

IV. SYSTEMATIC PART

CLASSIFICATION OF THE ASELLOTA

Within the Isopoda the Asellota is, as far as the number of species is concerned, by far the largest marine tribe (or suborder). It also exhibits striking differences in general body shape, being sometimes slender and extremely elongated, sometimes very broad and depressed. As explained below, it can be divided naturally into three (recently four) subtribes, but the division of the largest of these, the Paraselloidea (Parasellidae of HANSEN), has always presented the greatest difficulties.

The first division of the Asellota was made by G. O. SARS who established three families: Asellidae, Munnidae and Munnopsidae. BEDDARD (1886b) and STEBBING (1893) regarded the Asellota as consisting of two families, Asellidae and Munnopsidae. G. O. SARS (1899) divided the tribe into five families: Asellidae, Janiridae, Munnidae, Desmosomidae and Munnopsidae, but added (p. 95): "It is, however, very probable that it will be found convenient to establish more families subsequently".

In his important paper on the morphology and classification of the asellotes (1905)¹ HANSEN pointed out the great differences in size and structure of the male and female pleopods,² and accordingly, divided the asellotes into three families: Asellidae, Stenetriidae and Parasellidae; a division which has since been generally accepted. HANSEN was well aware that a more comprehensive subdivision of the latter family than that undertaken by SARS (1. c.) would be necessary, but this was postponed until 1916 (see p. 29).

MONOD (1922) referred the Asellota, together with six other suborders of Isopoda (Anthuridea, Valvifera, Flabellifera, Epicaridea, Oniscoidea, and Phreatoicoidea), to a new suborder Quatuordecempedes.³ This was in opposition to Decempedes (with one tribe only, the Gnathiidea), and this subdivision has been adopted here.⁴

In 1957 AMAR described a remarkable new asellote, *Gnathostenetroides laodicense*, from the Eastern Mediterranean; it creates a very interesting link between the Stenetrioidea and the Paraselloidea. The male pleopods 1 and 2 are shaped as in the former (although much larger), pleopods 1 totally covering all succeeding pleopods. The female operculum is large, as in Paraselloidea, covering all succeeding pleopods. Thus, pleopods 3 in both sexes are exactly as in Paraselloidea.

HANSEN (1905) and RACOVITZA (1920, 1924) have demonstrated the important role played by the pleopods in the classification of the asellotes. It is, therefore, fully justifiable that AMAR found it necessary to establish a new family, the Parastenetriidae, corresponding to HANSEN's Asellidae, Stenetriidae and Parasellidae. He was opposed to the modern tendency of regarding these four as superfamilies (or subtribes), while at the same time subdividing the Parasellidae into families instead of maintaining HANSEN's old groups (1916); he called this procedure more pragmatic than natural. I cannot agree with him on this point. In allied orders like Tanaidacea and Amphipoda the differences on family level seem, in my opinion, to correspond much more to the differences between the families of Paraselloidea than to those existing between the four subtribes.

Finally, MENZIES *et al.* (1961) have pointed out that in the primitive Stenetrioidea and Aselloidea three pleonites are preserved, while in the Paraselloidea there are only one or two pleonites (the presence of three pleonites in some Ischnomesidae of the latter subtribe is discussed in the following chapter). MENZIES *et al.* (1. c.) do not mention the Parastenetrioidea. AMAR (1957) does not remark on the number of pleonites in *Gnathostenetroides*, the only known representative of this subtribe, but according to his fig. 1 there are two distinct, short pleonites in front of pleotelson. Thus, the presence of three pleonites may indicate that the Parastenetrioidea are closer to Aselloidea and Stenetrioidea than to Paraselloidea, although the female pleopods are in close agreement with those of Paraselloidea, and the male pleopods are intermedial between those of the latter and those of Stenetrioidea.

1. Often cited 1904 (the year of the Proc. Zool. Soc. London), but it was actually published 18th April 1905.

2. Already ten years earlier, HANSEN (1895) had noted this fact.

3. Not Quatuordecapoda (MENZIES 1962b, pp. 89 and 92).

4. However, I do not consider it necessary to replace the name Isopoda Latreille, 1817, with Euisopoda Kossmann, 1880.

Key to the subtribes of Asellota

The following key has – with some alterations and amendments – been adopted from AMAR (1957). MENZIES (1962a, 1962b) has also given a key to the subtribes but has omitted the Parastenetroidea and states that there are only one or two pleonites in the Paraselloidea (cf. p. 30). Furthermore, in Stenetrioidea and Aselloidea he regards the anterior pair

of pleopods in the female as pleopods 1, as did HANSEN (1905) and earlier carcinologists. At a later date HANSEN (1916) realized, however, that the preserved pleopods in all female Asellota must be the second pair, and both RACOVITZA (1920, 1924) and NEEDHAM (1940) discussed this fact in detail regarding the Aselloidea.

1. Male pleopods 1 and 2 and female plps. 2 much smaller than plps. 3 which form an operculum over plps. 4 and 5..... 2
1. Male plps. 1 and 2 and female plps. 2 large, forming an operculum totally covering plps. 3-5... 3
2. Left and right male plps. 1 and female plps. 2 distinctly separated..... Aselloidea G.O.Sars
Genera: *Asellus* St.-Hilaire, *Caecidotea* Packard, *Mancasellus* Harger, and *Stenasellus* Dollfus.
2. Basal joint (sympod) of male plps. 1 fused. Female plps. 2 forming a small, pear-shaped operculum..... Stenetrioidea Hansen
Genus: *Stenetrium* Haswell.
3. Basal joint (sympod) of male plps. 1 short, totally fused; rami separated, large, entirely covering the succeeding plps. Female operculum with a broad median incision terminally. Mandibles, antero-exteriorly, with a large tusk-like prolongation in the male and a small acute process in the female..... Parastenetroidea Amar
Genus: *Gnathostenetroides* Amar.
3. Sympods of male plps. 1 elongated, coupled (sometimes fused) with each other along the midline, and covering only the interior margins of plps. 2; plps. 1 and 2 together cover succeeding plps. Female operculum very occasionally having a median incision terminally. Mandibles without prolongation or process antero-exteriorly..... Paraselloidea Hansen
Genera: See below!

