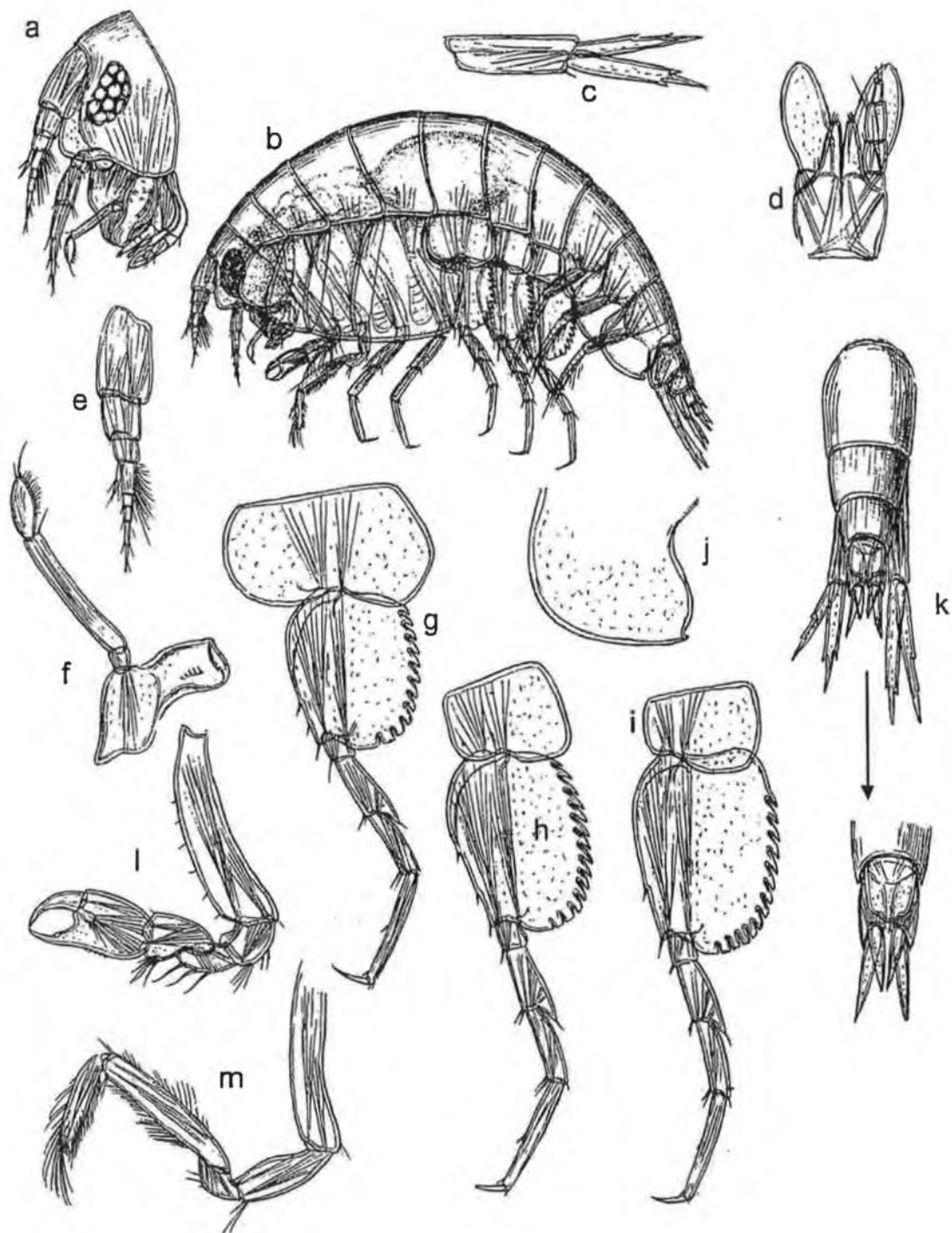


Figure 99: *Podoprionella norvegica* G.O. Sars, 1895. Female. (a) head and antennae; (b) entire; (c) uropod 2; (d) maxilliped; (e) antenna 1; (f) mandible; (g) pereopod 5; (h) pereopod 6; (i) pereopod 7; (j) epimeron 3; (k) urosome, uropods 1-3 and telson; (l) gnathopod 1; (m) gnathopod 2. [After: Sars, 1895].

Prachynella mediterranea (Ruffo, 1975)

Fig. 100

Pachychelium mediterraneum Ruffo, 1975: 440, figs 1-4.

Prachynella mediterranea. – Lowry, 1984: 72, figs 16–17. – Diviaco & Ruffo, 1989: 538, figs 369-370.

Prachynella mediterraneum. – Barnard & Karaman, 1991: 520.

Type material. HOLOTYPE: MSNV reg. no. MVR-Cr 257, slides 1341-1343.

Type locality. Central Adriatic.

Material examined. Lowry, 1984: 72, figs 16–17; Diviaco & Ruffo, 1989: 538, figs 369-370.

Description based on mature male, female unknown.

Description. Antenna 1 subequal to antenna 2; peduncle article 1 producing strong dorsal and ventral lobes; flagellum article 1 slightly longer than article 2. Calceoli absent. Eyes apparently absent. Lateral cephalic lobes subacute. Maxilliped palp 3-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 chelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus very compressed, distinctly shorter than propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded, posterior margin with 1 deep notch. Urosomite 1 without dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson entire.

Length. 1.8 mm.

Distribution. Mediterranean endemic.

Depth. Circalittoral (The only specimen known was found at 160 m).

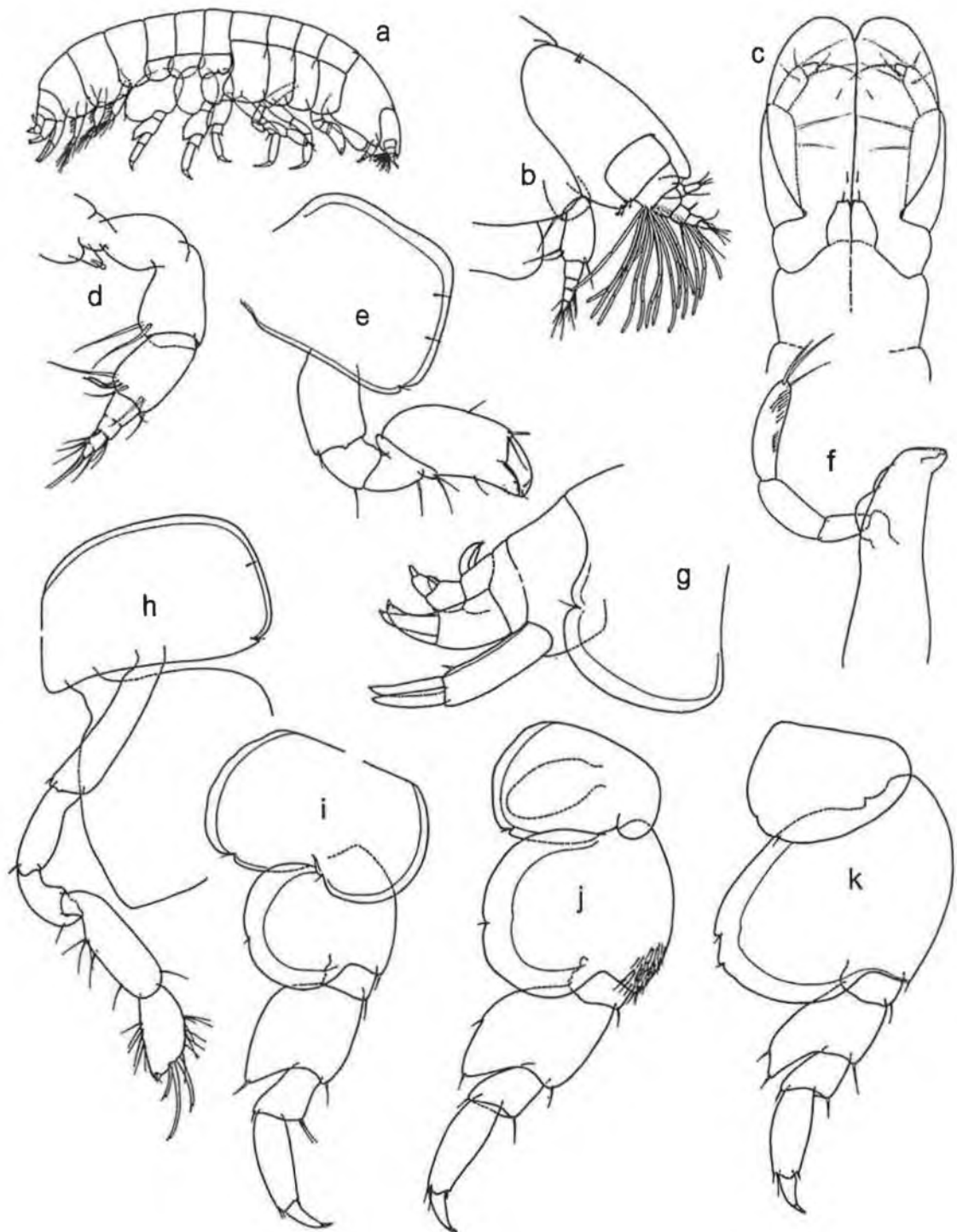


Figure 100: *Prachynella mediterranea* (Ruffo, 1975). Male (?). (a) entire; (b) head and antennae; (c) maxillipeds; (d) antenna 2; (e) gnathopod 1; (f) mandible; (g) epimeron 3 and urosome; (h) gnathopod 2; (i) pereopod 5; (j) pereopod 6; (k) pereopod 7.

[After: Diviacco & Ruffo, 1989].

Rhinolabia parthenopeia Ruffo, 1971

Fig. 101

Rhinolabia parthenopia Ruffo, 1971: 104, figs 1-2. – Ledoyer, 1977: 388. – Diviacco & Ruffo, 1989: 542, fig. 371. – Barnard & Karaman, 1991: 525.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 287, slides 1229-1231.
PARATYPE: MSNV Reg. no. MVR-Cr 287, in alcohol.

Type locality. Napoli.

Material examined. Diviacco & Ruffo, 1989: 542, fig. 371.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 distinctly elongate. Calceoli absent. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple, or weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus short, of subequal length to propodus; propodus margins tapering, palm extremely acute. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into a slight anterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, entire or very slightly emarginate.

Length. 1.5–3 mm.

Distribution. Mediterranean endemic.

Depth. Circalittoral (35-120 m).

Female (sexually dimorphic characters)

Lateral cephalic lobes acute, broader than male.

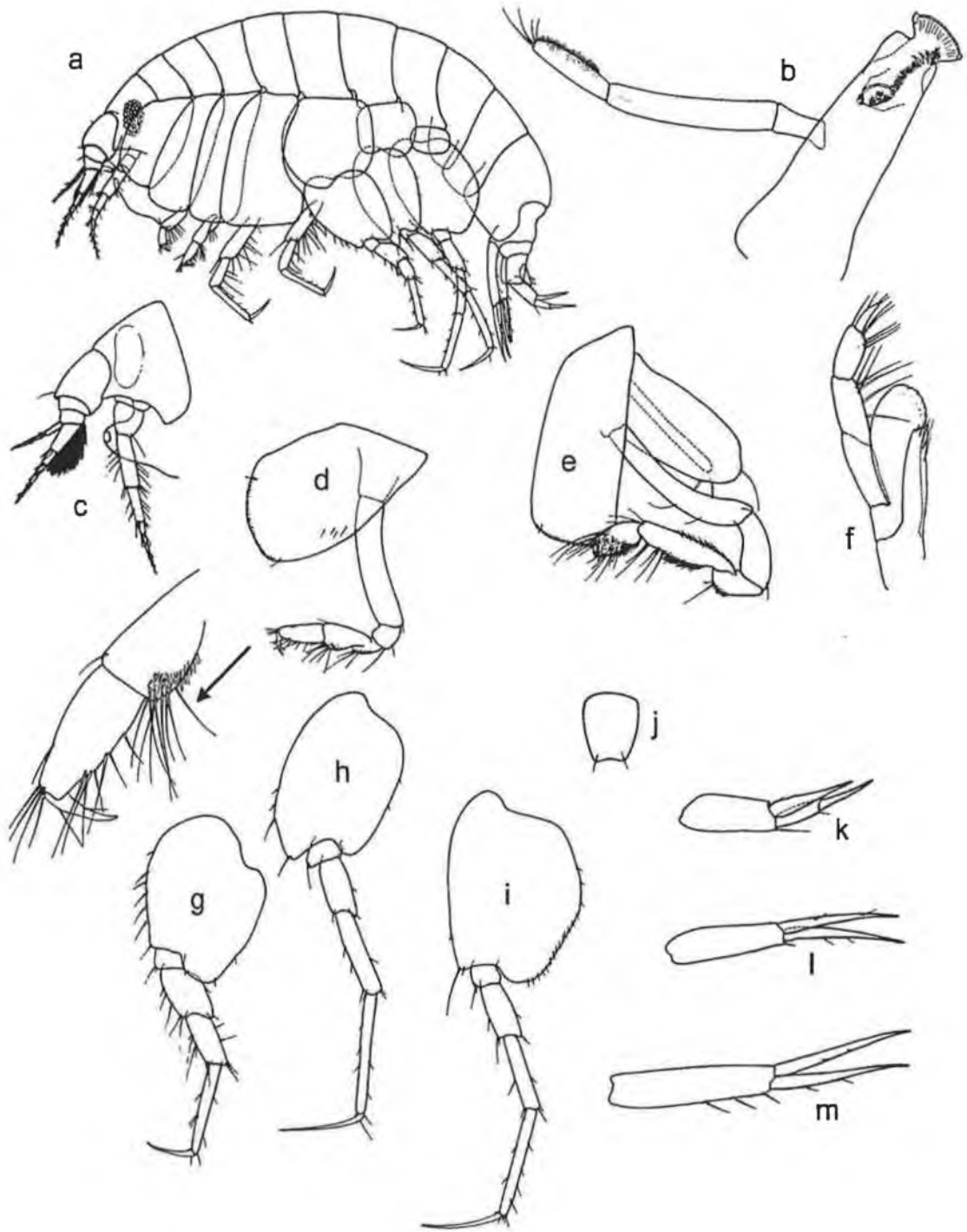


Figure 101: *Rhinolabia parthenopeia* Ruffo, 1971. (a) entire, female; (b) mandible; (c) head and antennae, male; (d) gnathopod 1; (e) gnathopod 2; (f) maxilliped; (g) pereopod 5; (h) pereopod 6; (i) pereopod 7; (j) telson; (k) uropod 3; (l) uropod 2; (m) uropod 1. [After: Diviacco & Ruffo, 1989].

Schisturella pulchra (Hansen, 1887)

Fig. 102

Tryphosa pulchra Hansen, 1887: 78, pl. 2, fig. 6.

Schisturella pulchra. – Norman, 1900b: 208. – Stebbing, 1906: 719. – Stephensen, 1923b: 75. – Gurjanova, 1951: 212, fig. 79. – Gurjanova, 1962: 197, fig. 63. – Barnard & Karaman, 1991: 527.

Ambasia pulchra. – Stebbing, 1906: 52.

Type material. ZMUC CRU-7892.

Type locality. Unknown.

Material examined. Female, 16mm, ZMUC (no accession no.), Grønlands Zoogeogr. Undersøgelser, Thule, 1968; Stephensen, 1923b: 75; Gurjanova, 1962: 197, fig. 63.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length. Eyes large, suboval. Lateral cephalic lobes quadrate. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa reduced, significantly shorter than coxa 2; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute to extremely acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner producing small, up-turned spine; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus with marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 16 mm.

Distribution. An arctic-boreal species, but has been found as far south as the northwest of Scotland at 61°10'N, 2°21'W (Norman, 1900b), and hence is included here.

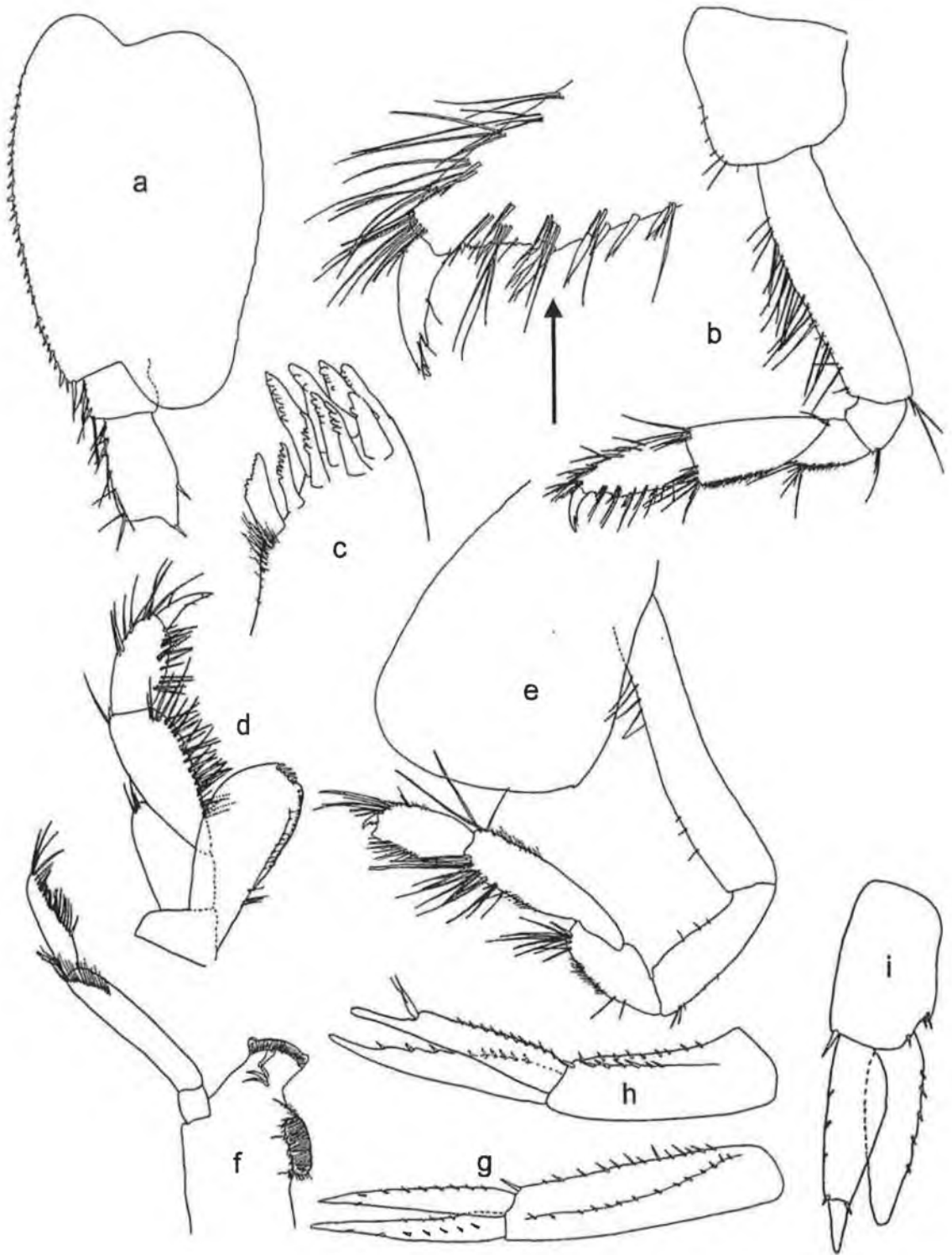


Figure 102: *Schisturella pulchra* Hansen, 1887. (a) pereopod 5; (b) gnathopod 1; (c) maxilla 1 setal teeth; (d) maxilliped palp and outer plate; (e) gnathopod 2; (f) mandible; (g) uropod 1; (h) uropod 2; (i) uropod 3. [Illustration by author].

Scopelocheirus hopei (Costa, 1851)

Fig. 103

Callisoma Hopei Costa, 1851: 5.

Callisoma Krøyeri. – G.O. Sars, 1890: 54, pl.19, fig. 2.

Scopelocheirus hopei. – Stebbing, 1906: 62. – Stephensen, 1935: 76. – Schellenberg, 1942: 111. – Lincoln, 1979a: 50, fig. 16. – Costello *et al.*, 1989: 35. – Diviacco & Ruffo, 1989: 544, fig. 372. – Barnard & Karaman, 1991: 528. – Dauvin *et al.*, 1994: 551, table 3. – Dauvin & Sorbe, 1995: 443, 447, 449, tables 4-5, 450, fig. 2, 456.

Scopelocheirus Hopei. – Chevreux & Fage, 1925: 55, figs 39-40.

Scopelocheirus crenatus. – Barnard & Karaman, 1991: fig. 89G, 90U, 91D, 92V, 93F

Type material. Unknown.

Type locality. Napoli.

Material examined. G.O. Sars, 1890: 54, pl.19, fig. 2; Stebbing, 1906: 62; Chevreux & Fage, 1925: 55, figs 39-40; Lincoln, 1979a: 50, fig. 16; Diviacco & Ruffo, 1989: 544, fig. 372.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel; dactylus rudimentary. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilateral; basis distinctly broader than long.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner slightly rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 7 mm.

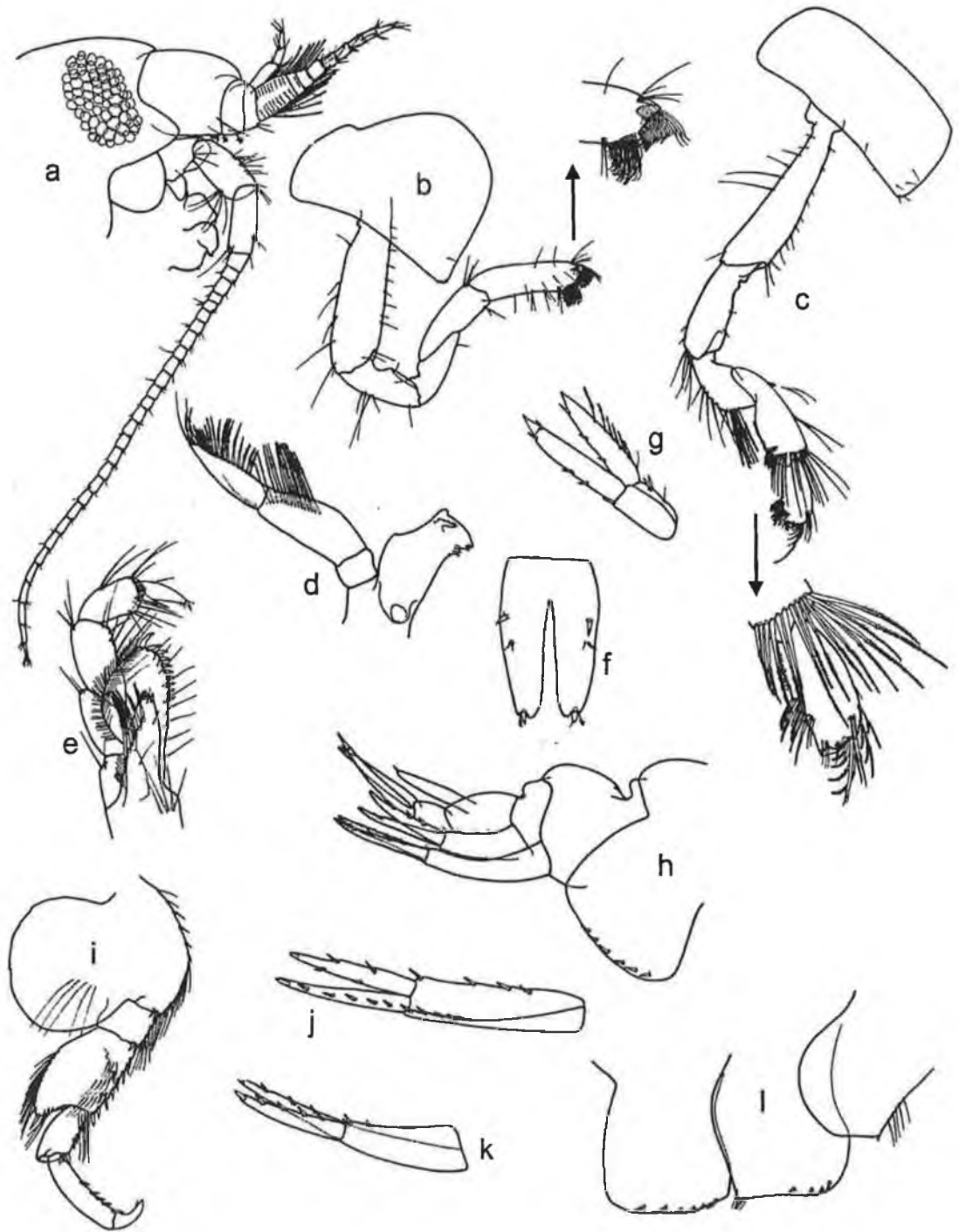
Distribution. North Atlantic Ocean; North Sea; Mediterranean Sea.