THE SIGNIFICANCE OF VARIOUS CHARACTERS IN THE TAXONOMY

During the systematic study of the present collections the variation within each species was evaluated in all cases where sufficient material was available. The following comments on the significance of various characters are considered useful.

Armament with spines or setae on the body.

The most remarkable instance of variation in this character is in *Ilyarachna*. OHLIN (1901) and HANSEN (1916) found that in spite of marked differences in the spine armament on head and pereonites 1-4, *I. longiremis* and *denticulata* were nevertheless identical. At a later date HULT (1936b) very convincingly showed the very spinous *hirticeps* to also be a synonym of *longicornis* (cf. p. 97). NORDENSTAM (1933, p. 270) studied the considerable variation in spine armament on pereonites 5-7 of *I. quadrispinosa* from South Georgia. In Table 5 (p. 105) I have recorded the variation in conical

processes on the head of a male and a female of *I. nordenstami* from the same locality. A slight difference in the spine armament on each side of the head was also found in a female of *I. bicornis* (p. 102).

I have found similar, although not so pronounced differences, in *Munnopsis typica* where specimens from Greenland had actual spines on the head and pereonites 6 and 7 and pleon in positions where Skagerrak specimens had rounded processes only (p. 189). In *M. beddardi* the number of setae on the head was found to be greatly varying in North Atlantic material (p. 189). In addition, a very careful comparison of the entire material of *Storothyngura pulchra*, which has been divided into three subspecies (p. 134), clearly showed that – as far as the shape, length and to some degree the spine direction of pereonites 2-4 and the ventral spines (hyposphenians) on prns. 1-5 are concerned – the greatest differences were found to exist between the (otherwise perfectly identical) specimens of *pulchra pulchra* from three stations in the Gulf of Panama area. These differences were considerably greater than those existing

between some specimens of *p. pulchra* and the material of the two other, widely separated subspecies.

A remarkable variation in the length of the postero-lateral processes (spines) has also been found in females of *Haploniscus b. bicuspis* (both with and without marsupium) from the same locality (Fig. 140, p. 210) and in juveniles, females and males of *H. antarcticus* (Fig. 141).

Thus, at least in the four genera mentioned, caution must be used in not laying too much stress on spine characters – and this is probably also true of most other asellote genera.

Number and coalescence of pleonites.

The number of pleonites is probably not very significant since there are one or two in e.g. *Ilyarachna* and most Eurycopidae, two or three in *Storothyngura* (three in, at least, *S. novae-zelandiae* (p. 123) and *S. sp.* – p. 132), and two or three in *Stylomesus*, *Heteromesus* and *Haplomesus* (p. 72). For this reason, it was considered impossible to use this character to separate on the family level in Janiridae (p. 34).

The coalescence or non-coalescence of pleonites is used to divide on the genus level in Ischnomesidae. On account of several exceptions (and for other reasons) I am opposed to the conception of this character being important enough to be considered the only significant one for separating Microparasellidae from Janiridae (cf. p. 37).

Blindness.

The absence of eyes cannot be used as a distinguishing character between genera (as used by e.g. RICHARDSON (1908b) in the case of *Caecimunna* – cf. p. 61). This statement is in agreement with that of BARNARD (1961, p. 26), in conjunction with a discussion of presence and absence of eyes in the amphipod family Oedicerotidae: "It is sensible to believe that the loss of eyes is assorted polyphyletically and is not a measure of generic distinctiveness". Moreover, several genera have species with and without eyes – e.g. *Janira* and *Munna*.

Mandibles.

Movable lacinia. A certain variation in the number of teeth and the shape of a keel was found in the complicated movable lacinia of specimens of *Paropsurus giganteus* from the same locality in the East Pacific (p. 178 and Fig. 113). These differences are considerably greater than those found between

the male holotype from the East Pacific and a female from the Tasman Sea.

Spine-row. In her detailed description of the mouthparts of *Jaera albifrons syei* Bocquet, LEMERCIER (1955) demonstrated the spine increase in both the left and right mandible during the postmarsupial development. In adults also, the number was found to increase according to size. In the present material the number or shape varied among specimens of the following species. *Haploniscus helgei* has two serrated and three simple spines in the left mandible of the male holotype, one serrated, one broad unserrated and three simple spines in the female allotype (p. 54); both specimens are adult. Specimens of *Munneurycope murrayi* from different localities have 11 or 12 spines in the left mandible, 12 or 13 in the right (p. 160). There are 20 spines in the holotype of *Paropsurus giganteus*, 22-23 in another male from the same station and in a female from a widely separated locality (p. 181).

Molar process. Quite early on HANSEN (1905, p. 308) pointed out that "in the shape of the mandibles the differences between the genera decidedly allied to each other ... are considerably larger than those which can be pointed out between the families." BIRSTEIN (1961, p. 137) also found that the shape of the molar process could not be regarded as an important distinguishing character. This is emphasized by the fact that within the nine species which I have found necessary to refer to the genus *Munnopsis*, all manner of transgressions from a well developed to a greatly reduced or totally absent molar process was discovered (p. 185). The relation between the shape of the molar process and the nutrition is mentioned on p. 245.