Depth. Circalittoral to abyssal (40-2500 m).

Remarks. Williams (1938) found specimens in the nerve tracts of the Spiny Dogfish, *Squalus acanthias* L., and believed them to attack both living and dead fish.

Female (sexually dimorphic characters)

Antenna 2 between 40 to 60% of body length; calceoli absent.



**Figure 103: *Scopelocheirus hopei* (Costa, 1851). (a) head and antennae, female; (b) gnathopod 1; (c) gnathopod 2 (d) mandible; (e) maxilliped; (f) telson; (g) uropod 3; (h) epimeron 3 and urosome, male; (i) pereopod 5; (j) uropod 1; (k) uropod 2; (l) epimeron 1-3.
[After: Diviacco & Ruffo, 1989].**

Scopelocheirus polymedus Bellan-Santini, 1985

Fig. 104

Scopelocheirus polymedus Bellan-Santini, 1985: 275, figs 1-2. – Diviacco & Ruffo, 1989: 544, figs 373-374. – Barnard & Karaman, 1991: 528.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 213, slides 911-924.
PARATYPE: MSNV Reg. no. MVR-Cr 213, in alcohol.

Type locality. Western Mediterranean (38°27'N, 04°08' E).

Material examined. Diviacco & Ruffo, 1989: 544, figs 373-374.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; dactylus rudimentary. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis distinctly broader than long.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner slightly rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 9 mm.

Distribution. Mediterranean endemic.

Depth. Abyssal (2400 m).

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent.

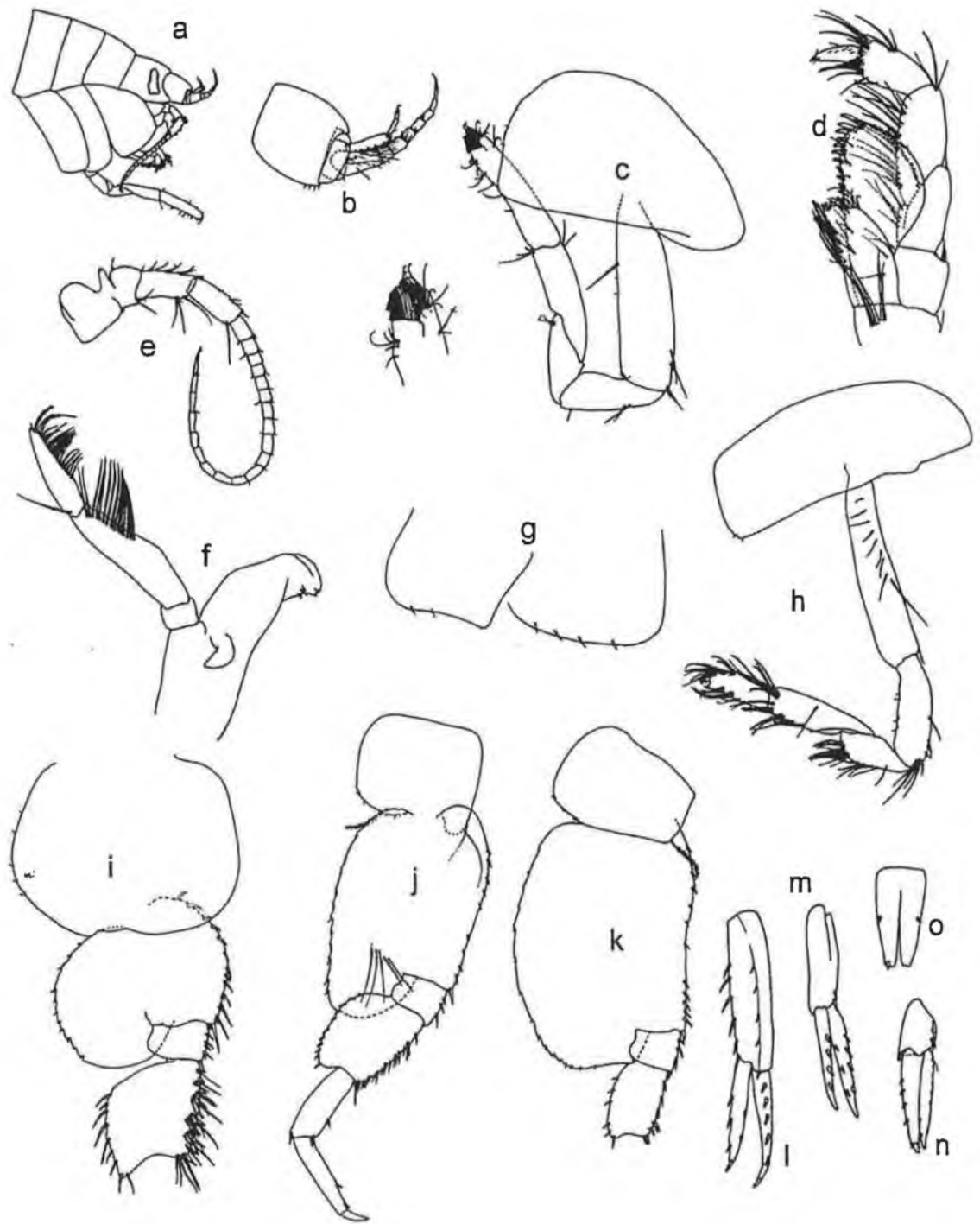


Figure 104: *Scopelocheirus polymedus* Bellan-Santini, 1985. Female. (a) head, pereonal segments 1-3; (b) antenna 1; (c) gnathopod 1; (d) maxilliped; (e) antenna 2; (f) mandible; (g) epimeron 2-3; (h) gnathopod 2; (i) pereopod 5; (j) pereopod 6; (k) pereopod 7; (l) uropod 1; (m) uropod 2; (n) uropod 3; (o) telson. [After: Diviacco & Ruffo, 1989].

Socarnes erythrophthalmus Robertson, 1892

Fig. 105

Socarnes erythrophthalmus Robertson, 1892: 200. – Bonnier, 1893: 183, pl. 6. – Stebbing, 1906: 57. – Chevreux, 1925: 285. – Chevreux & Fage, 1925: 50. – Lincoln, 1979a: 98, fig. 40. – Costello *et al.*, 1989: 35. – Barnard & Karaman, 1991: 531.

Type material. SYNTYPES: NHML Reg. No. 1911: 11: 8: 12714-12728, NHML Reg. No. 1911: 11: 8: M682.

Type locality. Cumbrae, Firth of Clyde, Scotland.

Material examined. 8 females, 3 males, from Roaringwater Bay, Co. Cork (51°28.86'N, 09°38.32'W); Stebbing, 1906: 57; Chevreux & Fage, 1925: 50; Lincoln, 1979a: 98, fig. 40.

Description. Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins tapering, palm extremely acute. Gnathopod 2 chelate; carpus at least twice as long as propodus; dactylus minute.

Epimeron 3 posterodistal corner quadrate or rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal. Telson distinctly longer than broad, moderately cleft.

Length. 3–4 mm.

Distribution. Atlantic coast of Europe and North Africa to Dakar.

Female (sexually dimorphic characters)

Calceoli absent.

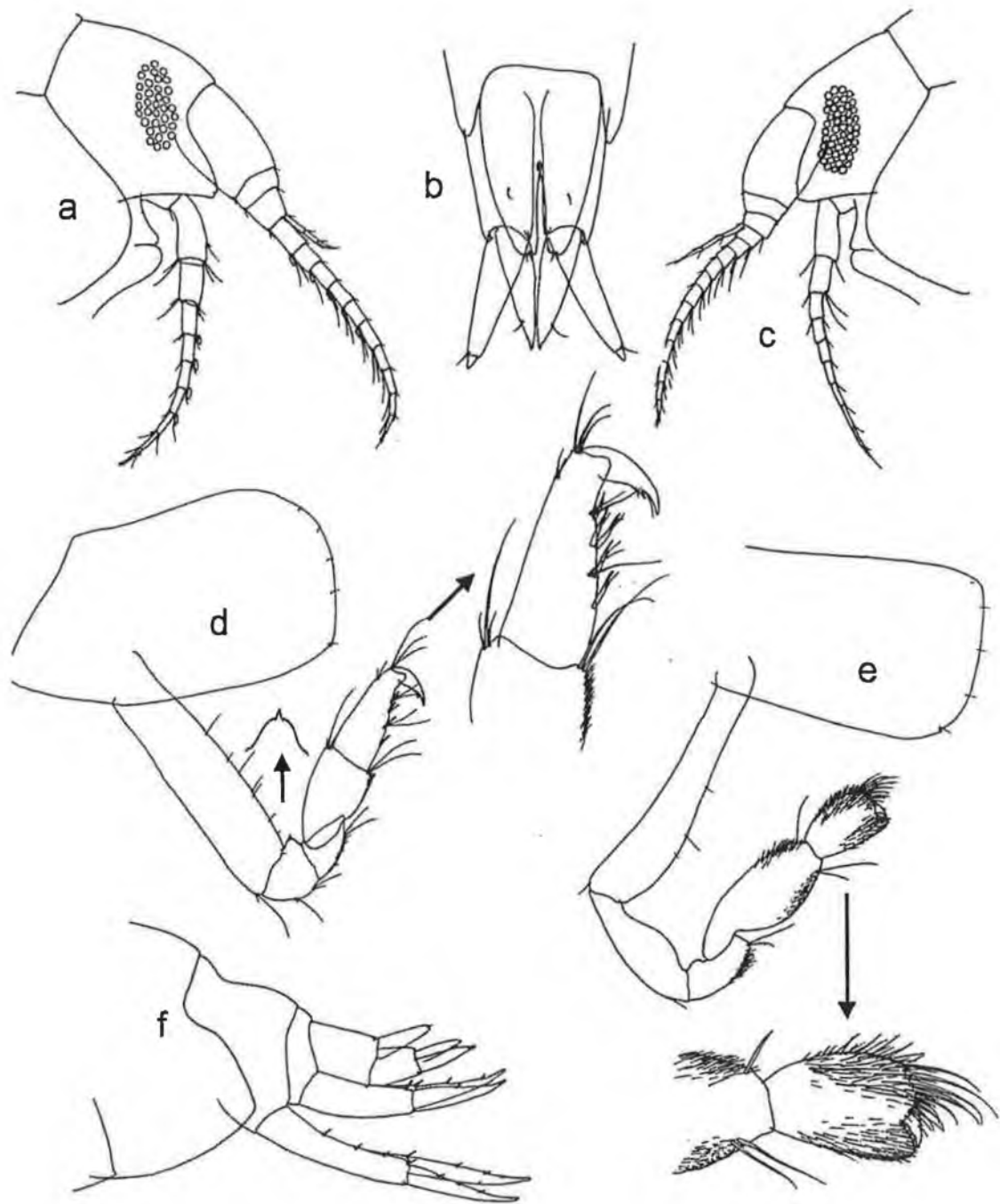


Figure 105: *Socarnes erythrophthalmus* Robertson, 1892. (a) head and antennae, male; (b) uropod 3 and telson; (c) head and antennae, female; (d) gnathopod 1; (e) gnathopod 2; (f) epimeron 3 and urosome. [After: Lincoln, 1979a].

Socarnes filicornis (Heller, 1866)

Fig. 106

Anonyx Schmarde Heller, 1866: 21, pl. 2, figs 29-33.

Anonyx filicornis Heller, 1866: 23, pl. 3, figs 13-16.

Ichnopus Schmaridae. – Della Valle, 1893: 803, pl. 5, fig. 4; pl. 27, figs 23-32.

Anonyx schmaridae. – Stebbing, 1906: 87.

Socarnopsis crenulata. – Chevreux, 1911: 165, fig. 2, pl. 7, figs 1-13. – Chevreux, 1925: 285. – Chevreux & Fage, 1925: 49, figs 31-32. – Cecchini & Parenzan, 1935: 164, fig. 8.

Socarnopsis filicornis. – Krapp-Schieckel, 1974: 337. – Ledoyer, 1977: 389. – Barnard & Karaman, 1991: 532.

Socarnes crenulatus. – Lincoln, 1979a: 98, fig 39. – Costello *et al.*, 1989: 35. – Dauvin *et al.*, 1994: 550, table 3.

Socarnes filicornis. – Diviacco, 1985: 539. – Diviacco & Ruffo, 1989: 549, fig. 375.

Type material. Unknown (probably lost).

Type locality. Hvar.

Material examined. Chevreux & Fage, 1925: 49, figs 31-32; Lincoln, 1979a: 98, fig 39; Diviacco & Ruffo, 1989: 549, fig. 375.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 weakly subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins tapering, palm extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into an anterior lobe; basis distinctly broader than long.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner slightly rounded. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately to deeply cleft.

Length. 5–10 mm.

Distribution. Atlantic Ocean (coasts of Europe and North Africa), Mediterranean.

Depth. Infralittoral to bathyal (0 – 350 m).

Female (sexually dimorphic characters)

Antenna 1 longer than antenna 2. Calceoli absent.

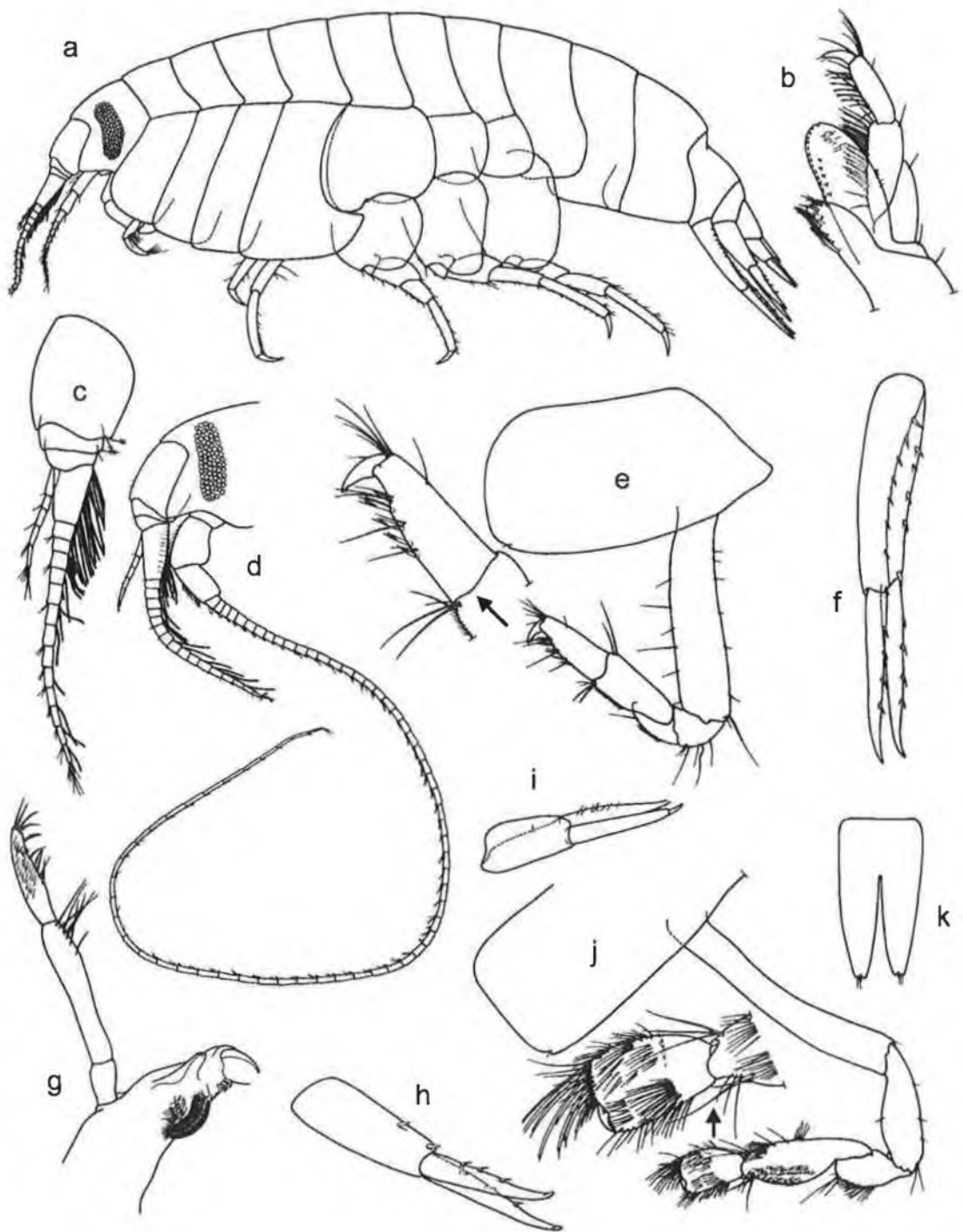


Figure 106: *Socarnes filicornis* (Heller, 1866). (a) entire, female; (b) maxilliped; (c) antenna 1; (d) head and antennae, male; (e) gnathopod 1; (f) uropod 1; (g) mandible; (h) uropod 2; (i) uropod 3; (j) gnathopod 2; (k) telson. [After: Diviacco & Ruffo, 1989].

Socarnes vahlii (Krøyer, 1838)

Fig. 107

Lysianassa vahlii & *Anonyx vahlii* Krøyer, 1838: 233, 244.

Socarnes vahlii. – (in part) Boeck, 1871: 100. – G.O. Sars, 1890: 44, pl. 16, fig. 2.

Ephippiphora vahlii, *Socarnes*. – (in part) Stebbing, 1888: 177, 1698.

Ichnopus nugax. – (in part) Della Valle, 1893: 804.

Socarnes vahlii. – Stebbing, 1894: 3. – Stebbing, 1906: 57. – Stephensen, 1923b: 88, chart 15. – Gurjanova, 1951: 226, fig. 91. – Gurjanova, 1962: 308. – Barnard & Karaman, 1991: 531.

Type material. ZMUC CRU-9318.

Type locality. Unknown.

Material examined. ZMUC CRU-9318; Stebbing, 1906: 57; Stephensen, 1923b: 88, chart 15; Gurjanova, 1962: 308.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 simple; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins tapering. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner rounded. Urosomite 1 with very slight dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, moderately cleft.

Length. 14 mm.

Distribution. Arctic Ocean, North-Atlantic (West Norway, chiefly to the north).

Depth. Infralittoral to bathyal (0-265 m).

Remarks. Although this is mainly an arctic species, it is occasionally found as far south as the southern tip of Norway.

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Lateral cephalic lobes broader than male.

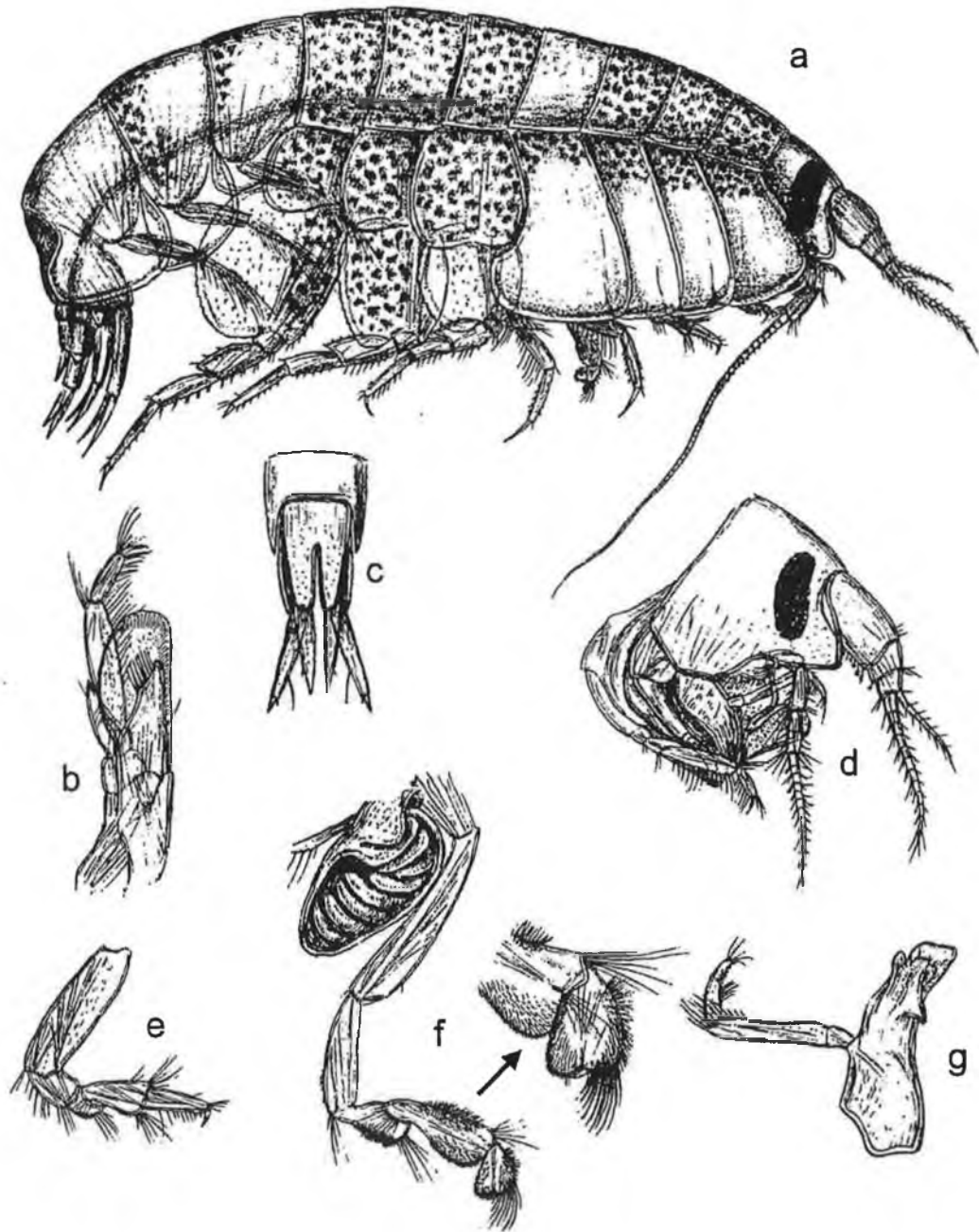


Figure 107: *Socarnes vahlii* (Krøyer, 1838). (a) entire, male; (b) maxilliped; (c) uropod 3 and telson; (d) head and antennae, female; (e) gnathopod 1; (f) gnathopod 2; (g) mandible.
 [After: G.O. Sars, 1895].

Sophrrosyne hispana (Chevreux, 1888)

Fig. 108

Opis hispana Chevreux, 1888: 567.

Sophrrosyne hispana. – Chevreux, 1900: 13, pl. 3, fig. 1. – Stebbing, 1906: 22. – Ruffo, 1975: 446. – Ledoyer, 1977: 389, fig. 23. – Diviacco & Ruffo, 1989: 550 figs 376-377. – Barnard & Karaman, 1991: 533. – Dauvin & Sorbe, 1995: 456.

Type material. MOM 37 0090, on 6 slides.

Type locality. Cape Finisterre (Atlantic Ocean).

Material examined. Holotype, female, 2 mm, MOM 37 0090 from Cape Finisterre.

Description. Antenna 1 subequal to antenna 2; f flagellum article 1 as long as remaining articles combined; calceoli absent. Eyes not apparent in preserved material. Lateral cephalic lobes subacute. Mandible molar absent, palp elongate with article 2 slightly longer than article 3. Maxilliped palp 4-articulate; outer plate poorly developed, not reaching half length of article 2 of palp; inner plate poorly developed, not reaching article 1 of palp.

Gnathopod 1 chelate; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus compressed, distinctly shorter than propodus; propodus margins diverging distally, palm slightly obtuse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad and sparsely armed anteriorly with robust setae, posterodistally produced beyond ischium; merus more or less subequal to carpus; carpus distinctly shorter than propodus; dactylus elongate and slender, subequal in length to propodus. Pereopod 6 basis much longer than broad, sparsely armed anteriorly with robust setae and posterodistally produced beyond ischium; merus subequal in length to carpus; carpus shorter than propodus; dactylus slender and elongate, subequal in length to propodus. Pereopod 7 basis expanded posteriorly, posterodistally produced, reaching to less than half of merus length, anterior margin sparsely armed with robust setae; merus short, barely longer than broad and subequal in length to carpus; carpus much shorter than propodus; dactylus long and slender, subequal in length to propodus.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with weak dorsal depression. Uropod 1 peduncle longer than rami, outer ramus slightly longer than inner ramus; uropod 2 peduncle slightly shorter than rami, inner ramus without marginal constriction, rami subequal; uropod 3 peduncle much shorter than rami, outer ramus slightly longer than inner ramus and 2-articulate, article 2 as long as or slightly longer than article 1. Telson cleft to about half length.

Length. Up to 4 mm.

Distribution. Atlantic Ocean (coasts of Europe), Mediterranean Sea.

Depth. Circalittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2.

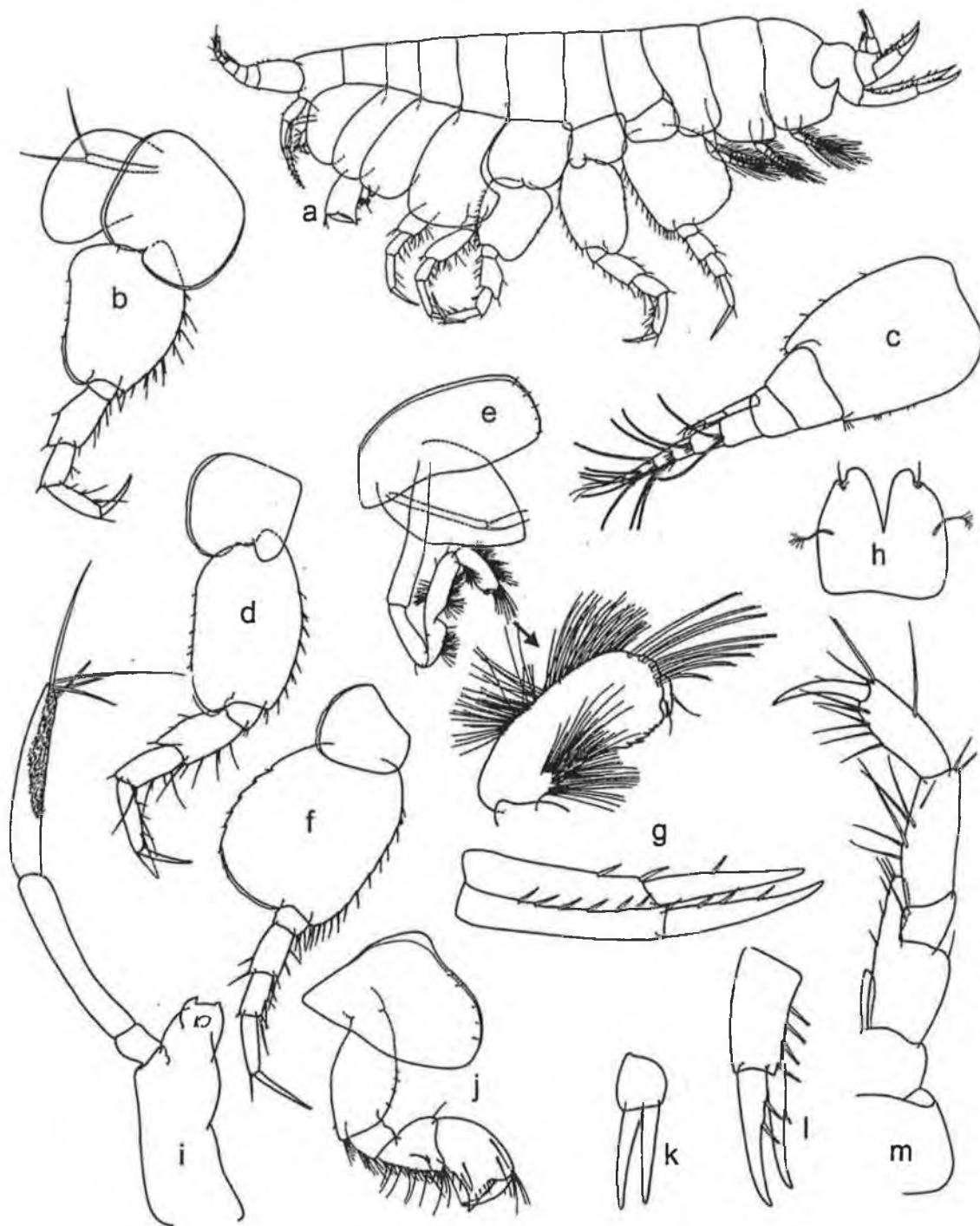


Figure 108: *Sophrosyne hispana* (Chevreux, 1888). Female. (a) entire; (b) pereopod 5; (c) antenna 1; (d) pereopod 6; (e) gnathopod 2; (f) pereopod 7; (g) uropod 1; (h) telson; (i) mandible; (j) gnathopod 1; (k) uropod 3; (l) uropod 2; (m) maxilliped.

[After: Diviacco & Ruffo, 1989].

Sophrosyne robertsoni Stebbing & Robertson, 1891

Fig. 109

Sophrosyne robertsoni Stebbing & Robertson, 1891: 31. – Stebbing, 1906: 21. – Lincoln, 1979a: 52, fig. 17. – Moore, 1983: 103, figs 1-3. – Barnard & Karaman, 1991: 533, fig. 92L.

Type material. Unknown.

Type locality. Firth of Clyde.

Material examined. Female, NHML 1911.11.8.651-653, from Inveraray, Scotland; female, NHML 1911.11.8.12549, from Inveraray, Scotland, 1874; male, 4 mm, NHML 1982.249.1 from Lynn of Lorne, Scotland (56°28.5'N, 5°27'W); female, 5 mm, from Co. Mayo, Ireland (54°34'N, 11°06'W), 347.9 m; female, 4.5 mm, from Co. Mayo, Ireland (54°33'N, 11°06'W), 342.6 m; female, 6 mm, from Co. Mayo, Ireland (54°35'N, 11°04'W).

Description. Antenna 1 peduncle article 1 inflated, distinctly longer than broad; flagellum article 1 elongate, almost as long as remainder of flagellum, calceoli absent. Eyes not apparent in preserved material. Lateral cephalic lobes subacute. Mandible molar absent, palp elongate with article 2 subequal to or slightly longer than article 3. Maxilliped palp 4-articulate; outer plate poorly developed, not reaching half length of article 2 of palp; inner plate poorly developed, not reaching article 1 of palp.

Gnathopod 1 slightly chelate; coxa large, about as long as coxa 2, broadly expanded anterodistally; ischium short; carpus compressed, distinctly shorter than propodus; propodus margins diverging distally, palm slightly obtuse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad and heavily armed with robust setae along anterior margin; merus slightly longer than carpus; dactylus slender and elongate, subequal in length to propodus. Pereopod 6 coxa produced into a posterior lobe; basis much longer than broad, merus distinctly longer than carpus, dactylus slender and elongate, subequal in length to propodus. Pereopod 7 basis broadly expanded posteriorly, not produced posterodistally, not reaching beyond ischium, and heavily armed with robust setae along anterior margin; merus slender, subequal in length to carpus; propodus subequal in length to dactylus, dactylus slender and elongate.

Epimeron 3 posteriorly produced into large upturned spine. Urosomite 1 with slight dorsal depression. Uropod 1 peduncle longer than rami and armed with a row of robust setae, rami subequal; uropod 2 peduncle more or less subequal to rami, inner ramus without marginal constriction, outer ramus slightly longer than inner; uropod 3 peduncle only slightly longer than broad, much shorter than rami, outer ramus only slightly longer than inner ramus and 2-articulate, article 2 as long as or slightly longer than article 1. Telson cleft, variable between one-third to one-half length.

Length. 6 mm.

Distribution. North-east Atlantic, recorded only from the west coasts of Scotland and Ireland.

Female (sexually dimorphic characters)

Antenna 1 peduncle article 1 not inflated, distinctly longer than broad; flagellum article 1 only slightly longer than article 2.

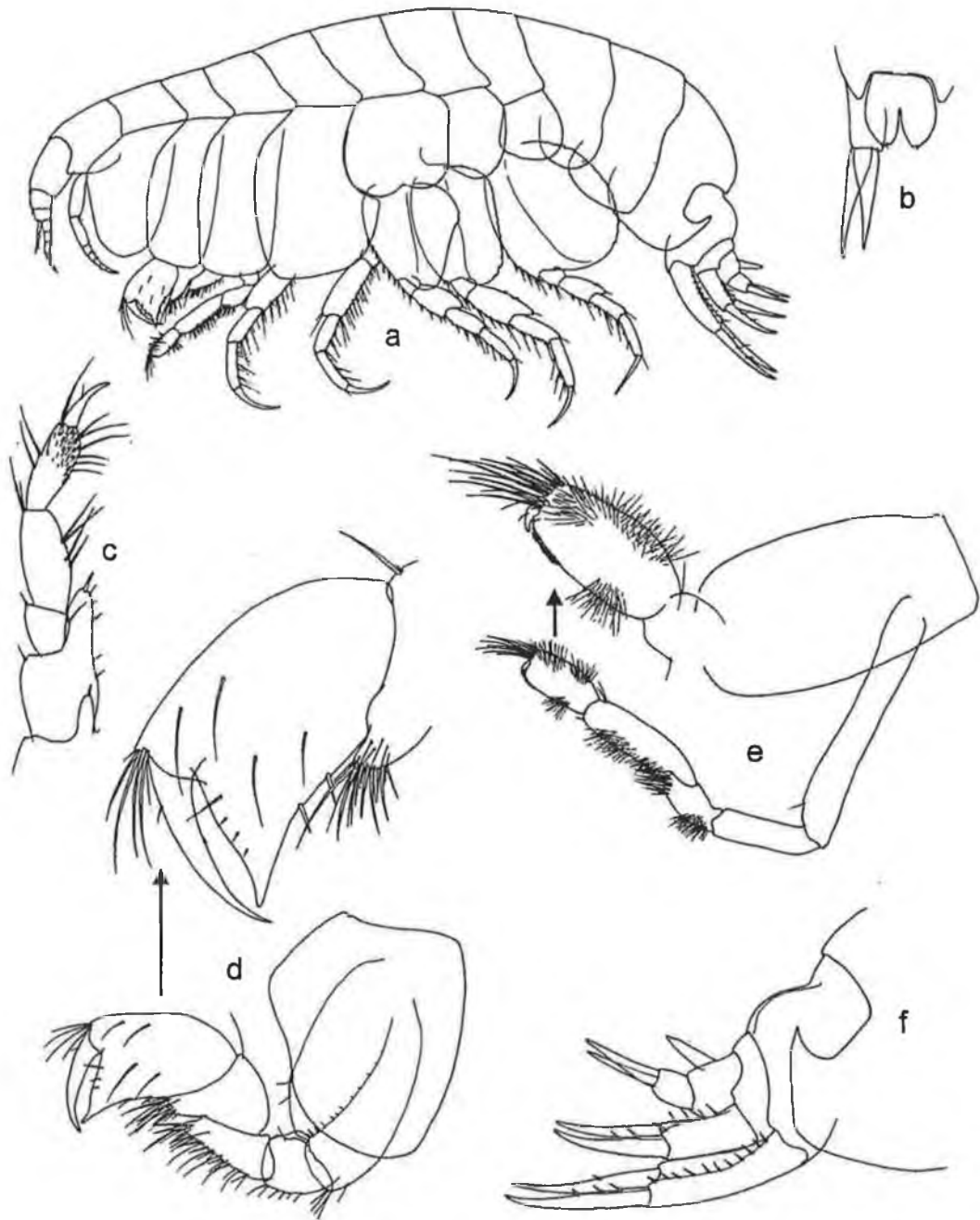


Figure 109: *Sophrosyne robertsoni* Stebbing & Robertson, 1891. Female. (a) entire; (b) uropod 3 and telson; (c) maxilliped; (d) gnathopod 1; (e) gnathopod 2; (f) epimeron 3 and urosome. [After: Lincoln, 1979a].

Stephonyx biscayensis (Chevreux, 1908)

Fig. 110

Euonyx biscayensis Chevreux, 1908: 1, fig. 1. – ? K.H. Barnard, 1916: 110. – Stephensen, 1923b: 42. – ? Schellenberg, 1926a: 200. – Chevreux, 1927: 47. – Chevreux 1935. 7, pl. 5, fig. 2. – ? J.L. Barnard, 1961: 34, fig. 4. – ? Griffiths, 1975: 144. – ? Ledoyer, 1986: 748, fig. 289. – Barnard & Karaman, 1991: 485.
Stephonyx biscayensis. – Lowry & Stoddart, 1989: 522, figs 2-3. – Palerud & Vader, 1991: 43. – Poupin, 1994: 16. – Lowry & Stoddart, 1997: 129, fig. 63.
Stephonyx sp. Paulmier, 1993: 29, pl. 34, fig. 1.

Type material. MOM.

Type locality. Gulf of Gascony (45°02'N, 3°16'W), 1455m, *Princesse-Alice* Station 1453.

Material examined. Female, 8mm, Thor Stn 99, 61°15'N, 90°35'W, ZMUC (no accession no.); Chevreux, 1908: 1, fig. 1; Stephensen, 1923b: 42; Lowry & Stoddart, 1989: 522, figs 2-3; – Lowry & Stoddart, 1997: 129, fig. 63.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 chelate; coxa reduced, significantly shorter than coxa 2, subquadrate; ischium extremely elongate; carpus very long, of subequal length to propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly broader than long. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner slightly acute. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 13 mm.

Distribution. Eastern Atlantic from the Faeroes to South Africa.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent. Urosomite 1 without dorsal depression.

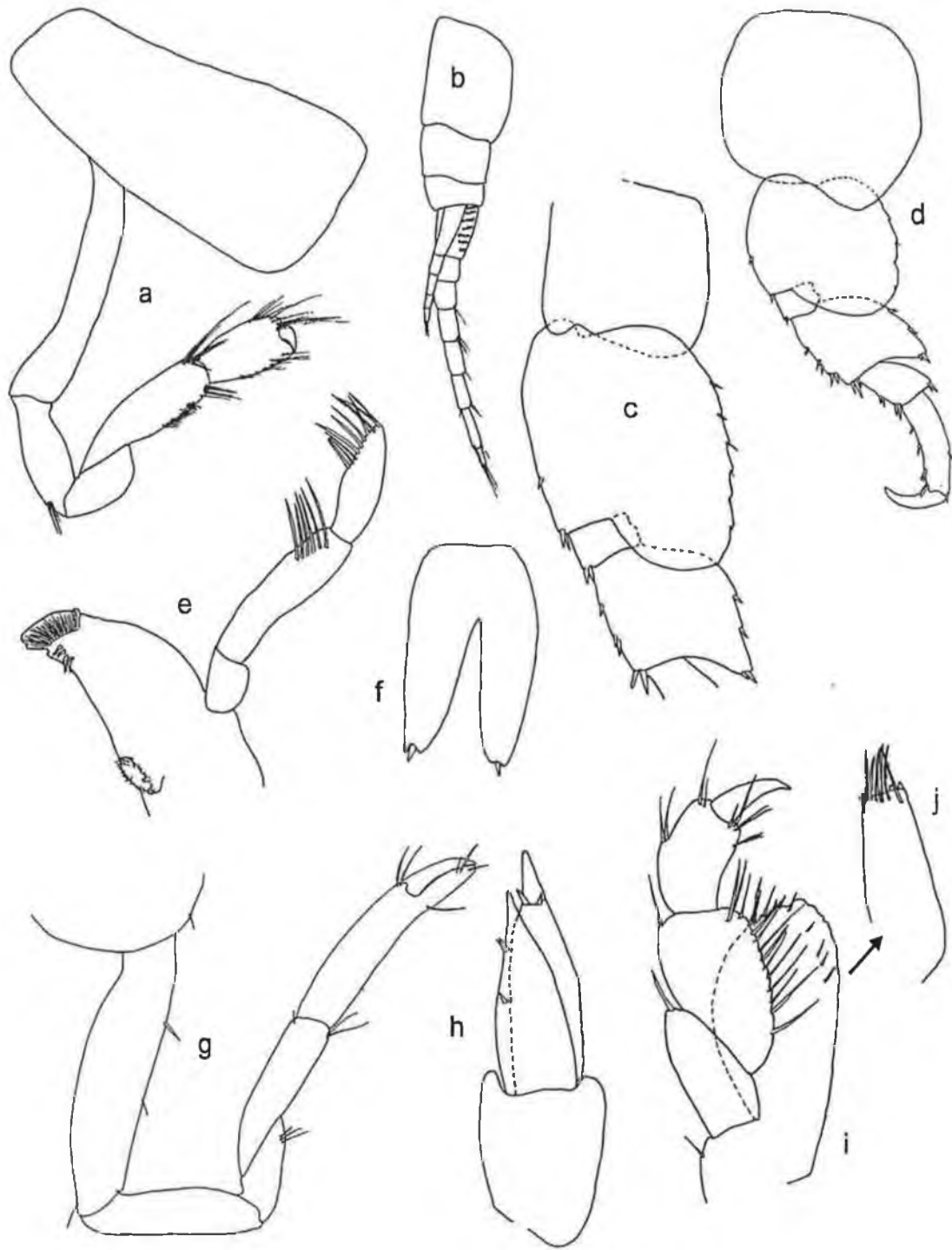


Figure 110: *Stephonyx biscayensis* (Chevreux, 1908). Female. (a) gnathopod 2; (b) antenna 1; (c) pereopod 6; (d) pereopod 5; (e) mandible; (f) telson; (g) gnathopod 1; (h) uropod 3; (i) maxilliped palp and outer plate; (j) maxilliped inner plate. [Illustration by author].

Stephonyx talismani (Chevreux, 1919)

Fig. 111

Euonyx talismani Chevreux, 1919: 576. – Stephensen, 1923b: 41, fig. 2. – Barnard & Karaman, 1991: 485.
Stephonyx talismani. – Lowry & Stoddart, 1989: 521.

Type material. TYPES: MNHN Reg No. Am5498 (1 female, ethanol), MNHN Reg. no. Am5499 (juvenile, ethanol).

Type locality. Off Cape Bojador, 882 m.

Material examined. Female, 6mm, Thor St. 78, 12-5-1904, 61°7'N, 90°30'W, ZMUC (no accession no.); Chevreux, 1919: 576; Stephensen, 1923b: 41, fig. 2; Lowry & Stoddart, 1989: 521.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 slightly longer than article 2. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 chelate; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium elongate, more than twice as long as broad; carpus very long, of subequal length to propodus; propodus margins subparallel, palm obtuse. Gnathopod 2 subchelate; carpus longer than propodus; palm deeply excavate, dactylus strongly curved; dactylus well developed. Pereopod 5 coxa produced into a posterior lobe; basis about as long as broad. Coxa 6 produced into an anterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression, not dorsally carinate. Uropod 1 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami subequal. Telson distinctly longer than broad, deeply cleft.

Length. 12 mm.

Distribution. Off southwest Faeroes; southwest Ireland.

Depth. Bathyal (698-1180 m).

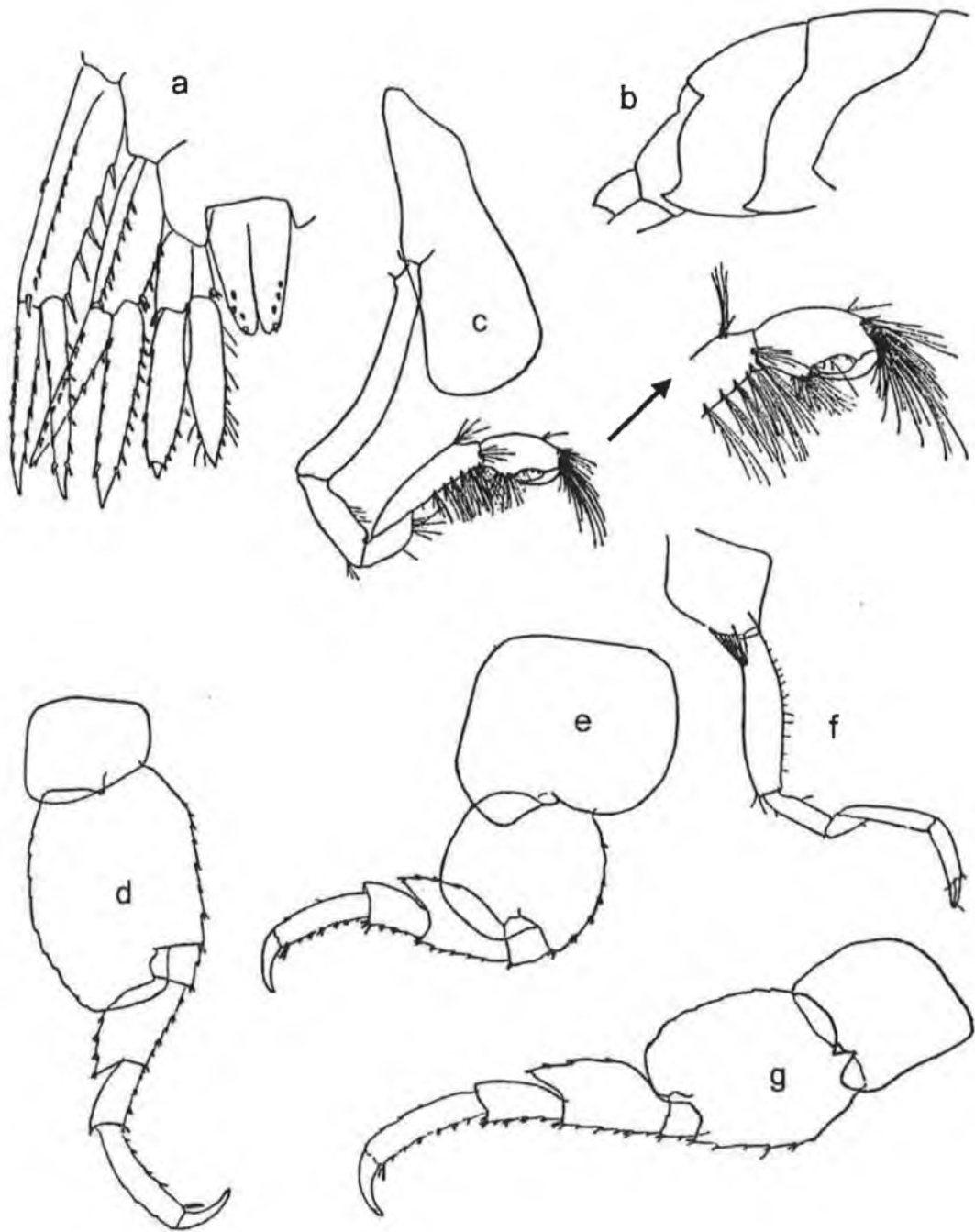


Figure 111: *Stephonyx talismani* (Chevreux, 1919). (a) uropods 1-3 and telson; (b) epimeron 1-3; (c) gnathopod 2; (d) pereopod 7; (e) pereopod 5; (f) gnathopod 1; (g) pereopod 6.
 [After: Stephensen, 1923].

Tmetonyx acutus (G.O. Sars, 1895)

Fig. 112

Hoplonyx acutus G.O. Sars, 1895: 95, pl. 33, fig. 2.

Anonyx acutus. – (in part) Della Valle, 1893: 833.

Tmetonyx acutus. – Stebbing, 1906: 75.

Tmetonyx acuta. – Barnard & Karaman, 1991: 535.

Type material. ?ZMO.

Type locality. Vennæs, Trondjemsfjord.

Material examined. G.O. Sars, 1895: 95, pl. 33, fig. 2; Stebbing, 1906: 75.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes acute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 13 mm.

Distribution. Bohuslän, Skagerrak, Norwegian Sea, off the Southwest Faeroes.

Depth. Bathyal.