Palp. The presence or absence of a palp varies greatly within several families and even within some well defined genera (e.g. *Ischnomesus* (cf. table 1 in WOLFF 1956a), *Ilyarachna* and *Munnopsis*). LEMERCIER (1955) showed that in *Jaera albifrons* the number of setae (primarily on joint 3) increases not only during the postmarsupial development but also in the adult stage. In *Ilyarachna thori* I found some variation in the spine armament in males from different as well as from the same localities (p. 100, Fig. 47f-h).

Maxillula and maxilla.

These do not vary significantly during the postmarsupial development (LEMERCIER 1955). In *Jaera albifrons* she sometimes found 13 instead of 12 spines on the outer endite of the maxillula.

Maxilliped.

Coupling hooks. According to MENZIES (1962a, 1962b) the number of coupling hooks is an important character. However, the number has quite often been found to vary. LEMERCIER (l. c.) recorded in *J. albifrons* an increase from 1-3 on each side during the development and an increase from 4-6 in the adults. Moreover, the number on the left and right maxillipeds was generally the same but exceptions did occur occasionally.

I have found variation in the following cases: The holotype of *Ilyarachna kermadecensis* has nine coupling hooks on the right mxp. compared to six in a specimen from another station. In *Munneurycope murrayi* the number was found to vary from five to seven. The holotype of *Paropsurus giganteus* has 14 coupling hooks, another (slightly smaller) male from the same station 15 (left) and 16 (right mxp.). One male of *Munnopsis latifrons* has four coupling hooks instead of three.

In some species within the same genus (e.g. *Munnopsis*) there is an equal number of coupling hooks on the two maxillipeds, while others have an unequal number.

Endite. In *Ilyarachna thori* the holotype has five flat, serrated spines on the distal margin while a male from another station has only three or four (p. 100).

Palp. LEMERCIER found that an increase both in the relative size of joint 2 (fig. II, 1 and 3-5), and in the number of setae on the joints took place in *J. albifrons* during development. In two males of *Paropsurus giganteus* from the same station I found some variation in the shape of joint 4 (p. 181).

Incomplete development of pereonite 7 and lack of pereopods VII.

It is a well known fact that in the first post-marsupial stages of the isopods pereonite 7 is much smaller than the preceding pereonites, and pereopods VII are lacking. In the third stage (according to Table 11, p. 213) prn. 7 becomes relatively larger and prps. VII are at about half their size and will attain full size before maturity is reached.

However, in three species of Asellota prn. 7 is conspicuously smaller than prn. 6 in sexually mature specimens and prps. VII are absent or rudimentary. They are:

(1) *Dendromunna mirabile* n. sp. Fig. 27d (p. 67) of the holotype and only specimen shows that prn. 7 is small, lacks the latero-ventral protuberances found on the preceding segments, and is entirely devoid of pereopods. Presence of developing ooste-

gites indicates that maturity is reached. It appears highly improbable that prn. 7 and prps. VII will attain full size during the moult between the present and the succeeding stage (with marsupium). MENZIES' fig. 52 A (1962b) of *D. spinipes*, the only other species of *Dendromunna*, shows pereonite 7 to be as inconspicuous as in *mirabile*. At my request, however, Dr. MENZIES has informed me that prps. VII are present.

(2) *Munella danteci* was described by BONNIER (1896) who stressed that prn. 7 was reduced and prps. VII totally absent in spite of the fact that the only specimen, a male, was definitely adult, pleopods 1 and 2 being fully developed.

(3) *Lipomera lamellata* was described by TATTERSALL (1905) who had several specimens at his disposal. Again, prn. 7 is much smaller than prn. 6; however, prps. VII are always present, although "very small and rudimentary, consisting of a feebly jointed slender appendage, unarmed save for two plumose setae" (l. c., p. 34 and pl. VIII, 10). Several of the females carried eggs.

It is interesting to note that a similar feature is apparently found in all four species of three genera within the Anthuridea, viz.:

(1) *Cruregens fontanus* Chilton, described in detail by CHILTON (1894) who had access to "a considerable number of specimens". In all cases prn. 7 was small and entirely devoid of appendages. There can be no doubt that the specimens were adult.¹

(2) *Hyssura producta* and *H. profunda* were described on single specimens by NORMAN & STEBBING (1886) and BARNARD (1925b), respectively. They found no legs on prn. 7. In *producta* (not described in *profunda*) prn. 7 seems, however, to be no different in size from the preceding pereonites than it is in allied genera. Both specimens are adult.

(3) *Colanthura tenuis* was described by RICHARDSON (1902), who found that both the females available had a very small prn. 7 and lacked prps. VII. One of the females had a well developed marsupium.

Only TATTERSALL (1905) has given a possible explanation for this peculiar feature, viz. for *Lipomera lamellata*, which he did not regard as primitive "but rather as a very specialised species in which

1. CHILTON (l. c., p. 210) mentioned *Paranthura neglecta* Beddard as another example of an anthurid with a small prn. 7 and lacking prps. VII. BEDDARD (1886b) recorded the only specimen as immature but CHILTON doubted this since BEDDARD "does not mention any other point of immaturity about it". It seems to me that this is certainly no proof that BEDDARD was wrong in regarding it as immature.

the post-larval character of the seventh legs is secondarily developed. Specialisation in the direction of reduction of size has, from the exigencies of reproduction, probably led to this arrest of development." This conception seems very debatable; it appears more probable that the above cases may be instances of neoteny which otherwise appears to be unknown in Crustacea. It is to be hoped that much more material of these six interesting genera can be obtained.