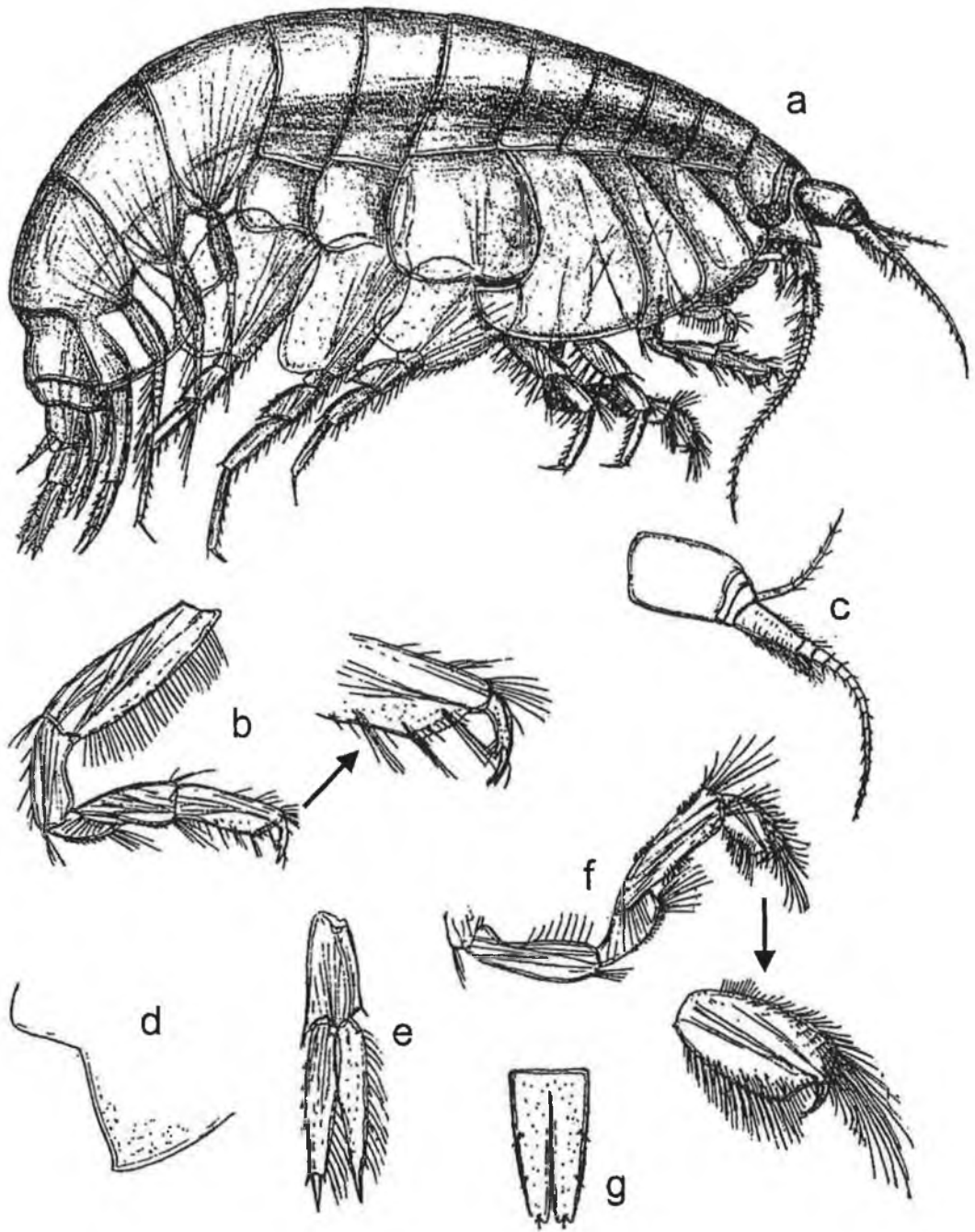


Figure 112: *Tmetonyx acutus* (G.O. Sars, 1895). Female. (a) entire; (b) gnathopod 1; (c) antenna 1; (d) epimeron 3; (e) uropod 3; (f) gnathopod 2; (g) telson. [After: G.O. Sars, 1895].

Tmetonyx albidus (G.O. Sars, 1895)

Fig. 113

Hoplonyx albidus. – G.O. Sars, 1895: 96, pl. 33, fig. 3.

Anonyx albidus. – Della Valle, 1893: 826.

Tmetonyx albidus. – Stebbing, 1906: 75.

Tmetonyx albida. – Barnard & Karaman, 1991: 535.

Type material. ?ZMO.

Type locality. ?Trondjemsfjord.

Material examined. G.O. Sars, 1895: 96, pl. 33, fig. 3; Stebbing, 1906: 75.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes quadrate. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis slightly longer than broad.

Epimeron 3 posterodistal corner quadrate. Urosomite 1 with dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 12 mm.

Distribution. West and North Norway.

Depth. Circalittoral to bathyal.

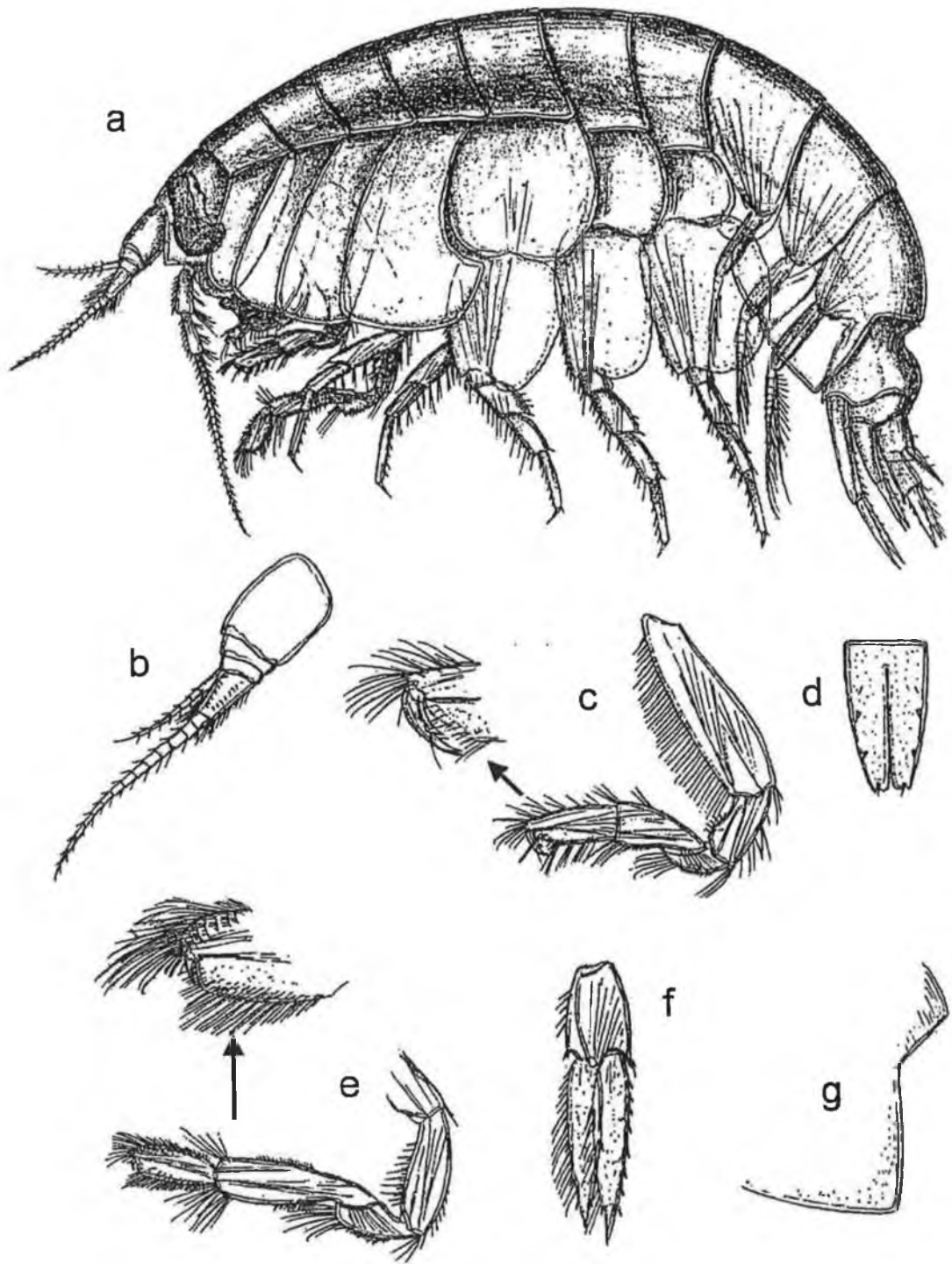


Figure 113: *Tmetonyx albidus* (G.O. Sars, 1895). Female. (a) entire; (b) antenna 1; (c) gnathopod 1; (d) telson; (e) gnathopod 2; (f) uropod 3; (g) epimeron 3. [After: G.O. Sars, 1895].

Tmetonyx cicada (Fabricius, 1780)

Fig. 114

Oniscus cicada Fabricius, 1780: 258.

Anonyx cicada. – Stebbing, 1888: 47, 617. – (in part) Della Valle, 1893: 833.

Hoplonyx cicada. – G.O. Sars, 1891: 92, pl. 32, fig. 2. – Stebbing, 1894: 9.

Anonyx gulosus Krøyer, 1845: 611. – Krøyer, 1846: pl. 14, fig. 2a-t.

Lysianassa gulosa. – Goës, 1866: 520.

Anonyx norvegicus. – Lilljeborg, 1851: 22.

Anonyx bruzelii Boeck, 1861: 643.

Tmetonyx cicada. – Stebbing, 1906: 74. – Chevreux & Fage, 1925: 69, fig. 59. – Schellenberg, 1942: 106. – Lincoln, 1979a: 90, figs 35a-d, 36a-d. – Costello *et al.*, 1989: 35. – Barnard & Karaman, 1991: 535.

Type material. SYNTYPE: ZMUC CRU-6032.

Type locality. Unknown.

Material examined. ZMUC CRU-6032; G.O. Sars, 1891: 92, pl. 32, fig. 2; Stebbing, 1906: 74; Chevreux & Fage, 1925: 69, fig. 59; Lincoln, 1979a: 90, figs 35a-d, 36a-d.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 about 70% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, reaching to half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with weak dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 18–24 mm.

Distribution. Boreal, circumpolar; North Atlantic, American and European coasts, North Sea.

Depth. Circalittoral to bathyal.

Female (sexually dimorphic characters)

Antenna 2 about 40% of body length; calceoli absent.

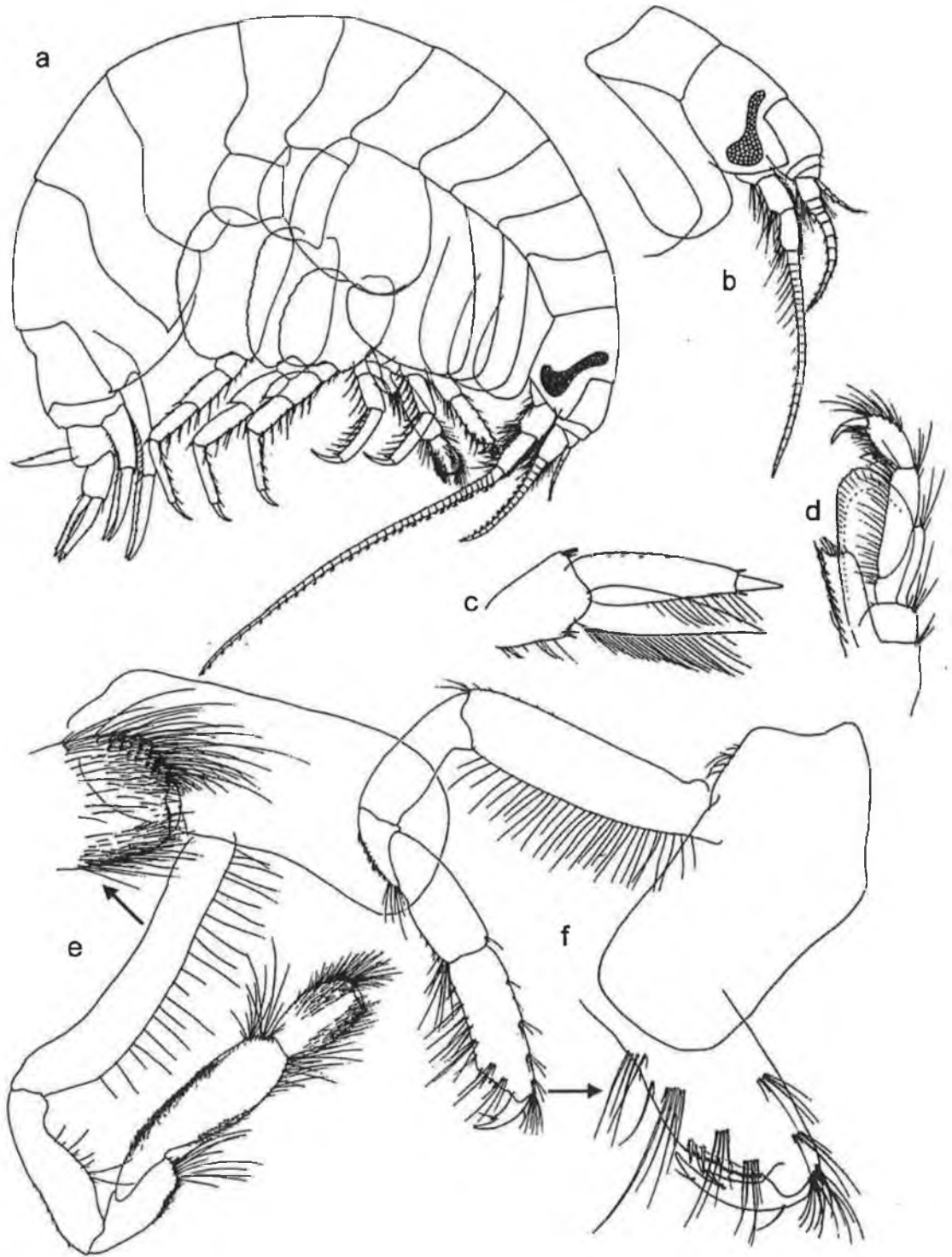


Figure 114: *Tmetonyx cicada* (Fabricius, 1780). (a) entire, male; (b) head and antennae, female; (c) uropod 3, male; (d) maxilliped; (e) gnathopod 2; (f) gnathopod 1.

[After: Lincoln, 1979a].

Tmetonyx leucophthalmus (G.O. Sars, 1895)

Fig. 115

Hoplonyx leucophthalmus G.O. Sars, 1891: 97, pl. 34, fig. 1.

Anonyx cicada. – (in part) Della Valle, 1893: 833.

Tmetonyx leucophthalmus. – Stebbing, 1906: 76.

Tmetonyx leucophthalma. – Barnard & Karaman, 1991: 535.

Type material. SYNTYPES: ZMO Reg. No. F13199; ZMUC CRU-3209.

Type locality. Vennæs, Trondjemsfjord.

Material examined. ZMUC CRU-3209; G.O. Sars, 1891: 97, pl. 34, fig. 1; Stebbing, 1906: 76.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes quadrate. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 15 mm.

Distribution. North and West Norway.

Depth. Circalittoral to bathyal (to 282 m).

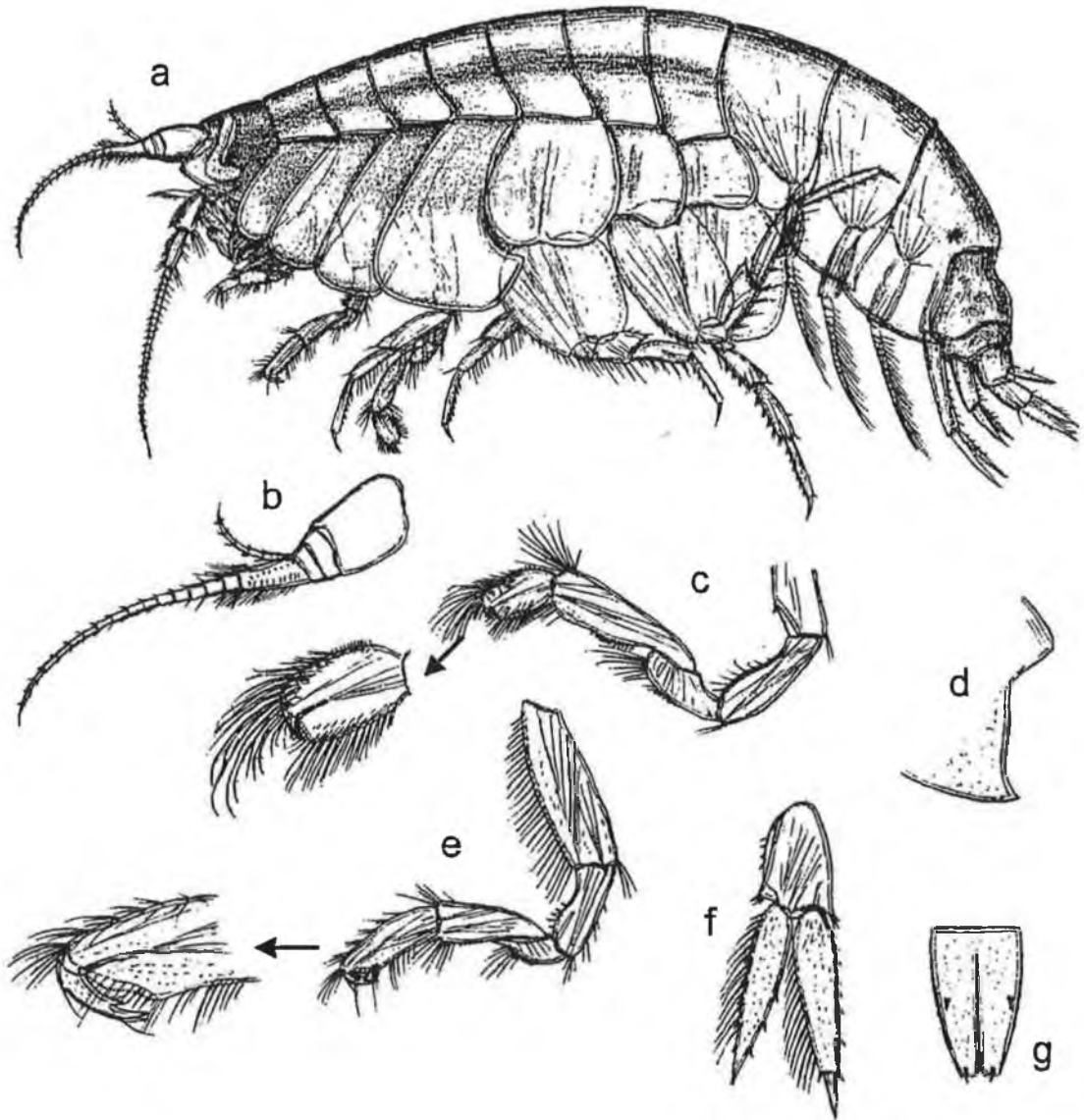


Figure 115: *Tmetonyx leucophthalmus* (G.O. Sars, 1895). Female. (a) entire; (b) antenna 1; (c) gnathopod 2; (d) epimeron 3; (e) gnathopod 1; (f) uropod 3; (g) telson.

[After: G.O. Sars, 1895].

Tmetonyx nardonis (Heller, 1866)

Fig. 116

Anonyx Nardonis Heller, 1866: 26, pl. 2, fig. 17-18.

Hoplonyx exiguus Chevreux, 1902: 696, pl. 5, fig. 1.

Tmetonyx exiguus. – Stebbing, 1906: 720. – Chevreux & Fage, 1925: 67, figs 56-57.

Tryphosella nardonis. – Krapp-Schickel, 1974: 338, pl. 26.

Tmetonyx nardonis. – Ruffo, 1985: 276, figs 1-4. – Diviacco & Ruffo, 1989: 552, figs 378-379. – Barnard & Karaman, 1991: 535.

Type material. Unknown.

Type locality. Piran.

Material examined. Chevreux & Fage, 1925: 67, figs 56-57; Diviacco & Ruffo, 1989: 552, figs 378-379.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate; inner plate poorly developed, not reaching half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, weakly tapering distally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 basis about as long as broad.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 3.5 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral (6–20 m).

Ecology. May be found in *Posidonia* and in marine caves (Diviacco & Ruffo, 1989).

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Calceoli absent. Urosomite 1 without dorsal depression.

Length. 4 mm.

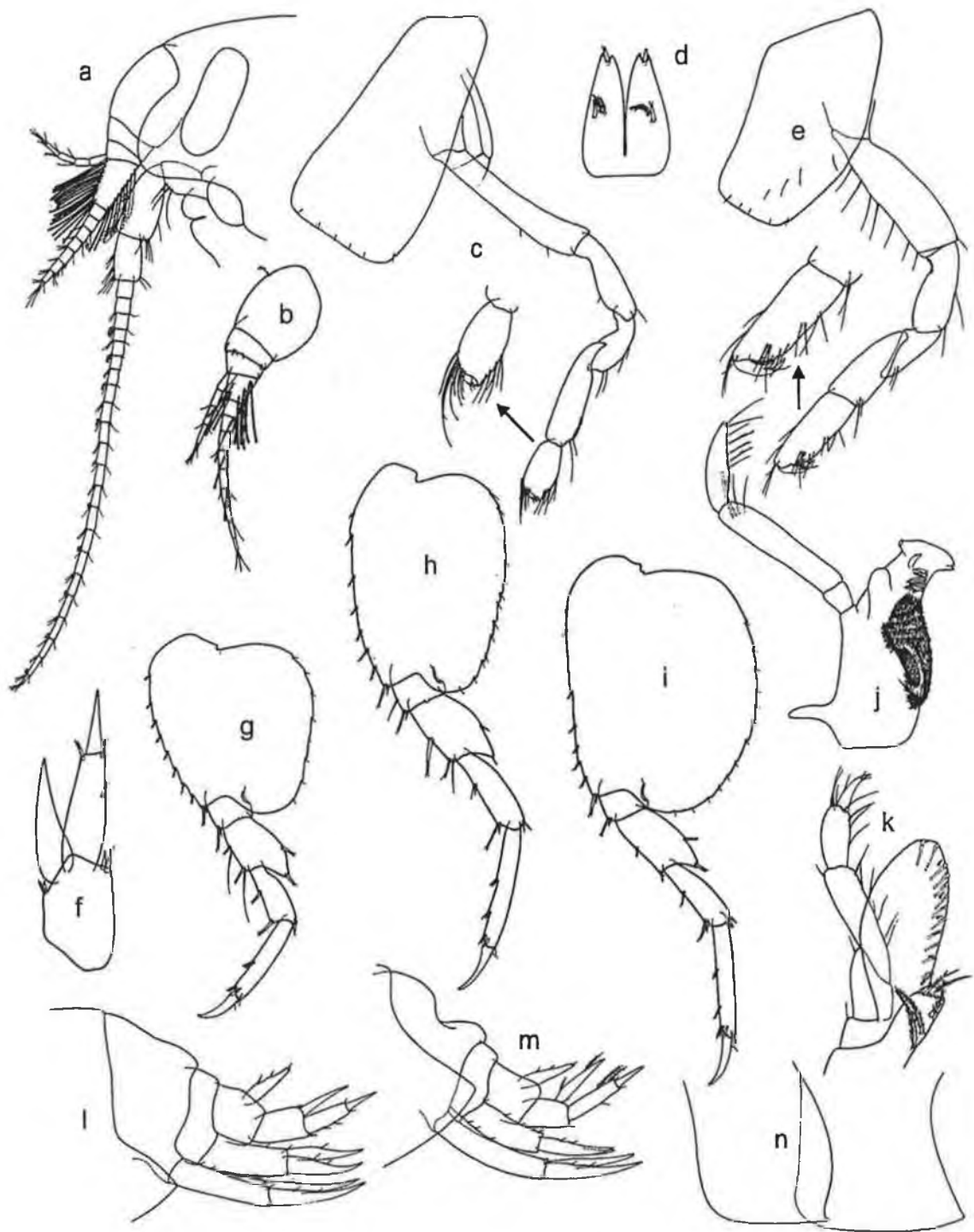


Figure 116: *Tmetonyx nardosis* (Heller, 1866). (a) head and antennae, male; (b) antenna 1, female; (c) gnathopod 2; (d) telson; (e) gnathopod 1; (f) uropod 3, female; (g) pereopod 5; (h) pereopod 6; (i) pereopod 7; (j) mandible; (k) maxilliped; (l) epimeron 3 and urosome, female; (m) epimeron 3 and urosome, male; (n) epimeron 2-3. [After: Diviacco & Ruffo, 1989].

Tmetonyx similis (G.O. Sars, 1891)

Fig. 117

Hoplonyx similis G.O. Sars, 1891: 93 pl. 33, fig. 1.

Tmetonyx similis. – Stebbing, 1906: 76. – Chevreux & Fage, 1925: 69, fig. 58. – Cecchini & Parenzan, 1935: 168, fig. 11. – Lincoln, 1979a: 90, fig. 35e-f, fig. 36e-h. – Ruffo, 1985: 274. – Costello *et al.*, 1989: 35. – Diviacco & Ruffo, 1989: 554, figs 380-381. – Barnard & Karaman, 1991: 535. – Dauvin & Sorbe, 1995: 449, 456.

Tryphosella similis. – Krapp-Schickel, 1974: 338, pl. 25.

Type material. ?ZMO.

Type locality. West coast of Norway.

Material examined. G.O. Sars, 1891: 93 pl. 33, fig. 1; – Stebbing, 1906: 76; Chevreux & Fage, 1925: 69, fig. 58; Lincoln, 1979a: 90, fig. 35e-f, fig. 36e-h; Diviacco & Ruffo, 1989: 554, figs 380-381.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, weakly tapering distally; ischium elongate, more than twice as long as broad; carpus long, of subequal length to propodus; propodus margins subparallel, palm extremely acute. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 14 mm.

Distribution. North Atlantic (American and European coasts from Norway to France), Mediterranean Sea.

Depth. Circalittoral to bathyal (27–2520 m).

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent. Urosomite 1 with very weak dorsal depression.