MONOD found (l. c.) that this atrophy of prn. 7 (as he called it), and loss of prps. VII in *Cruregens*, *Hyssura* and *Colanthura* (together with other features), indicates a relationship between Anthuridea and Gnathiidea in which prn. 1 is fused with the head and prn. 7 and prps. VII are not developed. However, the fact that an identical small size of prn. 7 and total lack or feeble development of prps. VII are found also in the said three genera of Asellota makes this less possible, since the asellotes differ markedly from the gnathiids in a great many respects.

In my opinion it is advisable not to lay too much emphasis on this feature, as far as taxonomy is concerned.

Male pleopods 1.

For obvious reasons, the first (and second) male

pleopods have offered excellent characters for distinguishing species. Attempts have also been made to show agreement in the general shape of the male pleopods in species of the same genus. This is sometimes possible but certainly not always. The most striking example of very differently shaped pleopods 1 within an otherwise well defined genus is that of *Jaera*. While the type is essentially the same in *albifrons*, *hopeana*, *sarsi*, and *italica* it varies somewhat in *schellenbergi* and extremely so in *nordmanni* and *petiti* (which is perhaps a synonym of *nordmanni*); these differences are demonstrated in BOCQUET's fig. 3 (1953).

I have similarly found a great difference in the male plps. 1 in e.g. *Paropsurus giganteus* and *P. pelucidus* (Figs. 115a-b and 117a-c); these species are otherwise closely related. Variation of width in the proximal and distal parts of plps. 1 were found in specimens of *Munnopsis typica* from Greenland and the Skagerrak (p. 188, Fig. 119a and c). Slight differences were also found in the shape of the lobes on plps. 1 in *Janira maculosa* from widely separated localities (p. 43, Fig. 6b-f).

Male pleopods 2.

Differences were also found in the size and slenderness of the copulatory organ in specimens of the same material of *M. typica* as above (Fig. 119e-f).

Subtribe Stenetrioidea

Stenetriidae Hansen, 1905, p. 315 (diagnosis).

Genus *Stenetrium* Haswell, 1881

Stenetrium Haswell, 1881, p. 478; HASWELL 1882, p. 308; 1885, p. 1010; BEDDARD 1886b, p. 8; HANSEN 1905, pp. 303, 316; STEBBING 1905, p. 53; RICHARDSON 1905, p. 439; MONOD 1925b, p. 238; NORDENSTAM 1946, p. 18.

Iamna Bovallius, 1886, p. 22 (= *Stenetrium*, fide RICHARDSON 1910, p. 109); STEBBING 1893, p. 379.

Since HANSEN's thorough description of the genus (1905, p. 303) 22 more species have been described, but this fact has brought about only a few alterations in his description. To some extent this may be explained by the rather shorter descriptions and fewer illustrations presented by several of the authors, but on the whole *Stenetrium* is no doubt exceedingly homogenous.

The following modifications of HANSEN's description are necessary:

In *S. abyssale* n. sp. and partly also *acutum* Vanhöffen the rostrum is so large that it makes both the epistome, the labrum and the distal part of the mandibular palps invisible from above. As shown below (p. 26), the peduncle of the antennula is 4-jointed in, at any rate, *longicorne* (Lucas), *serratum* Hansen, *antillense* Hansen, and *abyssale* n. sp. The sympod of the maxilliped in *abyssale* is less than twice as long as broad, and the endite is not marked off by a transverse suture. In *syzygus* Barnard the antero-lateral corners of pereonites 1-4 are hardly produced forwards at all, and in several other species most of the corners are not the least acute. HANSEN stated (l. c., p. 305) that in pleopod 4 the exopod "is slightly longer and somewhat broader than the unjointed endopod". Both in his own fig. 2k (pl. XX) and in all illustrations of pleopod 4 known to me, the exopod is narrower than the endopod; in some cases it is also shorter. Finally, pleopod 5 is 2-jointed in *truncatum* Nicholls.

Diagnosis:

Body depressed, elongated, parallel-sided. Head much broader than long, with a pair of projections at the base of the antennae and almost always a rostrum. Eyes present. The lateral parts of pereonites 1-4 projecting more or less forwards, those of prns. 5-7 backwards. Pleon consisting of two or three very short vestigial segments and a large pleotelson which has, postero-laterally, a sharp tooth in front of a small notch. Joint 1 of the antennulae is longer and thicker than joints 2 and 3; a very small fourth joint of the peduncle often marked off; flagellum varying. Antennae with joints 1 and 2 short, joint 3 somewhat longer and with a distinct, setiferous squama, joint 4 short, joints 5 and 6 elongated; flagellum very long, multi-jointed. Mandibles well-developed, with several strong, serrated spines, one of which emerges from the movable lacinia; palp 3-jointed, last joint curved, spinous. Maxilliped large, with scale-like setae distally on the endite; joints 1-3 of palp broad, joints 4-5 much narrower; epipod elongated. Pereopods I subchelate, always larger in the adult male than in the adult female

and often the hand shows a marked sexual difference. Prps. II-VII equal, moderately long, ambulatory, with two claws. Male pleopods 1-2 small, the former with a short, merged sympod and two sub-oval rami, the latter with a subtriangular sympod, a short, slightly curved exopod and a rather long, geniculate endopod. Female operculum also small, subtriangular. Exopod of pleopods 3 two-jointed, very large, thus covering the branchial cavity and serving as an operculum over the respiratory endopods of pleopods 3 and pleopods 4 and 5; the former having a 2-jointed exopod. Uropods with 1-jointed styliform endo- and exopod, the latter always the shorter.

While preparing the following key, I encountered great difficulty in finding easily recognizable and constant features in order to separate certain species. This is due not only to the insufficiently detailed descriptions and illustrations by some authors, but also to the fact that several species are very close to each other and some others are probably identical. The separation of the following species presented the greatest difficulties:

- S. armatum* (East Australia) from *dalmeida-diazi* (South Africa).
- S. chiltoni* (Indian and Pacific Oceans) from *glauerti* (Western Australia).
- S. stebbingi* (Bermudas) from *antillense* (West Indies).
- S. medipacificum* (Pacific Ocean) from *dagama* (South Africa).