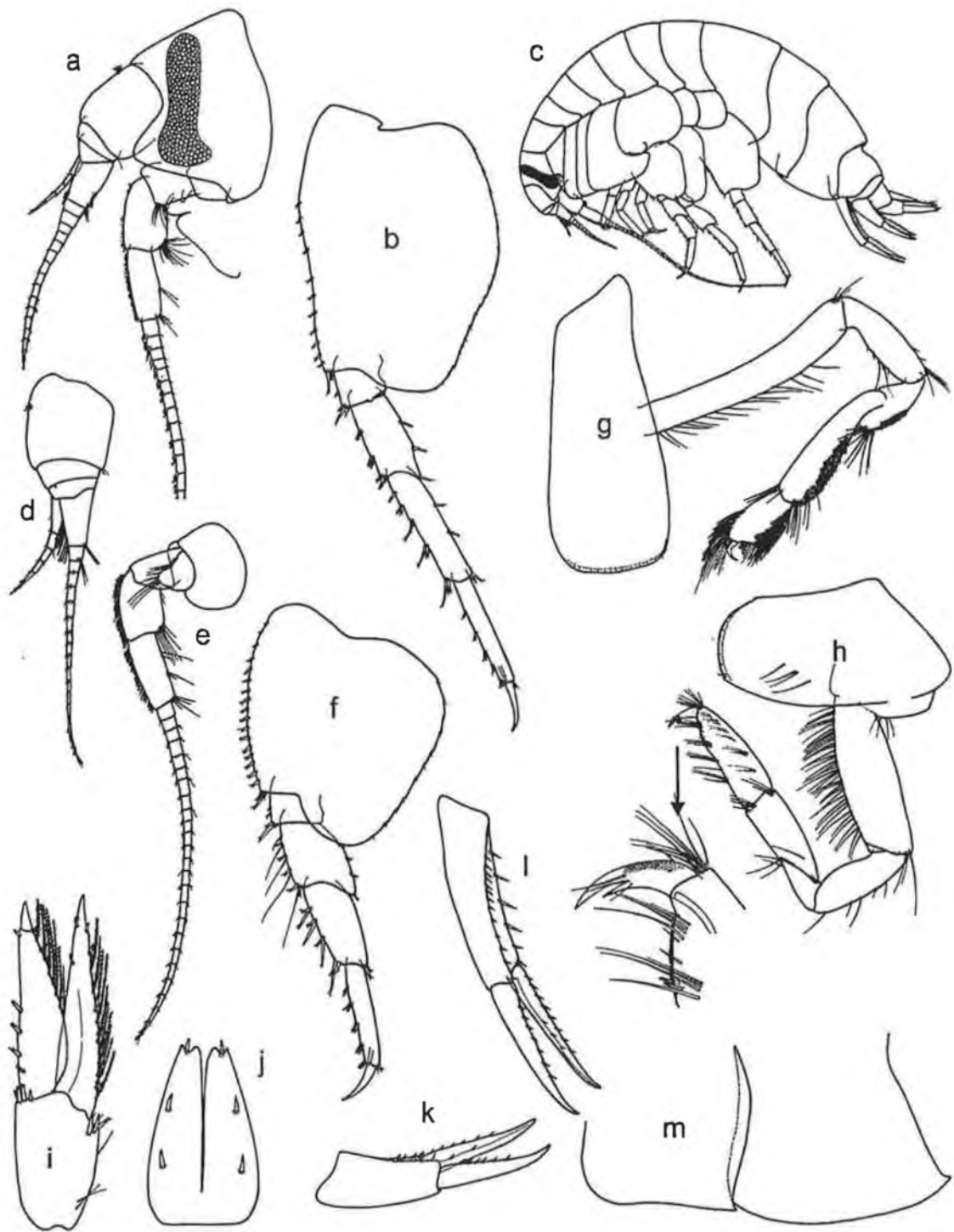


Figure 117: *Tmetonyx similis* (G.O. Sars, 1891). (a) head and antennae, male; (b) pereopod 7; (c) entire, female; (d) antenna 1; (e) antenna 2; (f) pereopod 5; (g) gnathopod 2; (h) gnathopod 1; (i) uropod 3; (j) telson; (k) uropod 2; (l) uropod 1; (m) epimeron 2-3.

[After: Diviacco & Ruffo, 1989].

Trischizostoma nicaeense (Costa, 1853)

Fig. 118

Guerinia nicaeensis A. Costa, 1853a: 4. – Brian, 1903: 41.

Guerina nicaeensis. – Della Valle, 1893: 776, pl. 61, figs 10-22.

Trischizostoma nicaeense. – Stebbing, 1906: 13. – Sexton, 1908: 375, pls 14-16, pl. 17, figs 1-12, pl. 19, fig. 1, pl. 21, fig. 14. – Chevreux & Fage, 1925: 30, fig. 6. – Ledoyer, 1977: 391, fig. 21B. – Diviacco, 1986: 513, fig. 1. – Diviacco & Ruffo, 1989: 557, fig. 382. – Barnard & Karaman, 1991: 536, figs 87D, 89O, 90B, 91H, 92H, 93C, 95U. – Dauvin & Sorbe, 1995: 449, 456.

Type material. Unknown.

Type locality. Nice.

Material examined. Stebbing, 1906: 13; Chevreux & Fage, 1925: 30, fig. 6; Diviacco & Ruffo, 1989: 557, fig. 382.

Description. Rostrum pronounced. Antenna 1 shorter than antenna 2; flagellum article 1 much longer than remaining articles combined. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, subtriangular. Mouthparts forming a conical bundle. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa reduced, shorter than coxa 2; ischium short; merus and carpus rotated; carpus compressed, distinctly shorter than propodus; propodus and dactylus inverted in adult; propodus broader than long, margins diverging distally, palm slightly acute and denticulate; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a very small spine. Urosomite 1 with dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson subequal in length and breadth, entire.

Length. 20 mm.

Distribution. Atlantic Ocean (coasts of Europe), west Mediterranean.

Ecology. Ectoparasitic on fishes and other animals.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length.

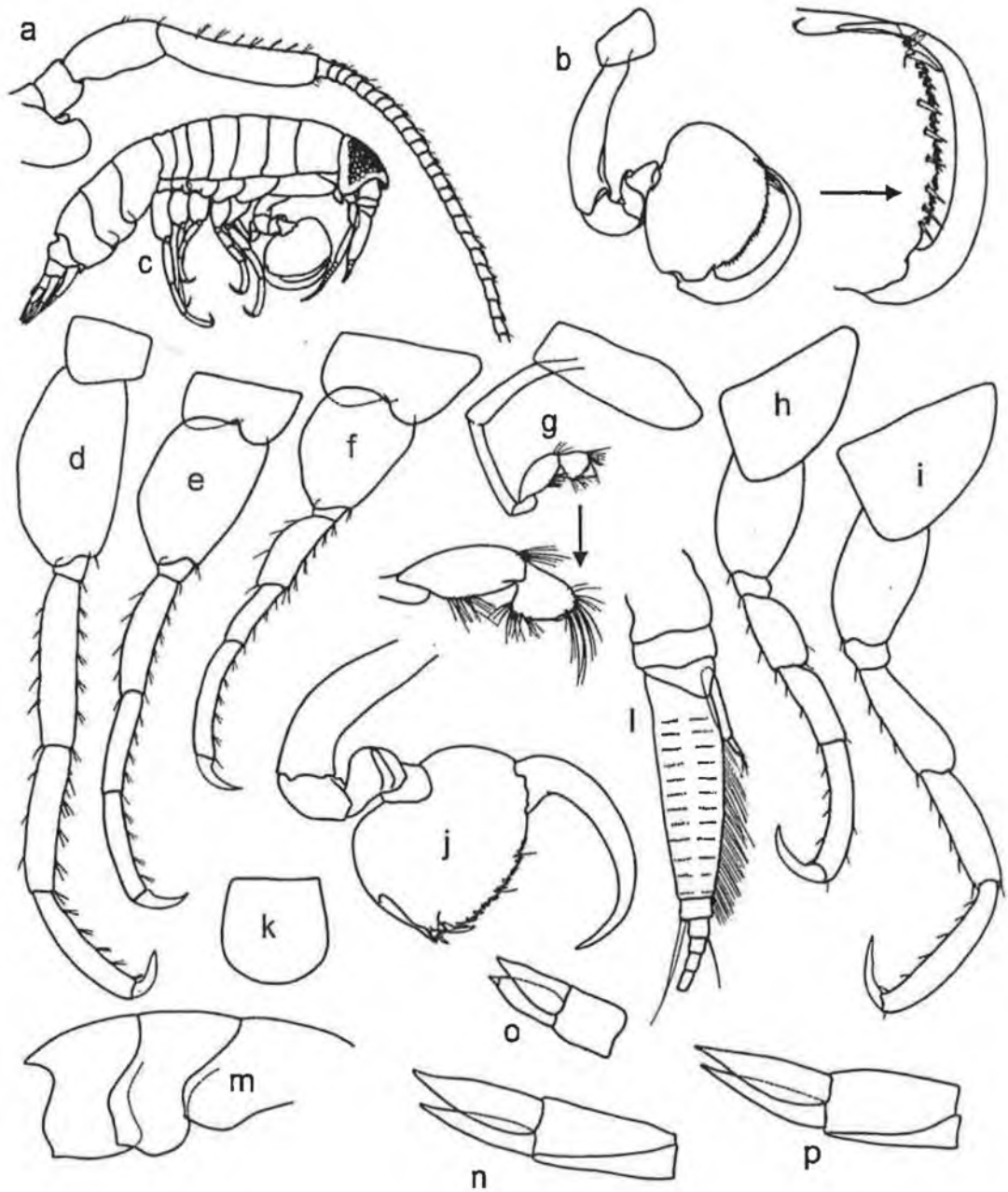


Figure 118: *Trischizostoma nicaeense* (Costa, 1853). (a) antenna 2; (b) gnathopod 1; (c) entire, male; (d) pereopod 7; (e) pereopod 6; (f) pereopod 5; (g) gnathopod 2; (h) pereopod 4; (i) pereopod 3; (j) gnathopod 1, juvenile; (k) telson; (l) antenna 1; (m) epimeron 1-3; (n) uropod 2; (o) uropod 3; (p) uropod 1. [After: Diviacco & Ruffo, 1989].

Trischizostoma raschi Esmark & Boeck, 1861 [in Boeck, 1861]

Fig. 119

- Trischizostoma Raschii* Esmark & Boeck, 1861: 637. – Boeck, 1871: 91. – Bovallius, 1866: 24. – Della Valle, 1893: 780. – Stephensen, 1923b: 39.
Trischizostoma Raschi. – G.O. Sars, 1890: 31, pl. 12. – Chevreux, 1927: 46.
Trischizostoma nicaeense. – (in part) Stebbing, 1906: 13.
Trischizostoma raschii. – Sexton, 1908: 385, pl. 17, fig. 13, pl. 18, pl. 19, figs 1-2, pl. 20, pl. 21, figs 1-13, 15-18. – Schellenberg, 1927: 658.
Trischizostoma raschi. – Stephensen, 1935: 30. – Diviacco, 1986: 513, fig. 1. – Diviacco & Ruffo, 1989: 559, fig. 383. – Barnard & Karaman, 1991: 536.
Trischizostoma nicaeensis. – Gurjanova, 1951: 156, fig. 31.

Type material. Unknown.

Type locality. Bergen.

Material examined. G.O. Sars, 1890: 31, pl. 12; Diviacco & Ruffo, 1989: 559, fig. 383.

Description based on female, male unknown.

Description. Rostrum pronounced. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Mouthparts forming a conical bundle. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium short; merus and carpus rotated, carpus very compressed, distinctly shorter than propodus; propodus and dactylus inverted in adult; propodus broader than long, palm transverse to slightly acute; palm denticulate; dactylus well developed. Gnathopod 2 subchelate; carpus at least twice as long as propodus; dactylus minute. Pereopod 5 coxa produced into a posterior lobe; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming a tiny spine. Urosomite 1 with dorsal depression. Uropods 1-3 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, inner ramus extending past article 1 of outer ramus. Telson subequal in length and breadth, emarginate or very slightly cleft.

Length. 22 mm.

Distribution. North Atlantic Ocean (Barents Sea, Norwegian Sea, North Sea, Celtic Sea), Mediterranean.

Ecology. Parasitic on the Velvet Belly shark (*Etmopterus spinax*) (Vader & Romppainen, 1985), although the type specimens were collected from the 'skinned body of a newly shot bird, submerged in the dredge' (G.O. Sars, 1890).

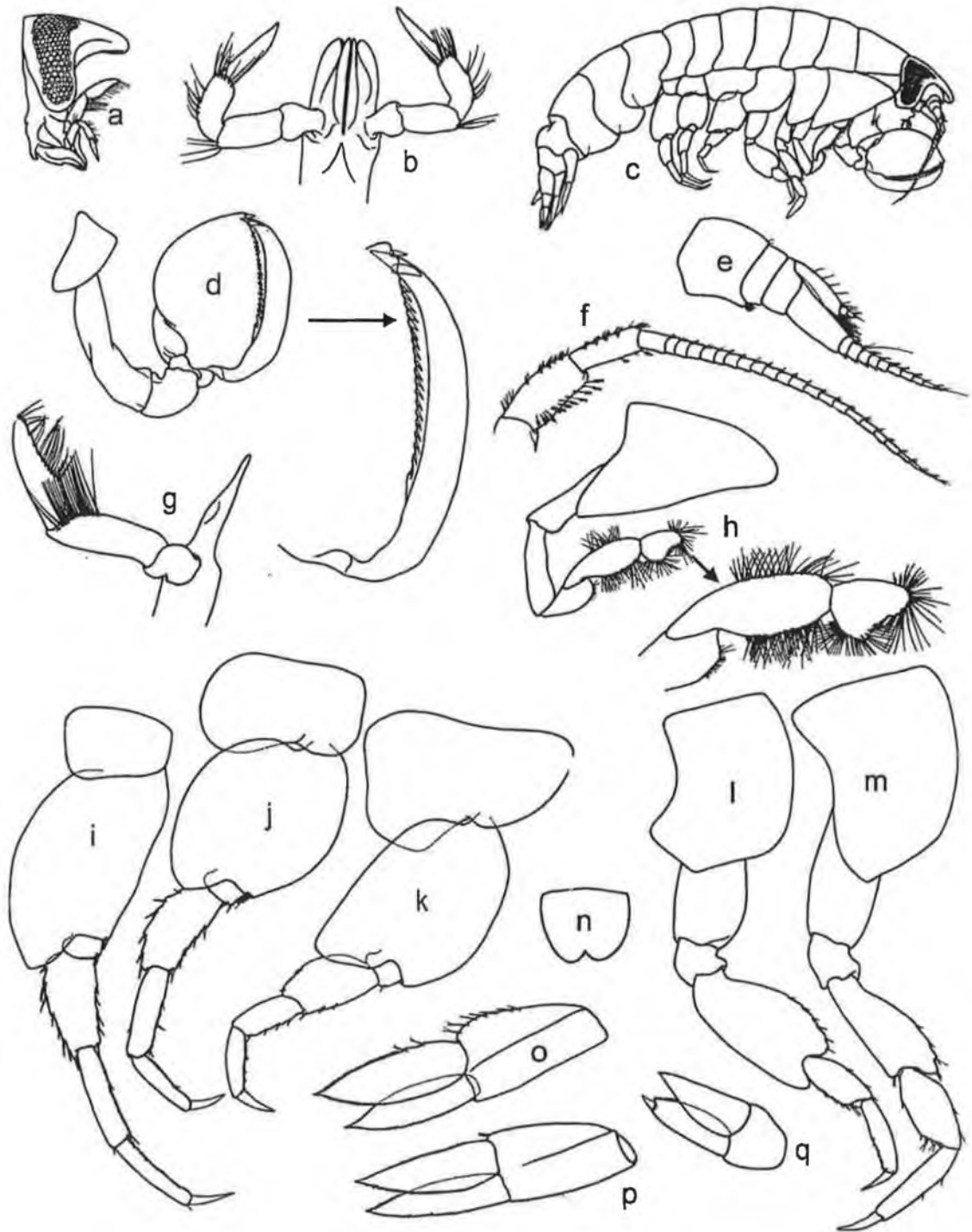


Figure 119: *Trischizostoma raschii* Esmark & Boeck, 1861. Female. (a) head; (b) maxilliped; (c) entire; (d) gnathopod 1; (e) antenna 1; (f) antenna 2; (g) mandible; (h) gnathopod 2; (i) pereopod 7; (j) pereopod 6; (k) pereopod 5; (l) pereopod 4; (m) pereopod 3; (n) telson; (o) uropod 1; (p) uropod 2; (q) uropod 3. [After: Diviacco & Ruffo, 1989].

Tryphosella angulata (G.O. Sars, 1895)

Fig. 120

Tryphosa angulata G.O. Sars, 1891: 78, pl. 28, fig. 1. – Stebbing, 1906: 70.
Tryphosella angulata. – Bonnier, 1893: 171. – Barnard & Karaman, 1991: 537.
Anonyx angulatus. – Della Valle, 1893: 825.

Type material. SYNTYPES: NHML Reg. No. 1911: 11: 8: 13257-13261

Type locality. Trondjemsfjord.

Material examined. G.O. Sars, 1891: 78, pl. 28, fig. 1; Stebbing, 1906: 70.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes acute; with small, up-turned projection on anterior end. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm slightly acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis distinctly longer than broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 7 mm.

Distribution. Norwegian sea, Iceland.

Depth. Circalittoral to bathyal (188–282 m).

Female (sexually dimorphic characters)

Antenna 2 less than 40% body length, calceoli absent.

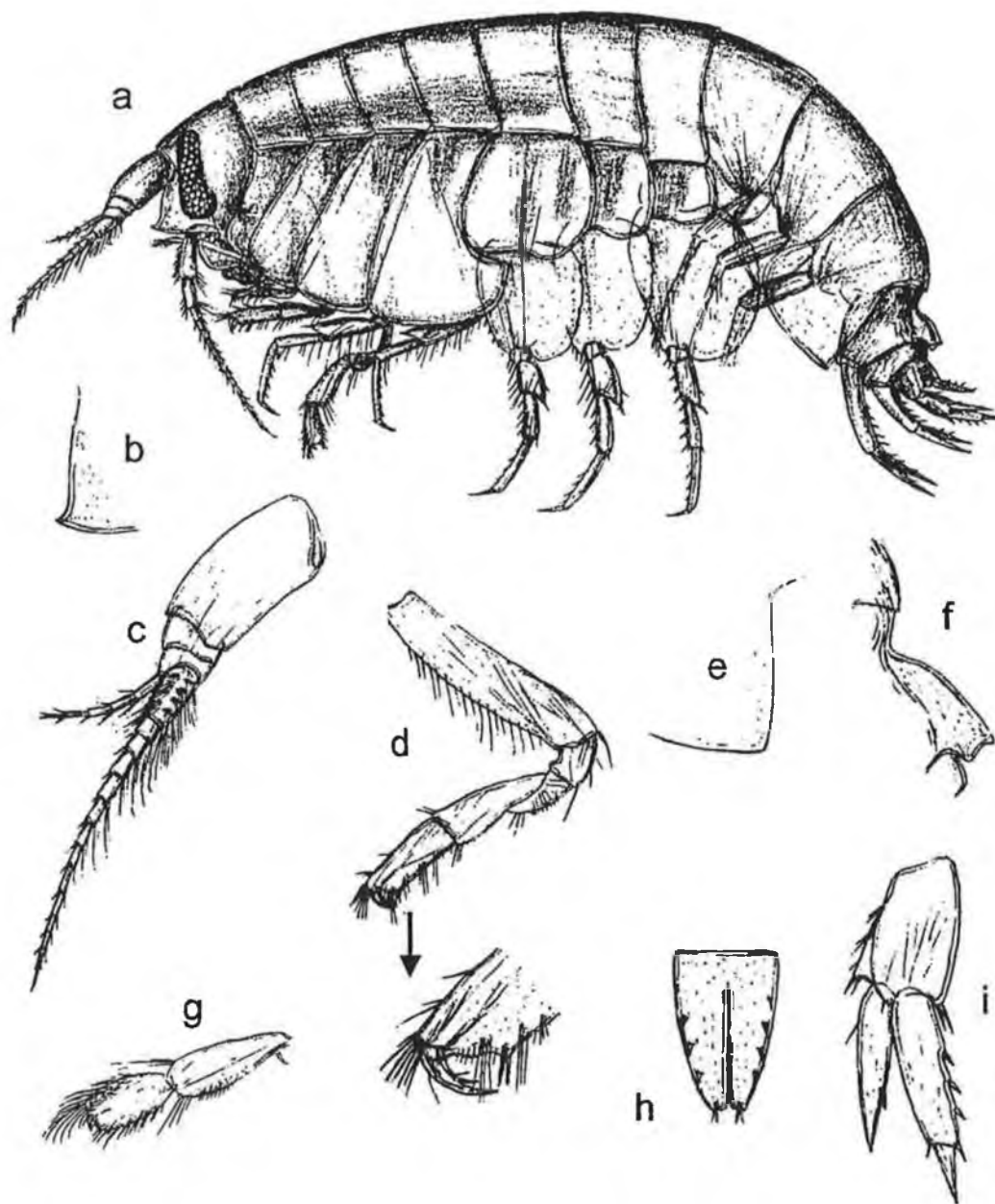


Figure 120: *Tryphosella angulata* (G.O. Sars, 1895). Female. (a) entire; (b) lateral lobes; (c) antenna 1; (d) gnathopod 1; (e) epimeron 3; (f) urosomite 1; (g) gnathopod 2; (h) telson; (i) uropod 3. [After: G.O. Sars, 1895].

Tryphosella compressa (G.O. Sars, 1895)

Fig. 121

Tryphosa compressa G.O. Sars, 1891: 76, 685, suppl. pl. 4, fig 2. – Stebbing, 1906: 71. – Shoemaker, 1930b: 19.

Tryphosella compressa. – Bonnier, 1893: 171. – Barnard & Karaman, 1991: 537.

Type material. ?ZMO

Type locality. Unknown.

Material examined. G.O. Sars, 1891: suppl. pl. 4, fig 2; Stebbing, 1906: 71.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus very long, distinctly longer than propodus; propodus margins subparallel, palm acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus quite well developed. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a slight posterior lobe.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 8 mm.

Distribution. Iceland, Arctic Seas.

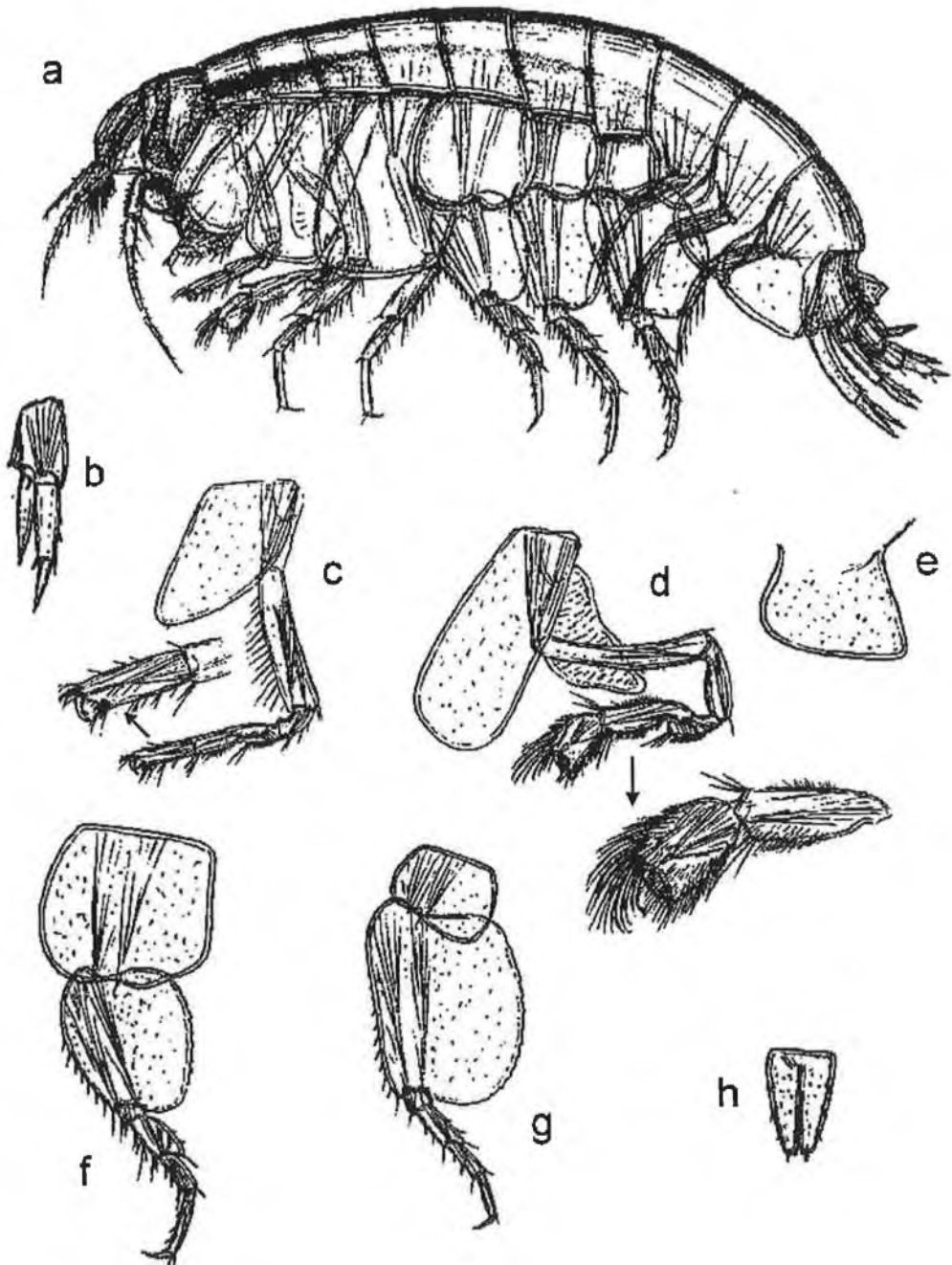


Figure 121: *Tryphosella compressa* (G.O. Sars, 1895). Female. (a) entire; (b) uropod 2; (c) gnathopod 1; (d) gnathopod 2; (e) epimeron 3; (f) pereopod 5; (g) pereopod 7. [After: G.O. Sars, 1895].

Tryphosella dilatata (Chevreux, 1903)

Fig. 122

Orchomenella dilatata Chevreux, 1903: 90, fig. 5. – Chevreux, 1935: 55, pl. 16, fig. 9.

Tmetonyx palpiserrata Bellan-Santini, 1985: 280, fig. 3.

Tryphosella palpiserrata. – Ruffo, 1985: 295.

Tryphosella dilatata. – Ruffo, 1986: 515, figs 1-2. – Diviacco & Ruffo, 1989: 561, fig. 386.

Orchomene dilatatus. – Barnard & Karaman, 1991: 508.

Type material. MOM 37 0643.

Type locality. Off Corsica (41°47'N, 7°14'15"E).

Material examined. Chevreux, 1903: 90, fig. 5; Diviacco & Ruffo, 1989: 561, fig. 386.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 unknown (the flagellum of the only known male specimen is broken at article 17 (Diviacco & Ruffo, 1989)). Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus without locking robust setae at posterodistal corner. Pereopod 5 coxa produced into a slight posterior lobe; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending slightly past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 4 mm.

Distribution. Mediterranean endemic.

Depth. Abyssal (2276–2660 m).

Remarks. This species does not have the tapering coxa 1 of other members of the genus.

Female (sexually dimorphic characters)

Antenna 1 slightly shorter than antenna 2. Antenna 2 less than 40% of body length; calceoli absent. Urosomite 1 not dorsally carinate.

Length. 3 mm.

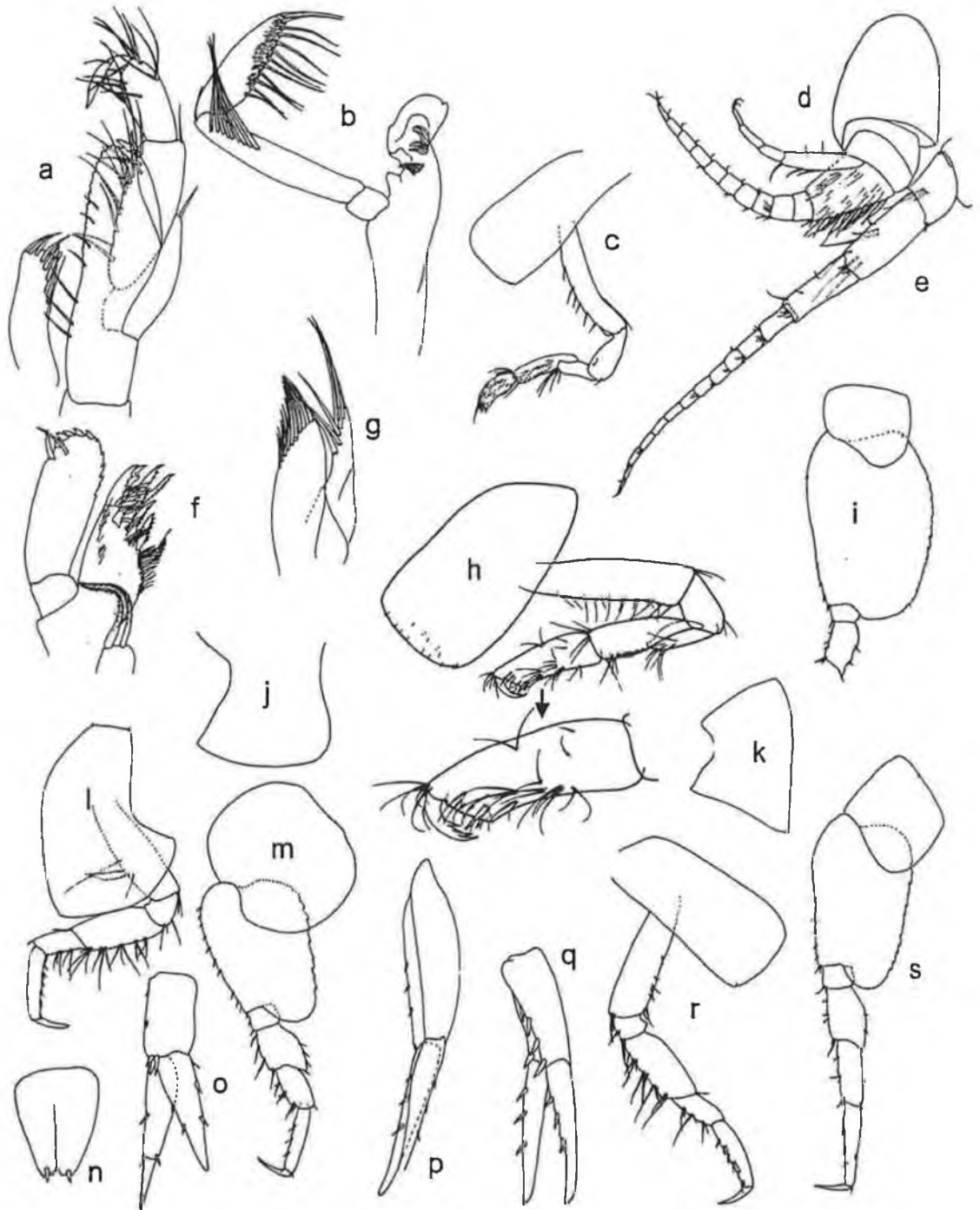


Figure 122: *Tryphosella dilatata* (Chevreux, 1903). Female. (a) maxilliped; (b) mandible; (c) gnathopod 2; (d) antenna 1; (e) antenna 2; (f) maxilla 1; (g) maxilla 2; (h) gnathopod 1; (i) pereopod 7; (j) epimeron 3; (k) head; (l) pereopod 4; (m) pereopod 5; (n) telson; (o) uropod 3; (p) uropod 1; (q) uropod 2; (r) pereopod 3; (s) pereopod 6.

[After: Diviacco & Ruffo, 1989].

Tryphosella horingii (Boeck, 1871)

Fig. 123

Tryphosa Høringii Boeck, 1871: 118. – Boeck, 1876: 182. – G.O. Sars, 1891: pl. 27, fig. 2. – Stebbing, 1906: 71.

Tryphosa Hörringii. – G.O. Sars, 1891: 77.

Tryphosella Hörringii. – Bonnier, 1893: 171.

?*Tryphosa høringii*. – Duhig & Humphries, 1955: 124. – Duhig, 1960: 64.

Tryphosella horingi. – Lincoln, 1979a: 86, fig. 34. – Barnard & Karaman, 1991: 537.

?*Tryphosa horingi*. – Dauvin *et al.*, 1994: 551, table 3.

Type material. ZMUC CRU-6730 (however, see Remarks below).

Type locality. Unknown.

Material examined. Female, 3.5 mm NHML 1977: 548; male, 4 mm NHML 1977: 548 - both from Koster Fjord, Säcken, Sweden; male 4.5 mm, ZMUC, Thor St. 273, 9/10/1904, 640 m; G.O. Sars, 1891: 77; Duhig & Humphries, 1955: 124; Duhig, 1960: 64; Lincoln, 1979a: 86, fig. 34.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm slightly acute to acute; dactylus well developed. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression, carinate dorsally. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 7 mm.

Distribution. North Sea, west and north Norway, off southwest Faeroes, ?British Isles.

Depth. Circalittoral to bathyal (50-900 m).

Remarks. The type material is catalogued as ZMUC CRU-6730, however, a search of the type-materials collection in the ZMUC did not yield this material and it therefore must be presumed to be lost.

Female (sexually dimorphic characters)

Antenna 1 slightly shorter than antenna 2, or subequal to antenna 2. Calceoli absent.

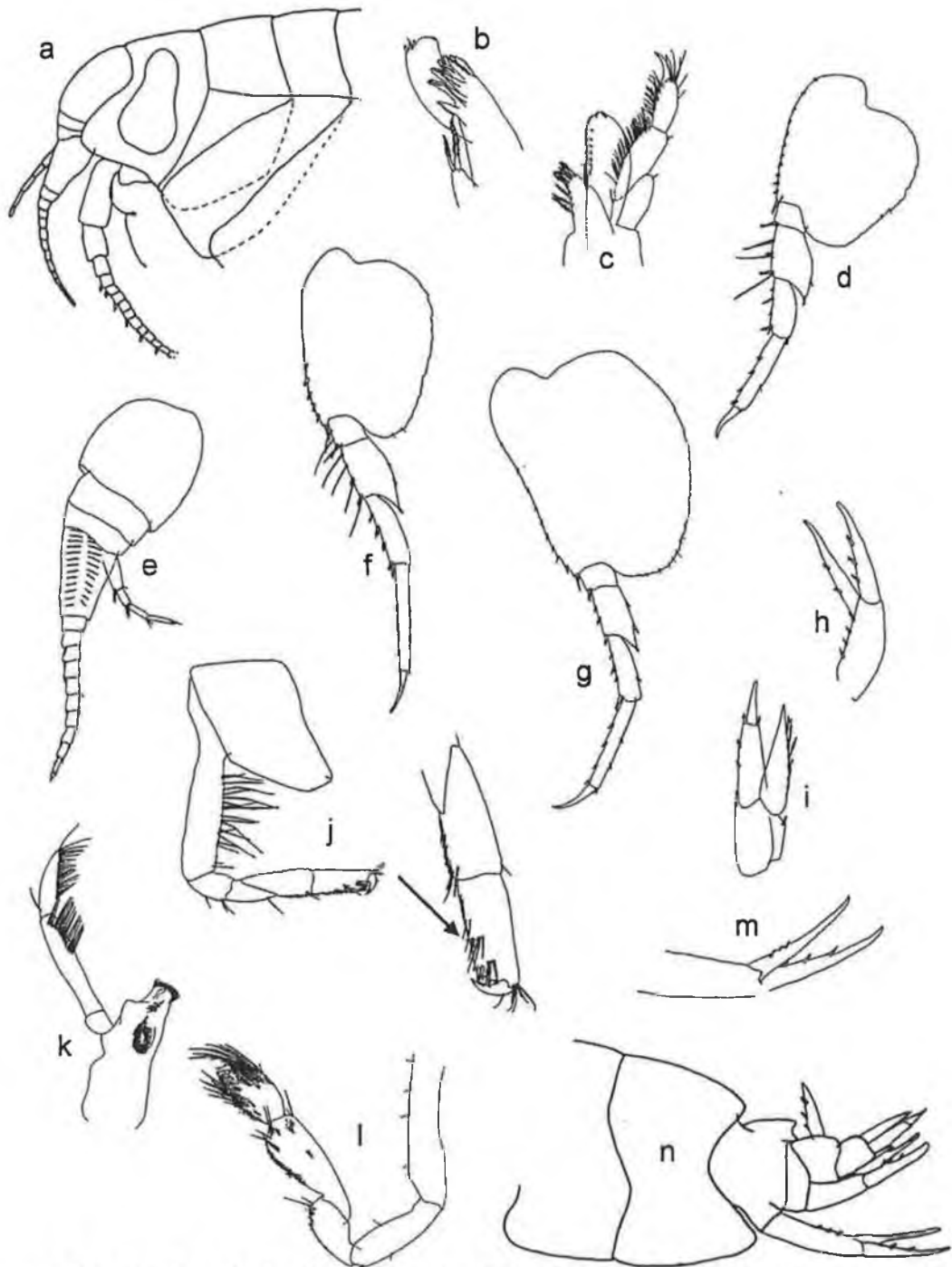


Figure 123: *Tryphosella horingii* (Boeck, 1871). Male. (a) head and antennae; (b) maxilla 1; (c) maxilliped; (d) pereopod 5; (e) antenna 1; (f) pereopod 6; (g) pereopod 7; (h) uropod 2; (i) uropod 1; (j) gnathopod 1; (k) mandible; (l) gnathopod 2; (m) uropod 1; (n) epimeron 2-3, urosome. [Illustration by author].

Tryphosella insignis (Bonnier, 1896)

Fig. 124

Tryphosa insignis Bonnier, 1896: 619, pl. 36, fig. 4. – Stebbing, 1906: 69.

Tryphosella insignis. – Barnard & Karaman, 1991: 537.

Type material. Unknown.

Type locality. 'Caudan' Stn 13; 44°17'N, 4°38'W, 950 m.

Material examined. Bonnier, 1896: 619, pl. 36, fig. 4; Stebbing, 1906: 69.

Description based on female, male unknown.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli absent. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute. Urosomite 1 without dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 6 mm.

Depth. Bathyal (950 m).



Figure 124: *Tryphosella insignis* (Bonnier, 1896). Female. (a) mandible; (b) gnathopod 2; (c) head and antennae, female; (d) pereopod 5; (e) pereopod 6; (f) pereopod 7; (g) uropods 1-3, telson; (h) epimeron 3, urosome; (i) gnathopod 1. [After: Bonnier, 1896].

Tryphosella laevis (Bonnier, 1896)

Fig. 125

Orchomenella laevis Bonnier, 1896: 617, pl. 35, fig. 3. – Stebbing, 1906: 81. – Stephensen, 1925: 124.

Tryphosella laevis. – Barnard & Karaman, 1991: 537. – Dauvin & Sorbe, 1995: 447, 449, tables 4-5, 450, fig. 2, 456.

Type material. Unknown.

Type locality. 'Caudan' Stn 13; Gulf of Gascony (44°17'N, 4°38'W), 950 m.

Material examined. Bonnier, 1896: 617, pl. 35, fig. 3; Stebbing, 1906: 81.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes apparently absent. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 equilobate.

Epimeron 3 posterodistal corner acute. Urosomite 1 with very deep dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending only slightly past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 5 mm.

Distribution. North Atlantic; West Greenland, Bay of Biscay.

Depth. Bathyal (600- 1096 m).

Female (sexually dimorphic characters)

Antenna 2 between 40 to 60% of body length; calceoli absent.

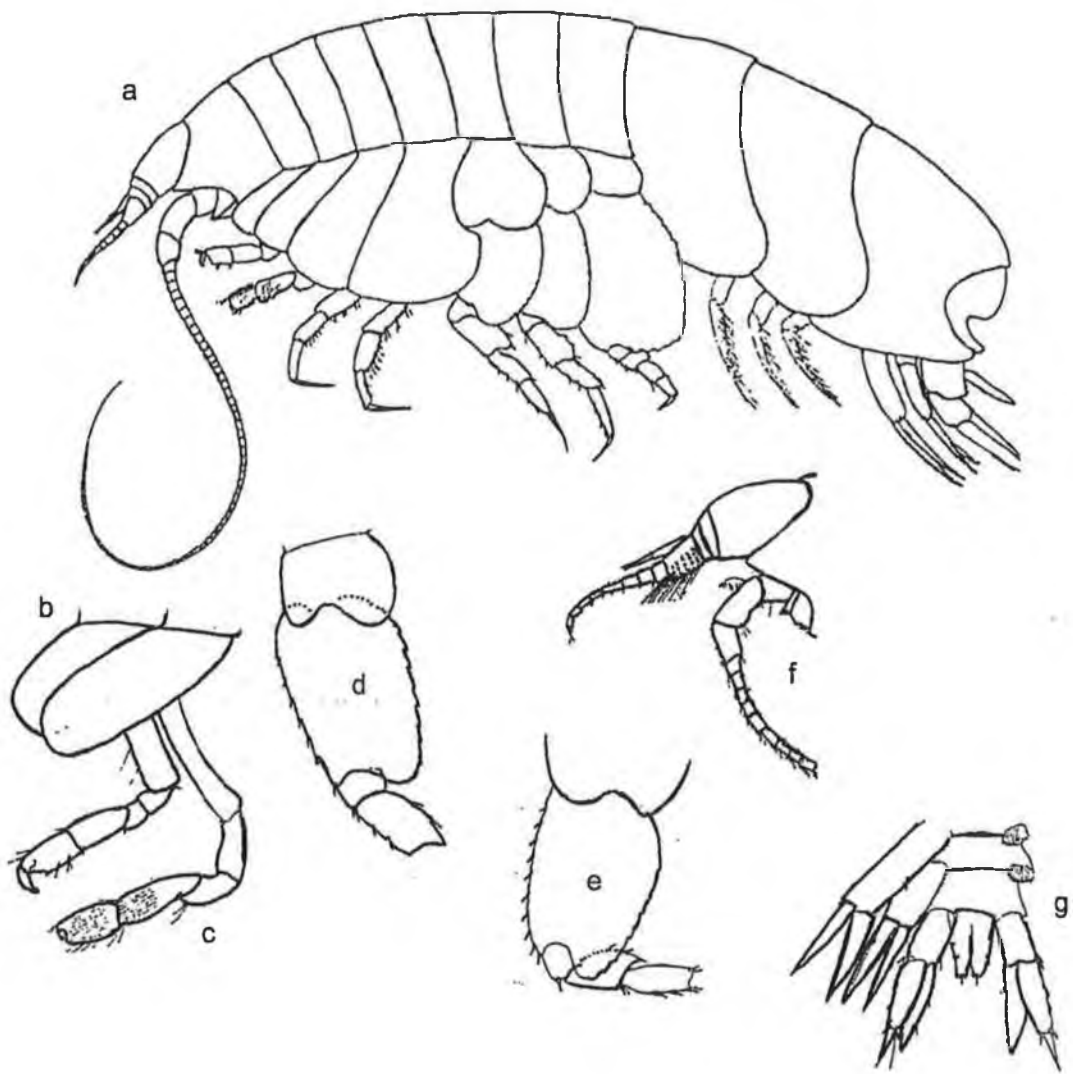


Figure 125: *Tryphosella laevis* (Bonnier, 1896). Male. (a) entire; (b) gnathopod 1; (c) gnathopod 2; (d) pereopod 6; (e) pereopod 5; (f) head and antennae; (g) uropods 1-3 and telson. [After: Bonnier, 1896].

Tryphosella longidactyla Ruffo, 1985

Fig. 126

Tryphosella longidactyla Ruffo, 1985: 288, figs 10-13. – Diviacco & Ruffo, 1989: 563, figs 387-388. – Barnard & Karaman, 1991: 537. – Dauvin & Sorbe, 1995: 443, 456.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 205, in alcohol.
PARATYPE: MSNV Reg. No. MVR-Cr 205, in alcohol and slides 798-800.

Type locality. Gaiola, Gulf of Naples, Italy, Mediterranean Sea.

Material examined. Diviacco & Ruffo, 1989: 563, figs 387-388.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes apparently absent. Lateral cephalic lobes broadly rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis distinctly longer than broad.

Epimeron 3 posterodistal corner acute or produced, forming a very small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 3 mm.

Distribution. Mediterranean sea; Bay of Biscay.

Depth. Circalittoral (67–150 m).

Remarks. This species is easily recognisable by the long and sharp dactylus of the peraeopods, from which its name is derived.

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Antenna 2 less than 40% of body length; calceoli absent. Urosomite 1 without dorsal depression.

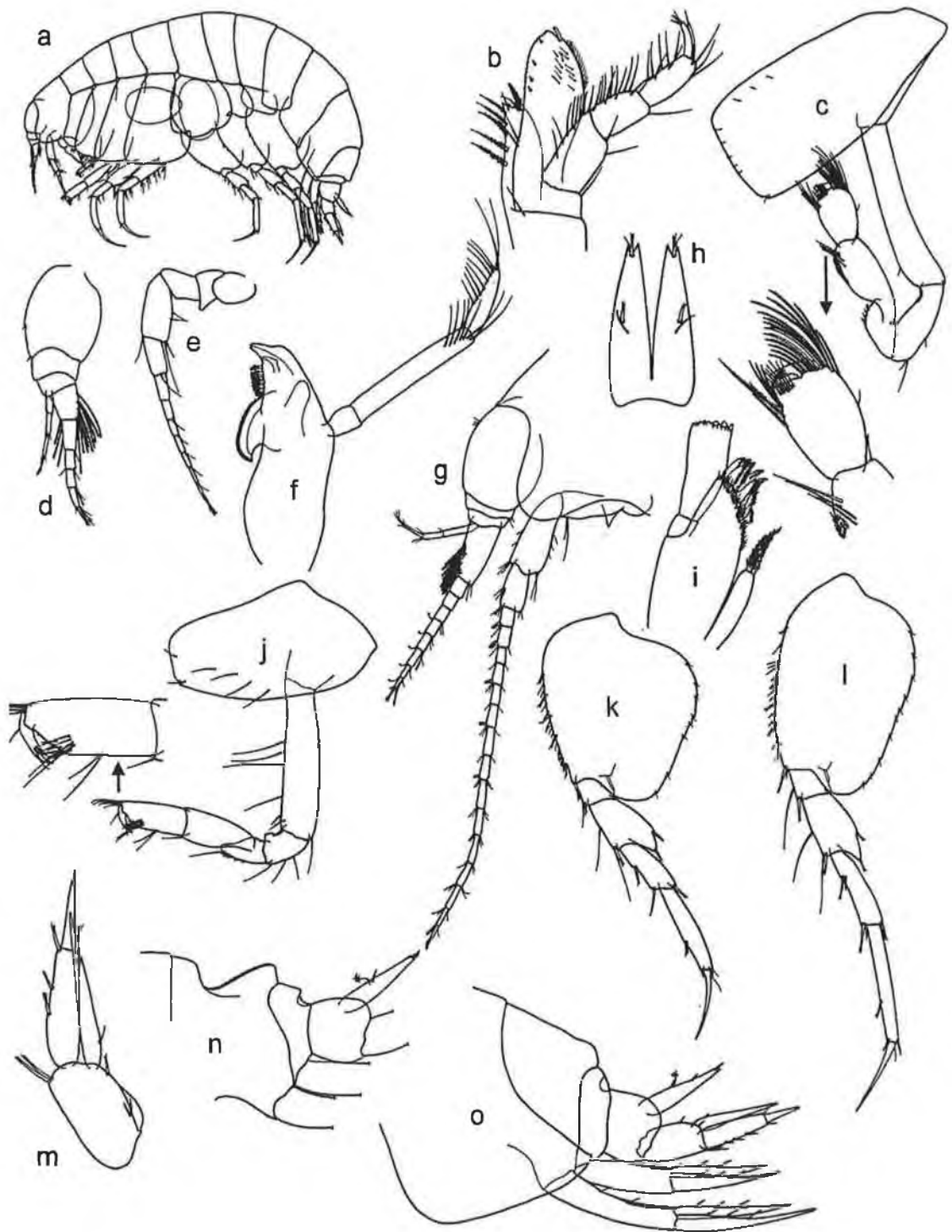


Figure 126: *Tryphosella longidactyla* Ruffo, 1985. (a) entire, female; (b) maxilliped; (c) gnathopod 2; (d) antenna 1, female; (e) antenna 2, female; (f) mandible; (g) head and antennae, male; (h) telson; (i) maxilla 1; (j) gnathopod 1; (k) pereopod 5; (l) pereopod 6; (m) uropod 3; (n) urosome, male; (o) epimeron 3 and urosome, female.

[After: Diviacco & Ruffo, 1989].

Fig. 127

?*Tryphosa horingii*. – Duhig & Humphries, 1955: 124. – Duhig, 1960: 64.

Tryphosella horingii. – Costello *et al.*, 1989: 36.

Tryphosella lowryi – Kilgallen *et al.*, 2006: 1067, figs 1-11.

Type material. HOLOTYPE: NMI(NH) 2005.101, ovigerous female, 3.2 mm; PARATYPE: NMI(NH) 2005.102, male, 3.5 mm.

Type locality. Clew Bay, Co. Mayo, Ireland (53°49.09'N, 09°39.54'W).