Key to the species of *Stenetrium*

1. First joint of antenna, seen from above, antero-laterally produced into an oblong, acute process or at least a conspicuous tooth..... 2
1. First joint of antenna with the exterior half of the anterior margin transverse, outer angle at most rectangular and acute, but without process or tooth..... 15
2. Pereopod I with the upper, distal corner of carpus with a long process (almost as long as the width of the joint)..... 3
2. Prp. I without a long process on the upper, distal corner of carpus..... 4
3. Lateral margins of pereonites 2-4 straight, of pleon serrated. Antero-lateral tooth on first antennal joint reaches beyond second joint..... *longicorne* (Lucas, 1849)
3. Lateral margins of prns. 2-4 concave, of pleon smooth. Antero-lateral tooth on first antennal joint does not reach the distal margin of second joint *haswelli* Beddard, 1886a
4. Lower, distal corner of carpus of male prp. I produced into a very large, apically rounded process, which reaches beyond the middle of the lower margin of the hand; palmar edge with several large triangular teeth. Pleotelson longer than broad, with smooth margins .. *monodi* Nordenstam, 1946
4. Lower, distal corner of carpus not produced, palmar edge with only moderate teeth or spines at most..... 5
5. Pleotelson with the lateral margins irregularly serrated and a rounded convexity terminally. Flagellum of antennula with few (about four) joints. Third (fourth?) joint of antenna with inner, distal process..... *fractum* Chilton, 1884
5. These features not combined..... 6
6. Rostrum distinctly broader than long, with straight or slightly concave front margin..... 7
6. Rostrum as long as broad or longer than broad, rounded (rarely bilobed) anteriorly 9

7. Lateral margins of pleotelson with four small saw-teeth besides the larger, posterior tooth. About seven joints in flagellum of antennula. Apex of female operculum subacute, entire..... *armatum* Haswell, 1881
7. Lateral margins of pleotelson with only one tooth. Ten to twelve joints in flagellum of antennula 8
8. Ventral keel only present on prns. 3-4 (as a blunt process on each). Hand of male prp. I a little broader than long. Apex of female operculum subacute, entire..... *dalmeida* Barnard, 1920
8. Ventral keel on prns. 1-4 low and rounded, with small denticles, on prns. 5-7 with the posterior angles acutely produced. Apex of operculum bifid..... *diasi* Barnard, 1920
9. Rostrum distinctly longer than broad. Body (especially pleon) covered with rather long hairs..... *crassimanus* Barnard, 1914
9. Rostrum at most as long as broad. Body almost devoid of hairs..... 10
10. Rostrum apically bilobed with rounded corners. Pleotelson with distinct saw-teeth. Hand of female prp. I more than twice as long as broad..... *proximum* Nobili, 1907
10. Rostrum apically rounded, sometimes with short spinules 11
11. Ventral keel with a forward-directed point on prns. 1-3 and a backward-directed point on prns. 6-7; keel absent on prns. 4-5. Palmar edge of a male prp. I has a broad, triangular, distal tooth, a somewhat longer, slender tooth and three smaller teeth..... *bartholemei* Barnard, 1940
11. These features not combined..... 12
12. Ocelli of eyes in two curved rows, ten or twelve in each row..... 13
12. Ocelli of eyes not in two rows, either numerous or few (six-seven)..... 14
13. Ten ocelli in each row. Rostrum with minute spinules at most, these being absent from the apex. Dactylus of male prp. I only slightly longer than palm..... *macrochirum* Nicholls, 1929
13. Twelve ocelli in each row. Rostrum with conspicuous spinules which are largest towards and on the apex. Dactylus of male prp. I distinctly longer than palm..... *spinirostrum* Nicholls, 1929
14. Numerous ocelli in a kidney-shaped eye..... *chiltoni* Stebbing, 1905
14. Six or seven ocelli in a nearly semi-circular eye..... *glauerti* Nicholls, 1929
15. Rostrum only two-fifths as long as broad, anterior margin with a row of pigment spots. Pleotelson a little longer than broad, evenly rounded apically. Pleopod 5 two-jointed.. *truncatum* Nicholls, 1929
15. These features not combined..... 16
16. Lateral corners of head without process. Pleotelson evenly rounded apically. Carpus or prp. I without lower process..... *siamense* Hansen, 1905 (p. 25)
16. Lateral corners of head with process..... 17
17. Carpus of prp. I with a distinct process on lower, distal corner..... 18
17. Carpus of prp. I with lower corner rounded..... 24
18. Frontal margin slightly convex, no rostrum present. Palmar edge of prp. I transverse, in female a little shorter, in male much shorter than dactylus. Exopod of male pleopod 2 with a long, tapering apex..... *euchirum* Nobili, 1906
18. Rostrum present..... 19
19. Rostrum as broad as long, almost semi-circular. Dactylus of male prp. I works against the distal margin of the very large lower process on fifth joint; hand without palmar edge. In the female the palmar edge is transverse, and the length of the hand is almost twice that of the width *hanseni* Nobili, 1906
19. Rostrum broader than long, with the front margin straight or slightly concave. Male prp. I shaped in another way..... 20
20. Antero-lateral processes on head much shorter than frontal processes at base of antennae. Pleotelson one-fifth longer than broad, evenly rounded apically. Palmar edge of female prp. I with six triangular teeth..... *gilbertense* Nordenstam, 1946
20. Antero-lateral processes on head about as long as frontal processes. Pleotelson at most very slightly longer than broad..... 21
21. Antero-lateral and frontal processes on head of equal size and shape. Hand of male prp. I with a strongly convex upper margin and having distally a very large, obliquely directed lower spine; including the spine, the hand is one-third broader than long..... *entale* Nordenstam, 1946