Material examined. Holotype; paratype; male, 3.5 mm, from Mulroy Bay, Co. Donegal (NMI(NH) 1981.58).

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 chelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending as far as article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 3 – 3.5 mm.

Distribution. West and north coasts of Ireland; (?)Dublin Bay.

Remarks. This species is very similar to *T. horingii* and is distinguishable by only a few characters. Specifically, these include the length of the inner ramus, the shape of the basis of the 5th pereopod, and the shape of the 1st urosomite, which is much more carinate in *T. horingii*. It is probable that some previous records of *T. horingii* from lower latitudes may actually represent this new species, and therefore those records require confirmation.

Female (sexually dimorphic characters)

Antenna 1 shorter than antenna 2; antenna 2 less than 40% body length. Calceoli absent.

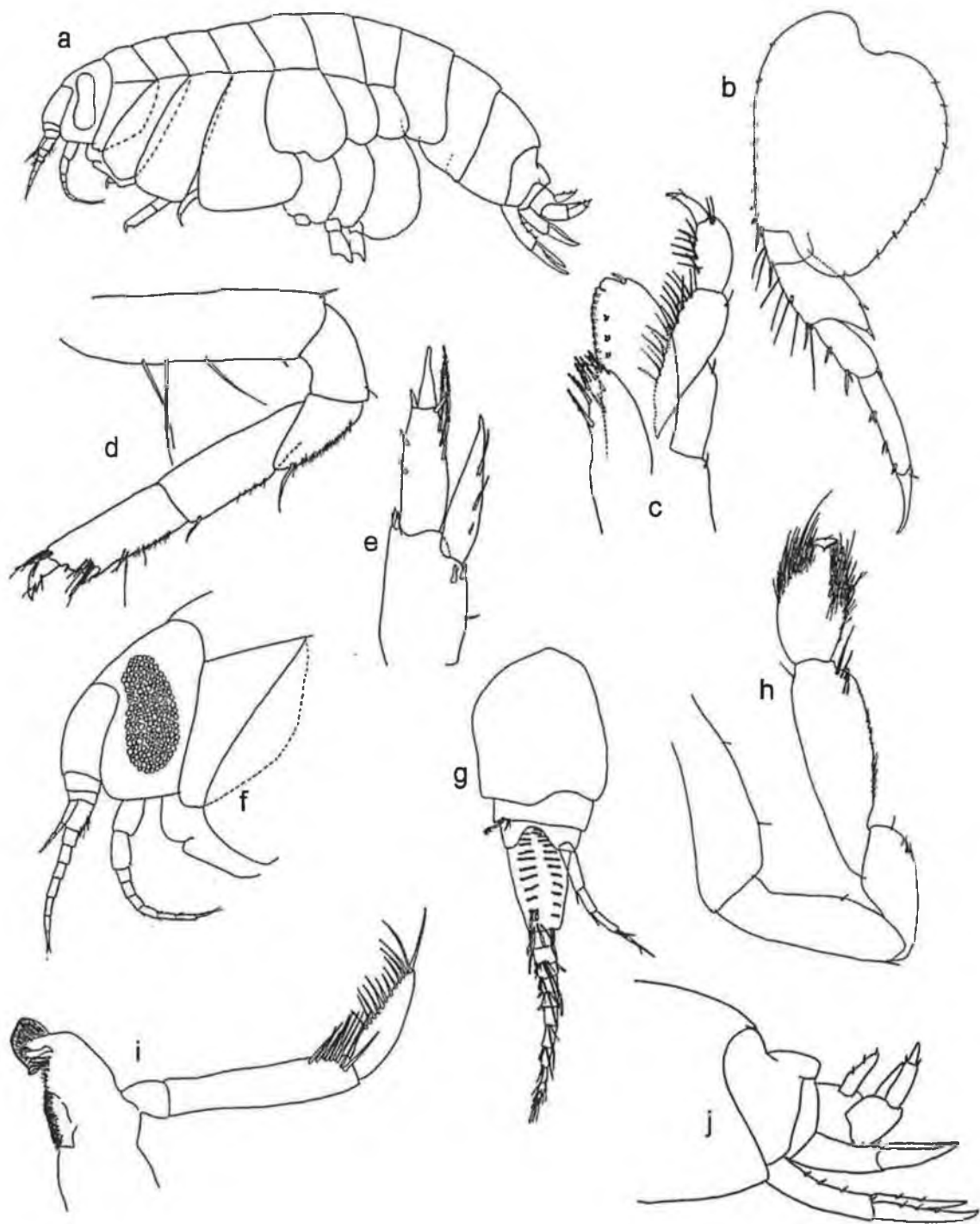


Figure 127: *Tryphosella lowryi* (a) entire, female; (b) pereopod 5; (c) maxilliped; (d) gnathopod 1; (e) uropod 3, male; (f) head and antennae, female; (g) antenna 1, male; (h) gnathopod 2; (i) mandible; (j) epimeron 3 and urosome. [Illustration by author].

Tryphosella minima (Chevreux, 1911)

Fig. 128

Tryphosa minima Chevreux, 1911: 174, fig. 4, pl. 8, figs 1-14. – Chevreux & Fage, 1925: 65, figs 53-54.

Tryphosella minima. – Ruffo, 1985: 282, figs 5-6. – Diviacco & Ruffo, 1989: 566, fig. 389. – Barnard & Karaman, 1991: 537.

Type material. Unknown.

Type locality. Alger.

Material examined. Clew Bay, Co. Mayo, Ireland (53°50.87'N, 09°38.12'W), 7.3 m Chevreux & Fage, 1925: 65, figs 53-54; Diviacco & Ruffo, 1989: 566, fig. 389.

Description. Antenna 1 shorter than antenna 2. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes broadly rounded. Maxilliped palp 4-articulate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 1 anterodistal corner obtuse or broadly rounded; epimeron 3 posterodistal corner produced, forming minute spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 2.5 mm.

Distribution. Atlantic Ocean (French Coasts, west of Ireland); Mediterranean.

Depth. Infralittoral to circalittoral (1–70 m).

Ecology. This species is probably mesopsammic (Diviacco & Ruffo, 1989).

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; flagellum article 1 slightly longer than article 2. Calceoli absent. Urosomite 1 without dorsal depression. Uropod 3 inner ramus extending slightly past article 1 of outer ramus.

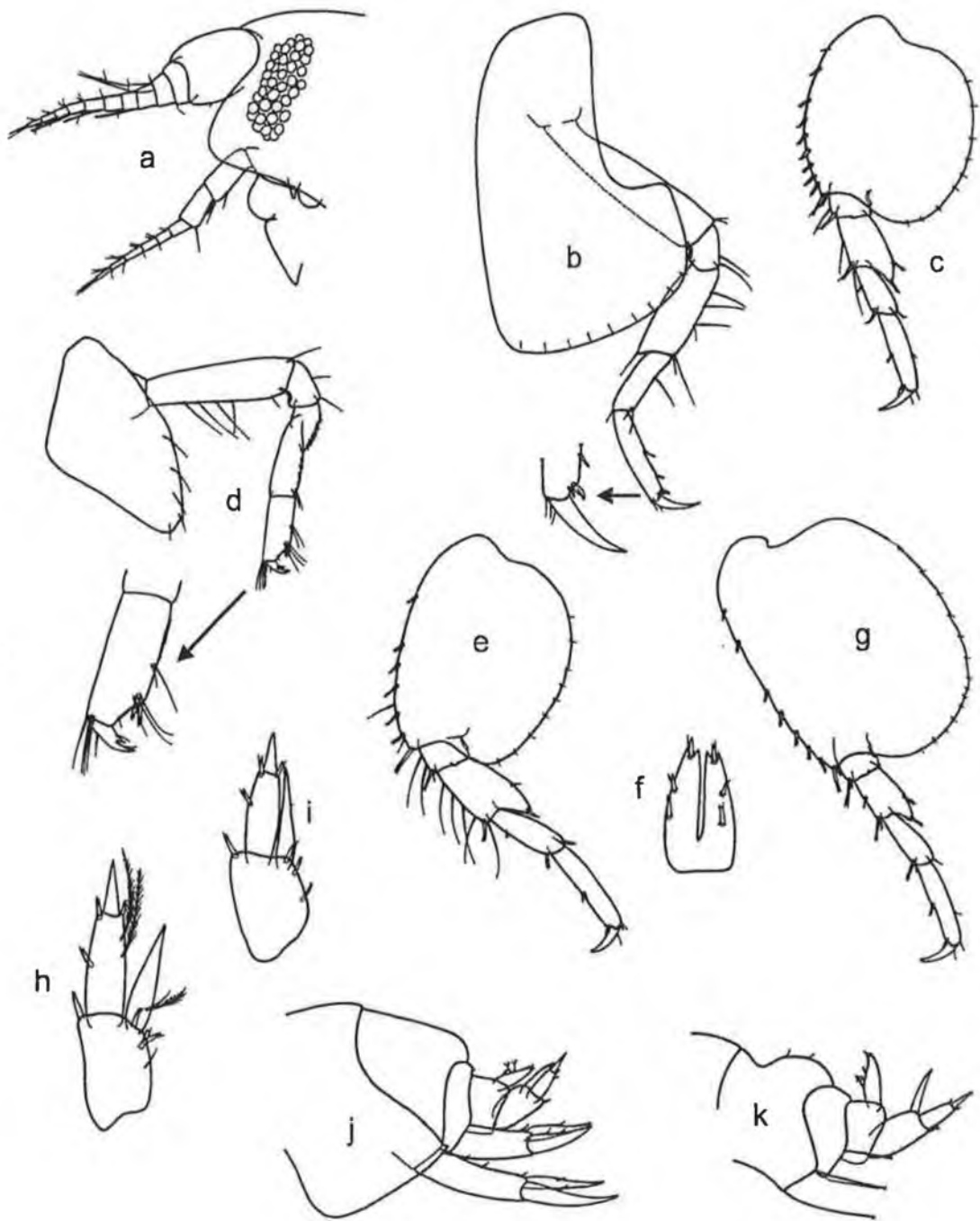


Figure 128: *Tryphosella minima* (Chevreux, 1911). (a) head and antennae, female; (b) pereopod 4; (c) pereopod 5; (d) gnathopod 1; (e) pereopod 6; (f) telson; (g) pereopod 7; (h) uropod 3, male; (i) uropod 3, female; (j) epimeron 3 and urosome, female; (k) urosome, male. [After: Diviacco & Ruffo, 1989].

Tryphosella nanoides (Lilljeborg, 1865)

Fig. 129

Anonyx nanoides Lilljeborg, 1865a: 25, pl. 3, figs 32-34.

Tryphosa nanoides. – Boeck, 1876: 186. – G.O. Sars, 1891: 79, pl. 28, fig. 2. – Stebbing, 1906: 71. – Stephensen, 1925: 102, chart 16. – Gurjanova, 1951: 250, fig. 114. – Gurjanova, 1962: 322.

Tryphosella nanoïdes. – Bonnier, 1893: 171.

Tryphosella nanoides. – Lincoln, 1979a: 84, fig. 32a-f, fig. 33a-d. – Ruffo, 1985: 294. – Costello *et al.*, 1989: 36. – Diviacco & Ruffo, 1989: 568, fig. 390. – Barnard & Karaman, 1991: 537.

Type material. HOLOTYPE: UUZM No. 214.

Type locality. Molde (Norway).

Material examined. G.O. Sars, 1891: 79, pl. 28, fig. 2; Stebbing, 1906: 71; Gurjanova, 1962: 322; Lincoln, 1979a: 84, fig. 32a-f, fig. 33a-d; Diviacco & Ruffo, 1989: 568, fig. 390.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm transverse. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus not extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 8 mm.

Distribution. North Atlantic Ocean (from Iceland to Britain), Mediterranean Sea.

Depth. Circalittoral to bathyal (60–660 m).

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent. Lateral cephalic lobes subacute, broader than male.

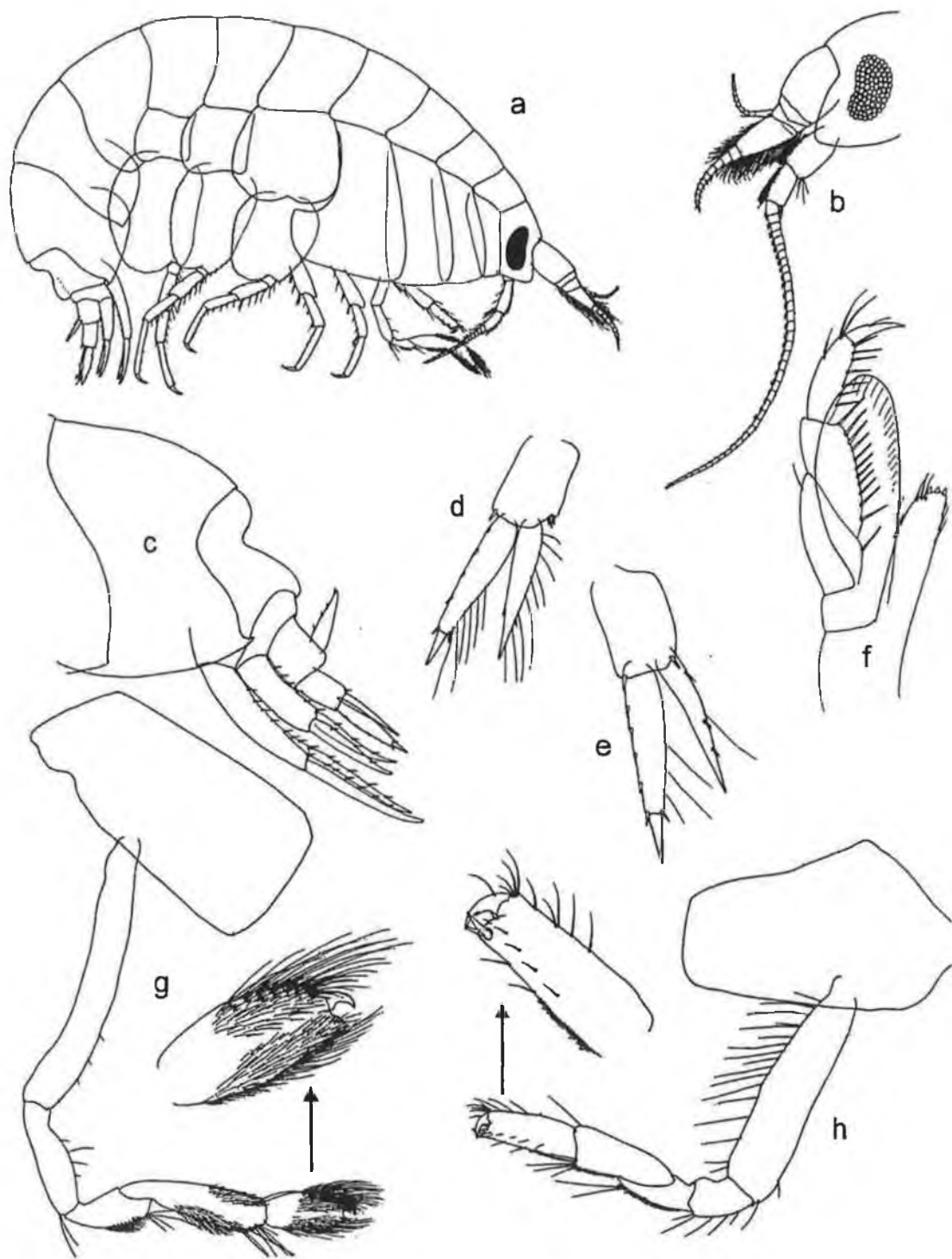


Figure 129: *Tryphosella nanoides* (Lilljeborg, 1865). (a) entire, female; (b) head and antennae, male; (c) epimeron 3 and urosome; (d) uropod 3, male; (e) uropod 3, female; (f) maxilliped; (g) gnathopod 2; (h) gnathopod 1. [After: Lincoln, 1979a].

Tryphosella propinqua (Chevreux, 1926)

Fig. 130

Tryphosa propinqua Chevreux, 1926: 7, fig. 4.

Tryphosella propinqua. – Barnard & Karaman, 1991: 537.

Type material. MOM 37 0603.

Type locality. Off the coast of Portugal.

Material examined. Chevreux, 1926: 7, fig. 4.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes apparently absent. Lateral cephalic lobes subacute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa produced into a very slight posterior lobe; basis distinctly longer than broad.

Epimeron 3 posterodistal corner produced, forming a small spine. Urosomite 1 with dorsal depression, carinate dorsally. Uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami about subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 4.5 mm.

Depth. Bathyal (750 m).

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2. Calceoli absent. Uropod 3 rami distinctly unequal, inner ramus not extending past article 1 of outer ramus.

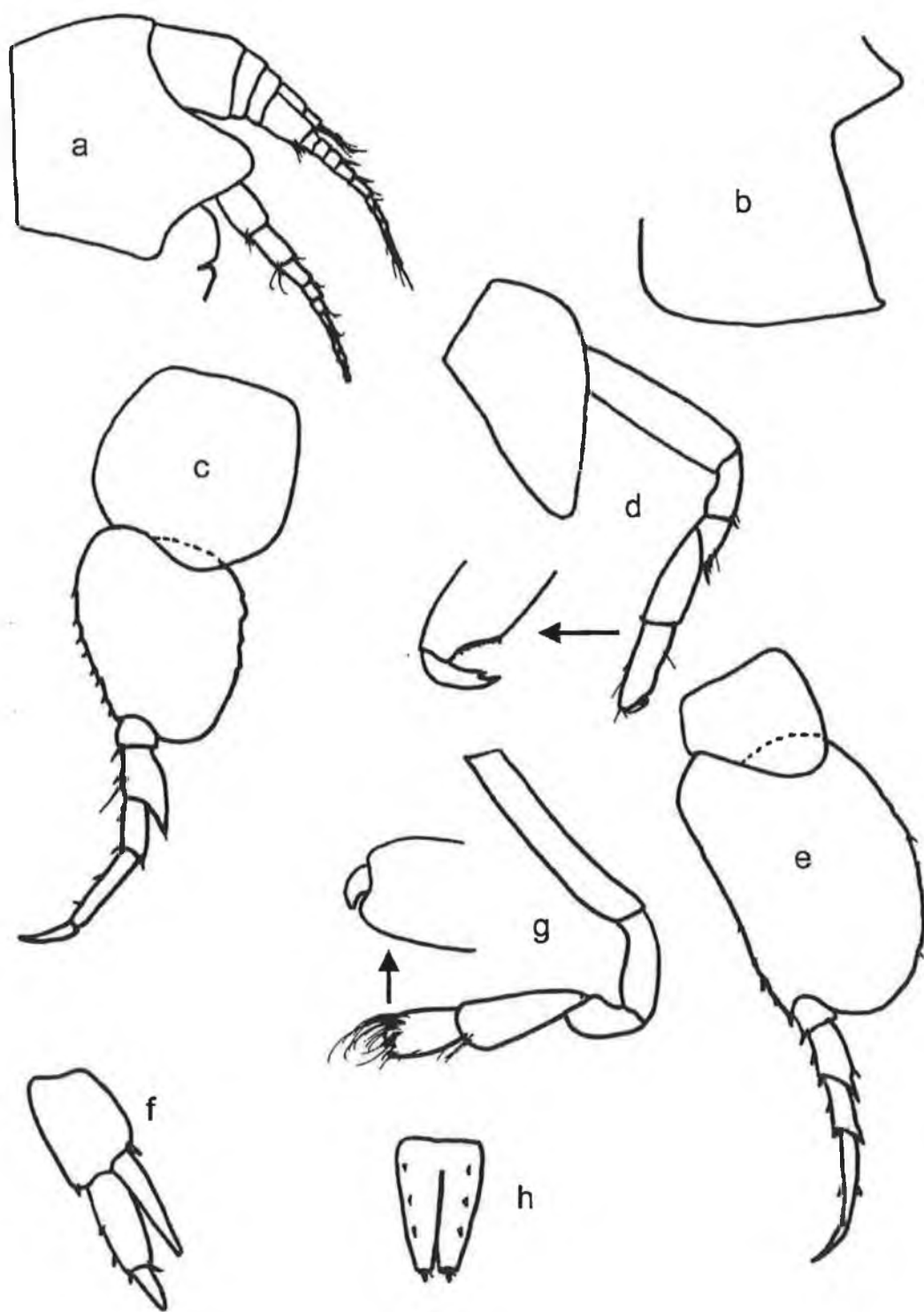


Figure 130: *Tryphosella propinqua* (Chevreux, 1926). Female. (a) head and antennae; (b) epimeron 3; (c) pereopod 5; (d) gnathopod 1; (e) pereopod 7; (f) uropod 3; (g) gnathopod 2; (h) telson. [After: Chevreux, 1926].

Tryphosella sarsi Bonnier, 1893

Fig. 131

Tryphosa nana G.O. Sars, 1891: 76, pl. 27 (not *Anonyx nanus* Krøyer, 1846: 30).

Tryphosella Sarsi Bonnier, 1893: 171.

Tryphosa sarsi. – G.O. Sars, 1895: 684. – Stebbing, 1906: 70.

Tryphosa grandimana. – Chevreux & Fage, 1925: 66.

Tryphosella sarsi. – Lincoln, 1979a: 84, fig 32g, fig. 33e-j. – Costello *et al.*, 1989: 36.

– Barnard & Karaman, 1991: 537, figs 90G, 92R, 94C.

Type material. Probably lost.

Type locality. Risør, Skagerrak, southern Norway (approx. 58°44'N 9°15'E).

Material examined. G.O. Sars, 1891: 76, pl. 27; Stebbing, 1906: 70; Chevreux & Fage, 1925: 66; Lincoln, 1979a: 84, fig 32g, fig. 33e-j.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 40 to 60% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending as far as article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 8 mm.

Distribution. Skagerrak; Kattegat; Bohuslän; north Norway; Shetlands; Plymouth.

Depth. Infralittoral to circalittoral (10–190 m).

Remarks. *Tryphosella grandimana* Chevreux and Fage (1925) was described from the English Channel, but appears to be so similar to *T. sarsi* that the two are considered to be conspecific.

Female (sexually dimorphic characters)

Antenna 2 less than 40% of body length; calceoli absent. Urosomite 1 with very slight dorsal depression.

Length. 7 mm.

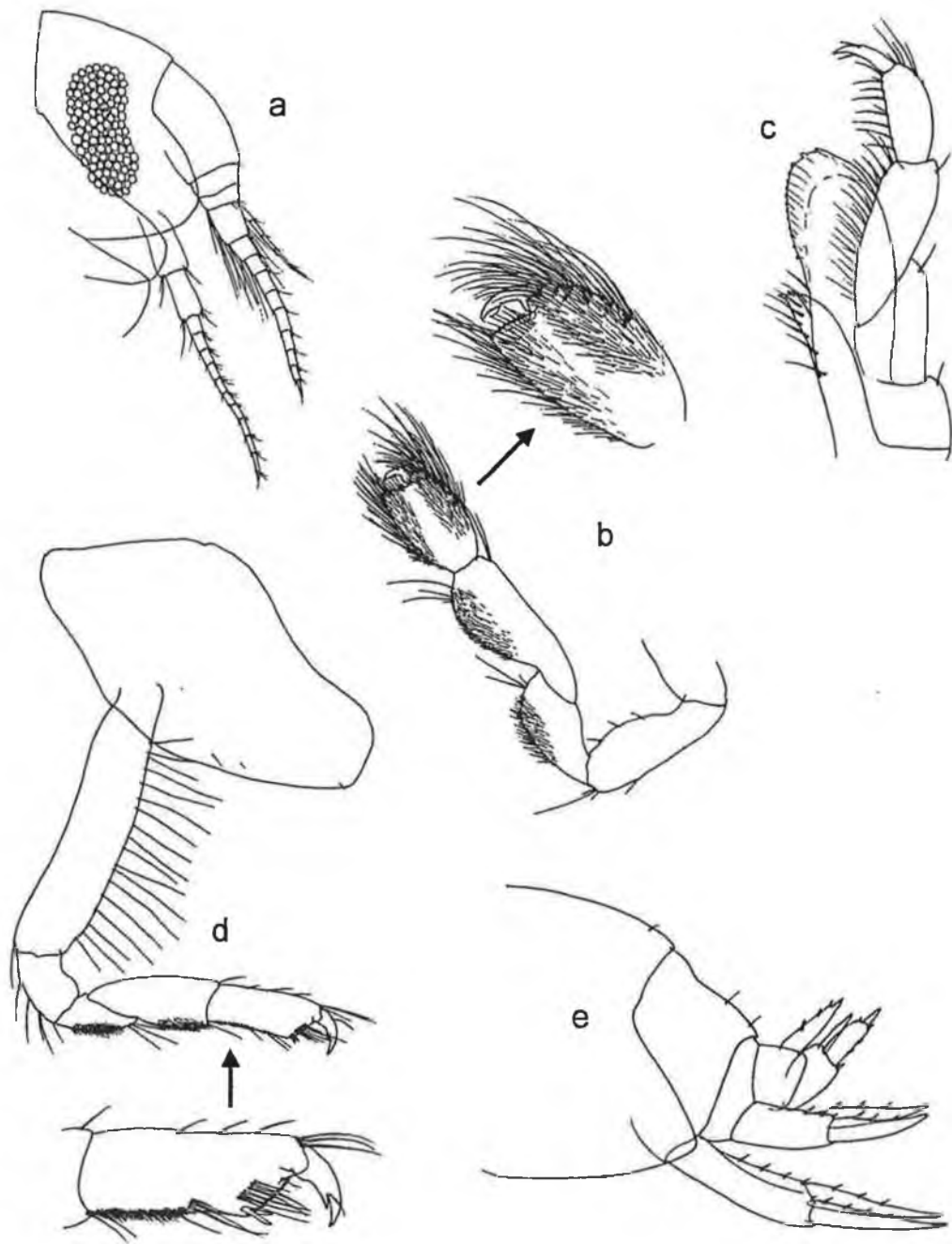


Figure 131: *Tryphosella sarsi* Bonnier, 1893. (a) head and antennae, female; (b) gnathopod 2; (c) maxilliped; (d) gnathopod 1; (e) epimeron 3 and urosome. [After: Lincoln, 1979a].

Tryphosella simillima Ruffo, 1985

Fig. 132

Tryphosella simillima Ruffo, 1985: 284, figs 7-9. – Diviacco & Ruffo, 1989: 568, figs 391-392. – Barnard & Karaman, 1991: 537.

Type material. HOLOTYPE: MSNV Reg. no. MVR-Cr 204, in alcohol.
PARATYPE: MSNV Reg. no. MVR-Cr 204, in alcohol and slides 801-803.

Type locality. Napoli.

Material examined. Diviacco & Ruffo, 1989: 568, figs 391-392.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 between 60 to 99% of body length; calceoli present. Eyes large, suboval. Lateral cephalic lobes rounded. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, tapering posterodistally; ischium short; carpus long, of subequal length to propodus; propodus margins subparallel, palm acute. Gnathopod 2 dactylus minute. Pereopods 3-4 propodus with blunt, locking robust setae at posterodistal corner. Pereopod 5 coxa equilobate; basis slightly longer than broad.

Epimeron 3 posterodistal corner produced, forming a very small spine. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 long, rami distinctly unequal with inner ramus extending marginally past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 3 mm.

Distribution. Mediterranean endemic.

Depth. Infralittoral to circalittoral (15–70 m).

Female (sexually dimorphic characters)

Antenna 1 flagellum article 1 slightly longer than article 2. Antenna 2 less than 40% of body length; calceoli absent. Urosomite 1 with dorsal depression (much less pronounced than in male). Uropod 3 inner ramus not extending past article 1 of outer ramus.

Length. 2.8–3.2 mm.

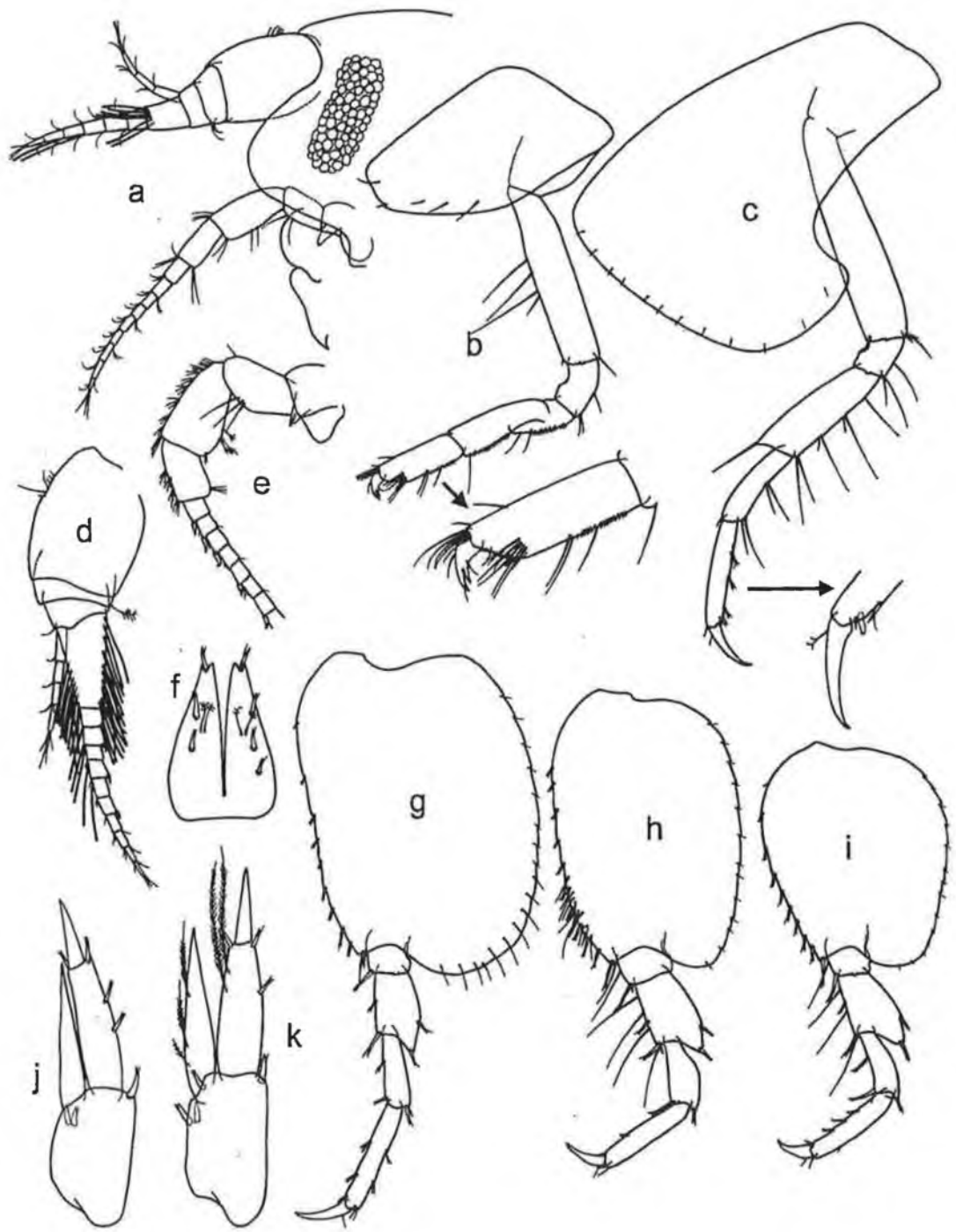


Figure 132: *Tryphosella simillima* Ruffo, 1985. (a) head and antennae, female; (b) gnathopod 1; (c) pereopod 4; (d) antenna 1, male; (e) antenna 2, male; (f) telson; (g) pereopod 7; (h) pereopod 6; (i) pereopod 5; (j) uropod 3, female; (k) uropod 3, male.

[After: Diviacco & Ruffo, 1989].

Tryphosites alleni Sexton, 1911

Fig. 133

Tryphosites alleni Sexton, 1911a: 510, pl. 14. – Stephensen, 1925: 116. – Diviacco & Ruffo, 1989: 572, fig. 393. – Barnard & Karaman, 1991: 538. – Dauvin & Sorbe, 1995: 443, 456.

Type material. Unknown.

Type locality. Bay of Biscay (48°07'N, 08°13'W).

Material examined. Diviacco & Ruffo, 1989: 572, fig. 393.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body. Eyes large, suboval. Lateral cephalic lobes acute. Epistome projecting acutely forward. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular, with straight anterior margin; ischium short; carpus very long, distinctly longer than propodus; propodus palm acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into an anterior lobe.

Epimeron 3 posterodistal corner produced, forming 2 spines, the superior the largest. Urosomite 1 with slight dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 8 mm.

Distribution. Atlantic Ocean (Ireland, Bay of Biscay); Mediterranean Sea.

Depth. Bathyal (350-500 m).

Female (sexually dimorphic characters)

Antenna 1 longer than antenna 2; calceoli absent.

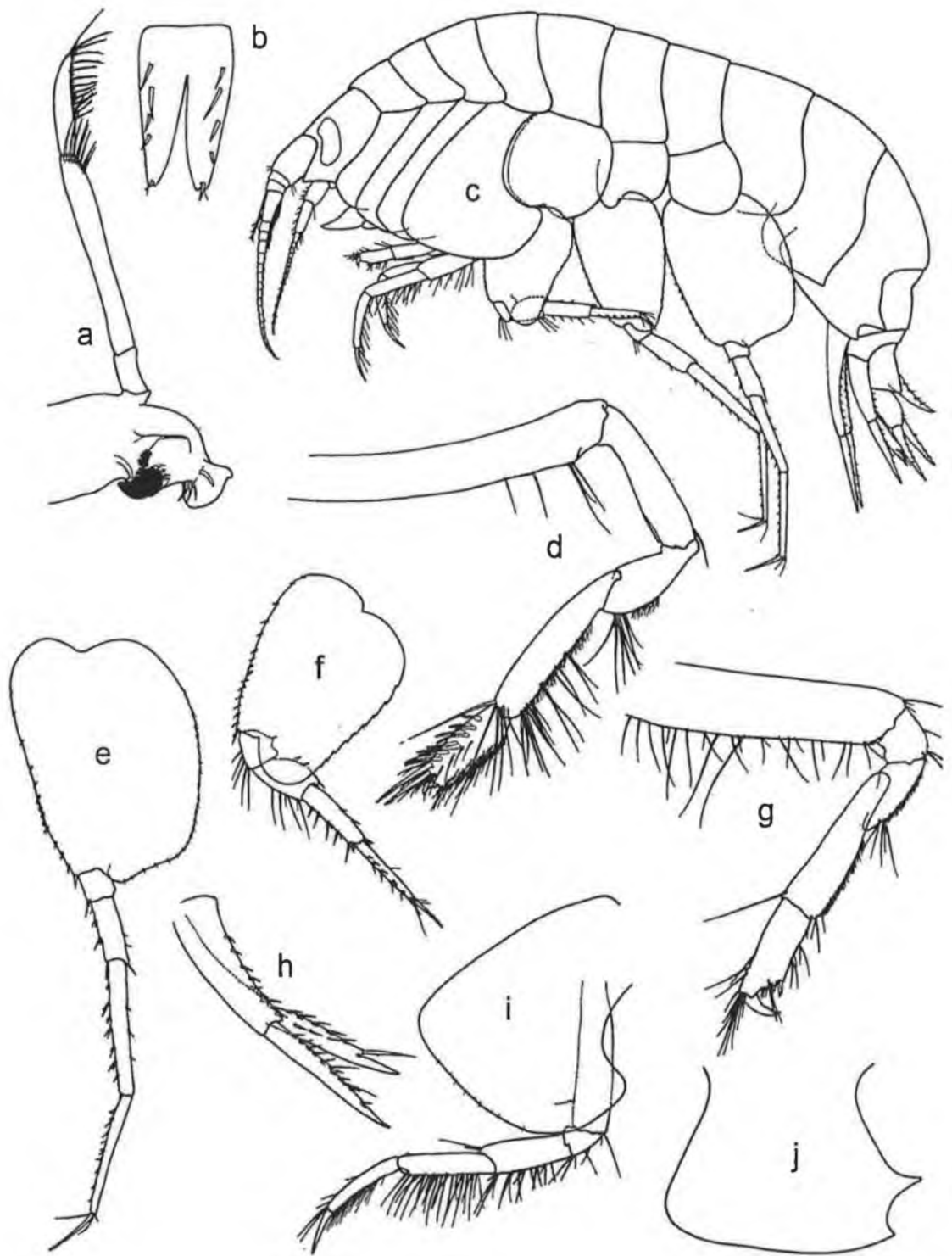


Figure 133: *Tryphosites alleni* Sexton, 1911. Female. (a) mandible; (b) telson; (c) entire; (d) gnathopod 2; (e) pereopod 7; (f) pereopod 5; (g) gnathopod 1; (h) uropod 2; (i) pereopod 4; (j) epimeron 3. [After: Diviacco & Ruffo, 1989].

Tryphosites longipes (Bate & Westwood, 1861)

Fig. 134

Anonyx longipes Bate & Westwood, 1861: 113. – Bate, 1862: 79, pl. 13, fig. 4.

Anonyx ampulla Bate & Westwood, 1861: 116. – Bate, 1862: pl. 13, fig. 5.

Tryphosa longipes. – Boeck, 1871: 118.

Tryphosites longipes. – G.O. Sars, 1891: 81, pl. 28, fig. 3, pl. 29, fig. 1. – Chevreux, 1925: 285. – Chevreux & Fage, 1925: 61, figs 48-49. – G. Karaman, 1973: 141. – Lincoln, 1979a: 80, fig. 31. – Costello *et al.*, 1989: 36. – Diviacco & Ruffo, 1989: 572, fig. 394. – Barnard & Karaman, 1991: 538. – Dauvin & Sorbe, 1995: 456.

Type material. Unknown.

Type locality. Off Shetland Islands.

Material examined. G.O. Sars, 1891: 81, pl. 28, fig. 3, pl. 29, fig. 1; Chevreux & Fage, 1925: 61, figs 48-49; G. Karaman, 1973: 141; Lincoln, 1979a: 80, fig. 31; Diviacco & Ruffo, 1989: 572, fig. 394.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 as long as or longer than body; calceoli present. Eyes large, suboval. Lateral cephalic lobes narrowly subacute. Epistome projecting acutely forward. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa large, about as long as coxa 2, subrectangular with concave anterior margin; ischium short; carpus long, distinctly longer than propodus; propodus margins subparallel, palm acute; dactylus well developed. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis distinctly longer than broad. Coxa 6 produced into a posterior lobe.

Epimeron 1 anterodistal corner acute; epimeron 3 posterodistal corner produced, forming a large upturned spine. Urosomite 1 with dorsal depression. Uropod 1 rami subequal; uropod 2 rami distinctly unequal, inner ramus with marginal constriction; uropod 3 outer ramus 2-articulate, article 2 long, rami subequal with inner ramus extending past article 1 of outer ramus. Telson distinctly longer than broad, deeply cleft.

Length. 12 mm.

Distribution. Kattegat, Bohuslän, North Sea, Norwegian Sea, Faeroes, Rockall, Canaries, Mediterranean Sea.

Depth. Circalittoral to bathyal (0–1200 m).

Female (sexually dimorphic characters)

Antenna 1 subequal to antenna 2; calceoli absent.

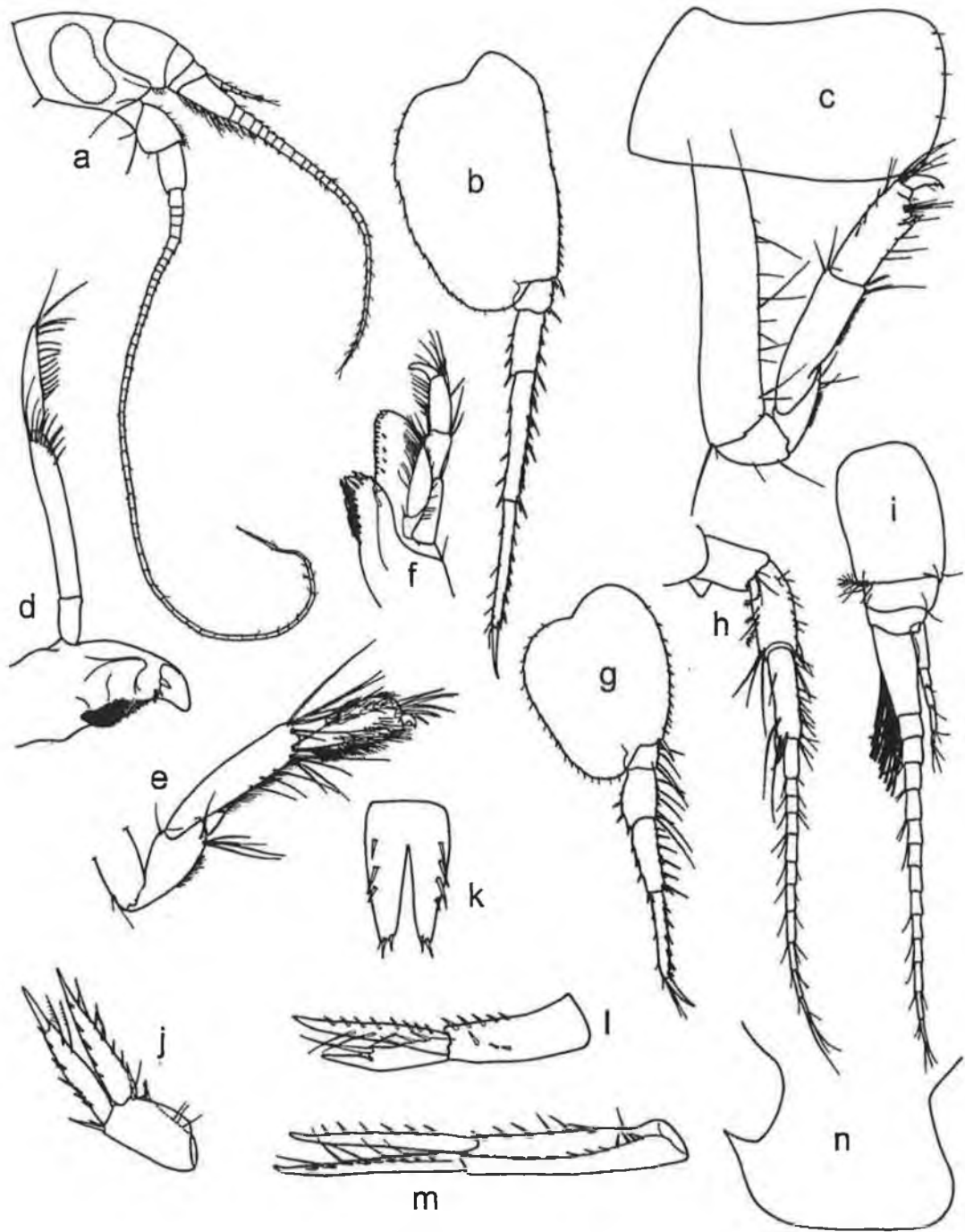


Figure 134: *Tryphosites longipes* (Bate & Westwood, 1861). (a) head and antennae, male; (b) pereopod 7; (c) gnathopod 1; (d) mandible; (e) gnathopod 2; (f) maxilliped; (g) pereopod 5; (h) antenna 2, female; (i) antenna 1, female; (j) uropod 3; (k) telson; (l) uropod 2; (m) uropod 1; (n) epimeron 3. [After: Diviacco & Ruffo, 1989].

Uristes umbonatus (G.O. Sars, 1882)

Fig. 135

Ichnopus umbonatus G.O. Sars, 1882: 79, pl. 3, fig. 2.

Pseudotryphosa umbonata. – G.O. Sars, 1891: 83, pl. 29, fig. 2.

Anonyx umbonatus. – Della Valle, 1893: 825.

Uristes umbonatus. – Stebbing, 1906: 64. – Stephensen, 1923b: 97. – Shoemaker, 1930b: 19. – Barnard & Karaman, 1991: 539.

Type material. ?ZMO.

Type locality. Hvitingsö, western Norway.

Material examined. G.O. Sars, 1891: 83, pl. 29, fig. 2; Stebbing, 1906: 64; Stephensen, 1923b: 97.

Description. Antenna 1 shorter than antenna 2; flagellum article 1 distinctly elongate. Antenna 2 less than 40% of body length; calceoli present. Lateral cephalic lobes acute. Maxilliped palp 4-articulate; inner plate well developed, greater than half length of outer plate.

Gnathopod 1 subchelate; coxa reduced, significantly shorter than coxa 2, tapering distally; ischium short; carpus short, distinctly shorter than propodus; propodus margins subparallel, palm acute to extremely acute. Gnathopod 2 subchelate; carpus longer than propodus; dactylus minute. Pereopod 5 coxa equilobate; basis about as long as broad.

Epimeron 3 posterodistal corner acute. Urosomite 1 with dorsal depression. Uropods 1-2 rami subequal; uropod 2 inner ramus without marginal constriction(s); uropod 3 outer ramus 2-articulate, article 2 short, rami distinctly unequal with inner ramus extending marginally past article 1 of outer ramus. Telson more than twice as long as broad, deeply cleft.

Length. 11 mm.

Distribution. West Skagerrak; Norwegian Seas; Iceland; off southwest Faeroe Islands.

Depth. Circalittoral to bathyal (55–790 m).

Female (sexually dimorphic characters)

Calceoli absent.

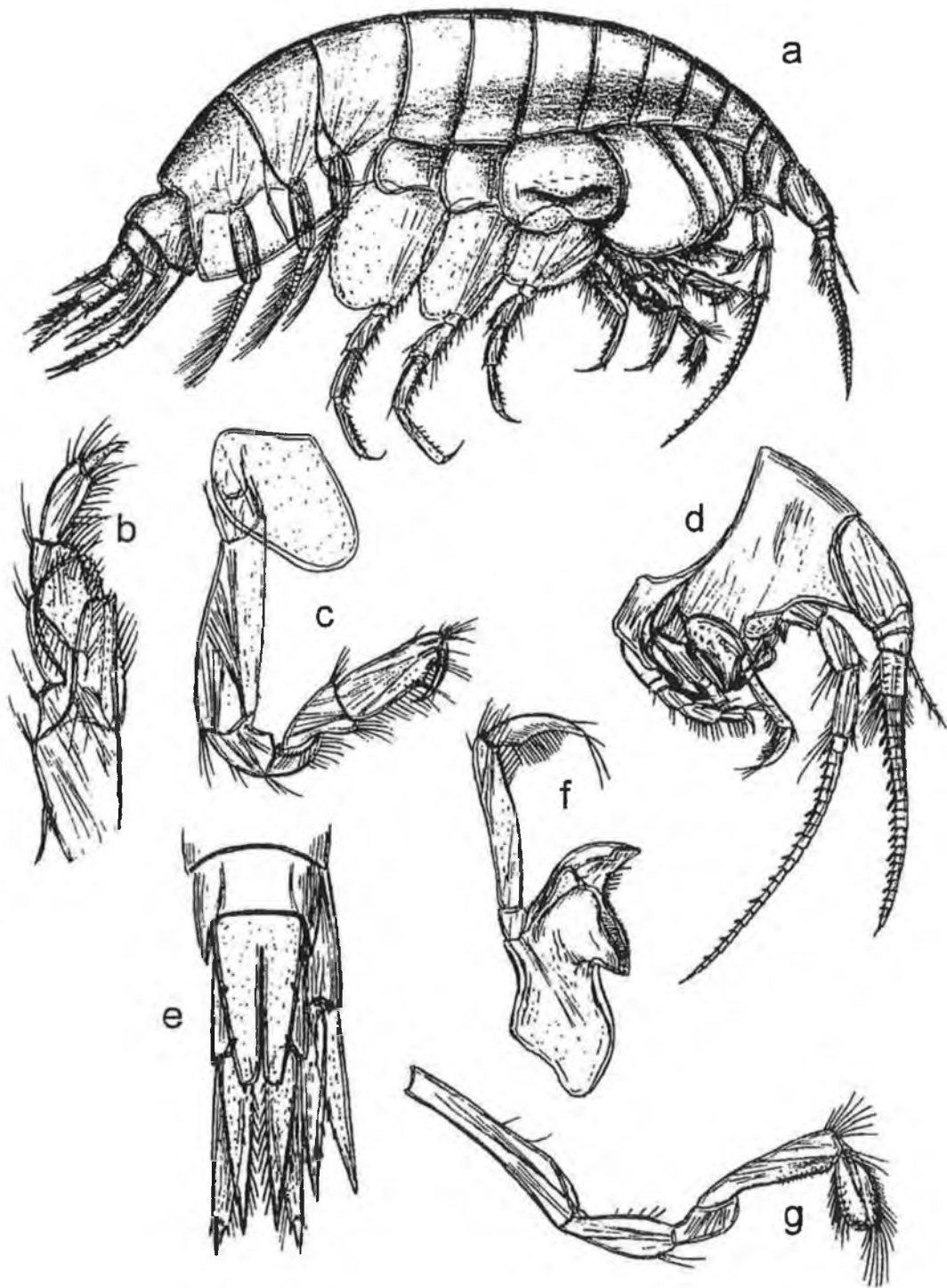


Figure 135: *Uristes umbonatus* (G.O. Sars, 1882). Female. (a) entire; (b) maxilliped; (c) gnathopod 1; (d) head and antennae; (e) urosome, uropods 2-3 and telson; (f) mandible; (g) gnathopod 2. [After: G.O. Sars, 1895].

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