21. Frontal processes (in dorsal view) broader than antero-lateral processes and with obtuse apex. Hand of male prp. I much longer than broad. 22
22. Pleotelson slightly broader than long. Lower margin of hand of male prp. I concave throughout. Width of hand in female two-thirds of length; angle between palmar and lower margin about 110°. Uropods two-thirds as long as pleotelson. *occidentale* Hansen, 1905 (p. 25)
22. Pleotelson slightly longer than broad. Lower margin of hand in male proximally convex, distally concave. 23
23. Lower distal corner of hand in male with two bifurcate processes. Width of hand in female half its total length; angle between palmar and lower margin about 125°. Uropods two-thirds as long as pleotelson. *stebbingi* Richardson, 1902
23. Lower distal corner of hand in male with one bifurcate process. Width of hand in female two-thirds its length; angle between palmar and lower margin less than 100°. Uropods only slightly more than half as long as pleotelson. *antillense* Hansen, 1905 (p. 25)
24. Rostrum distinctly broader than long, with slightly convex, straight or concave front margin. ... 25
24. Rostrum as long as broad or longer than broad, with rounded or subacute apex. 28
25. Front margin of rostrum concave. Lateral margins of pleotelson strongly serrated (with about six teeth on each side). Carpus of prp. I with a long process on upper, distal corner. *serratum* Hansen, 1905 (p. 25)
25. Front margin of rostrum straight or slightly convex. Lateral margins of pleotelson with one tooth only. Carpus of prp. I not produced on upper corner. 26
26. Flagellum of antennula with six joints. Hand of male prp. I pentagonal, one-third longer than broad, palmar edge with six blunt denticles. *medipacificum* Miller, 1941
26. Flagellum of antennula with twelve to fifteen joints. Hand in male triangular, a little broader than long, palmar edge with a few irregularly spaced teeth. 27
27. Outer corner of first antennal joint acute, but not produced. Ventral keel present on all pereonites, on 1-4 forming a process. Hand of female prp. I as broad as long, the distal margin being much longer than the lower margin. *dagama* Barnard, 1920
27. Outer corner of first antennal joint acute, somewhat produced. Ventral keel present only on prns. 3-4 (as a blunt process) and on prn. 7 (as a backward-directed spine). Hand in female longer than broad, the entire distal margin being shorter than the lower margin. *dalmeida* Barnard, 1920
28. Rostrum about as broad as long, almost semi-circular. Dactylus of male prp. I works against the distal margin of the very large lower process on fifth joint; hand without palmar edge. In the female the palmar edge is transverse, and the length of the hand is almost twice that of the width. *hanseni* Nobili, 1906
28. Rostrum longer than broad. Male prp. I differently shaped. 29
29. Frontal processes at inner base of antennae acute. Upper, distal corner of ischium of prp. I with distinct process. 30
29. Frontal processes low and rounded. Upper, distal corner of ischium of prp. I rounded. 32
30. Pleotelson longer than broad. Hand of prp. I about one-fourth longer than broad; angle between palmar and lower margin about 110°. *saldanha* Barnard, 1920
30. Pleotelson broader than long. Hand of prp. I as broad as or broader than long; angle between palmar and lower margin about 90°. 31
31. Pleotelson with acute apex. Apex of sympod of male plp. 2 produced as a lobe which is as long as the exopod; endopod terminally with a dense growth of short setae. *acutum* Vanhöffen, 1914
31. Pleotelson apically rounded. Apex of male plp. 2 not produced in a lobe; apex of endopod with deep incision and no setae. *rotundatum* Vanhöffen, 1914
32. Rostrum does not reach as far as peduncle of antennula. Sympod of male plps. 1 only about one-tenth as long as the rami. Exopod of male plp. 2 with two joints and endopod with an outer subapical appendage. *syzygus* Barnard, 1940
32. Rostrum reaches far beyond peduncle of antennula. Sympod of male plps. 1 about one-third of the rami. Exopod of male plp. 2 with one joint and endopod without outer appendage. *abyssale* n. sp. (p. 25)

**Type material of *Stenetrium*
in the Copenhagen Museum**

During the investigation of the total material of *Stenetrium* kept in this Museum and described as new species by HANSEN (1905)¹ I have designated the following lectotypes:

Stenetrium antillense Hansen.

Lectotype: Adult male (Fig. 2c; HANSEN 1905, pl. XXI, fig. 1 a-c); mouthparts are missing, but were figured on HANSEN's pl. XX, fig. 3 a-h.

Other specimens: 1 adult or subadult male and 1 juvenile female.

Stenetrium siamense Hansen.

Lectotype: Adult male (HANSEN's pl. XXI, fig. 2a-b and e); pleopods 1-2 are missing, but were figured on fig. 2f-h; the specimen is a little damaged.

Other specimens: 2 immature females.

Stenetrium occidentale Hansen.

Lectotype: Two of the five adult males are without pleopods 1-2 and the left pleopods 3-5; thus it cannot be stated which of these two males was used for HANSEN's drawing of the male pleopods (pl. XX, fig. 2g-l). I have therefore selected a third male which is complete.

Other specimens: 4 adult males, 1 ovigerous female (with 12-15 large eggs in the marsupium), 1 adult female, 5 immature males and females and 4 juvenile specimens, one of which measures only 0.8 mm. The lectotype and the remaining 15 specimens are from St. Thomas, West Indies, 12 February 1898 (not 1888). In addition, I have found a tube with 1 immature male and 1 juvenile specimen from the West Indies, without date and exact locality, but provided by the same collector (H. KIER).

Stenetrium serratum Hansen (Fig. 2b).

Holotype: Only female preserved (with 25 eggs in the marsupium, but there has probably been at least twice as many).

Stenetrium abyssale n. sp.
(Pl. IA; Text-figs. 1 and 3-5)

Material:

Galathea St. 602, Tasman Sea (43°58'S, 165°24'E), 4510 m, 15 January 1952. Bottom: bluish clay. Bottom temp.: c. 1.1°C. – 1 female.

1. HANSEN's *S. mediterraneum* was transferred to *S. longicorne* (Lucas) by MONOD (1925b, p. 238).

Galathea St. 664, Kermadec Trench (36°34'S, 178°57'W), 4540 m, 24 February 1952. Bottom: brown sandy clay with pumice. Bottom temp.: 1.1°C. – 1 male (holotype).

Description:

Body (Pl. I A and Fig. 1a) of the usual shape, depressed and with subparallel lateral margins; it is a little more than three times longer than broad. On the head are several very short setae and on each of the pereonites and pleon a few rather long and thin setae. The colour is milky white.

Head more than twice as broad as long, with a median, transversely-oval, low convexity and depressed, strongly projecting antero-lateral corners. The frontal margin is somewhat raised and slightly convex at the outer base of the antennula and at the base of the rostrum. This is very large and projecting, about twice as long as broad, subacute and with a slight lateral concavity placed in a rather proximal position. It has an insignificant lateral keel, and is somewhat raised proximally (Fig. 1b). Eyes are present as two small, circular, slightly raised, brown-pigmented areas with an irregular pattern of darker pigmented spots which may be interpreted as ocelli.

Pereonites 1-4 (Fig. 1a) with a low transverse depression and decreasing in width backwards, prn. 1 also being a little longer than the other segments (especially prn. 4). The postero-lateral corners become more and more rounded posteriorly. There is no ventral keel on these or the following segments. Female without oostegites.

Pereonites 5-7 separated from prn. 4 by a broad incision. All three segments almost equally long medianly.

Pleon (1a) with the two first segments short and vestigial. Pleotelson is a little broader than long, depressed and with a median and two lateral convexities faintly indicated. On each postero-lateral margin is the usual, small, triangular tooth, hence the margin is at first slightly convex, then slightly concave, becoming again slightly convex, and finally ending in a rounded apex (Fig. 4e). The lateral margins of pleon are finely jagged (1c). Ventrally, between the uropods, there is a short, longitudinal ridge (Fig. 4e), probably representing the anal opening. Immediately in front of the insertion of the uropods, a low transverse, slightly projecting edge is found.

Antennula in the male (1d) with three distinct joints in the peduncle. Joints 2 and 3 rather broad, compared with joint 1, as is the 20-jointed flagellum.

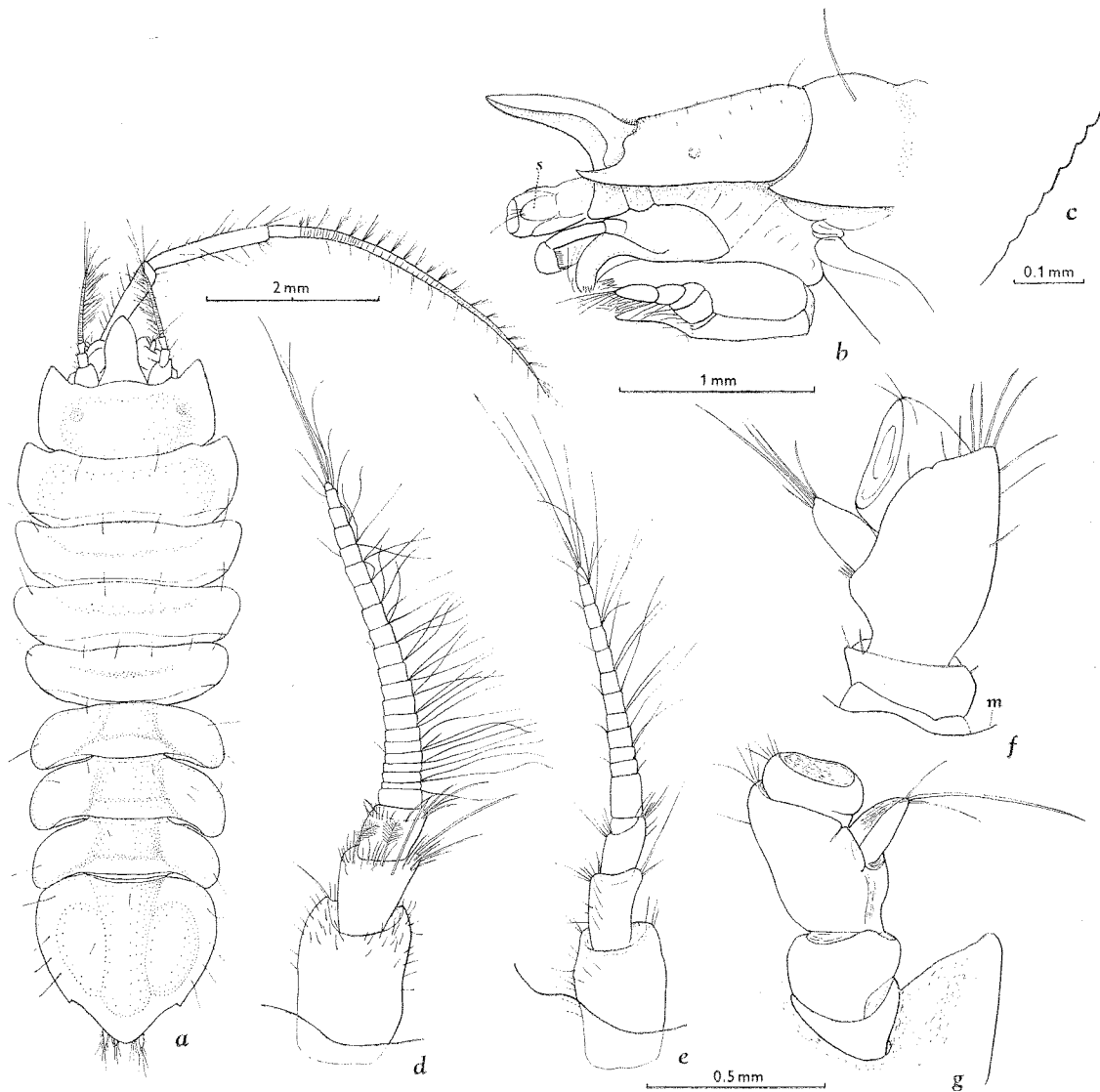


Fig. 1. *Stenetrium abyssale* n. sp.; a-c and e-f, ♀ allotype, d and g, ♂ holotype; a, dorsal view; b, lateral view of head and first pereiopod (s, squama); c, right postero-lateral margin of pleon; d and e, left antennula from above, ♂ and ♀; f, left antenna from above, ♀; g, left antenna from below, ♂.

Distally, on joint 3 is an inconspicuous fourth joint of the peduncle which is rather obscure in the male, but fairly visible in the female (1e). None of the previous authors have mentioned more than three joints in the very equally shaped peduncles of antennula in this genus.¹ An investigation of the material of *Stenetrium* in this Museum showed that *S. longicorne* (Fig. 2a), *serratum* (2b) and to some extent *antillense* (2c) have a fourth joint almost as conspicuous as that in the female of *abyssale*, while *siamense* and *occidentale* have a very obscure fourth joint, if it is present at all.

Female antennula of abyssale (1e) is more slender

1. NICHOLLS (1929) shows a distinct fourth joint on the antennula of *S. truncatum* (fig. 12), but mentions in the text only three joints in the peduncle.

than in the male, less setiferous and the flagellum is only 12-jointed.

Antenna with the first joint hardly visible beyond the frontal margin (m in Fig. 1f) and its outer corner rounded. Joint 2 short above, but longer on the lower side (1g). Joint 3 with a deep, outer incision for the excavated, setiferous squama which is almost egg-shaped in frontal view (s in Fig. 1b). Joint 4 short, joints 5 and 6 elongated, setiferous, the latter being the longest (1a). Flagellum multi-jointed, the proximal joints are not differentiated. The entire antenna as long as head and pereonites together.

Left mandible (3a) with the distal part of the body still broader and the molar process still feebler than in *antillense* (HANSEN 1905, pl. XX, 3a). Incisive

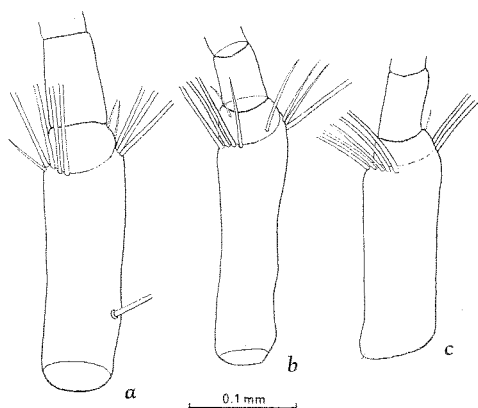


Fig. 2. Left antennula; third and fourth joint of peduncle and first joint of flagellum; a, *Stenetrium longicorne* (Lucas); b, *S. serratum* Hansen (♀ holotype); c, *S. antillense* Hansen (♂ lectotype).

part has two strong and two smaller teeth, the teeth of the movable lacinia are almost equal (3b). The spine on lacinia stronger and more serrated than any of the six spines in the spine-row, of which only the first two are serrated. More towards the distal end of lacinia there is a short row of setae, visible only in a direct lateral view (3c). Apex of molar process divided by a transverse furrow. Second and third joint of palp abundantly furnished with spine-like setae (3d).

Labium (3e) with a distal tuft of stiff setae, a long row of setae, and proximally, a growth of thin hairs. *Maxillula* and *maxilla* almost identical with those of e.g. *antillense* (HANSEN's fig. 3e-g), except that the spines of the maxillula are not serrated.

Maxilliped (3f) with the basipodite shorter than usual and the endite relatively larger. There are five, almost ball-shaped coupling hooks. Distal margin of endite with alternating simple and leaf-shaped, transparent spines, but towards the inner corner an overcrowding of simple and serrated spines may obscure one or two of the leaf-shaped type. The palp is typical. Situated somewhat proximally to the middle of the outer margin of the epipod there is a low, although conspicuous process.

Pereopod I (4a) without projecting corners on merus and carpus. The hand (propodus) is greatly expanded, almost regularly triangular, the width being slightly less than the maximal length (male). Palmar edge slightly sinuate, and besides the strong lateral tooth it is armed with simple setae and combed, curved spines which both emerge from a narrow transparent zone along the edge (4b). Dactylus narrower at base than a little further distally; inner margin with a dense row of teeth or short spines and slender setae (4c). The claw short, but distinct. Almost the entire leg is abundantly covered with hairs. Those not visible in Fig. 4a (being found on the inner side) include a small tuft on ischium, a transverse row on merus, and a dense growth on the hand especially on the convex (upper) half. The entire prp. I (with dactylus widely open) is almost one-fourth longer than prp. II.

The differences between the male and female prps. I are extraordinarily few, the only apparent ones being that the width of the female hand is a little larger than its total length and that the total length

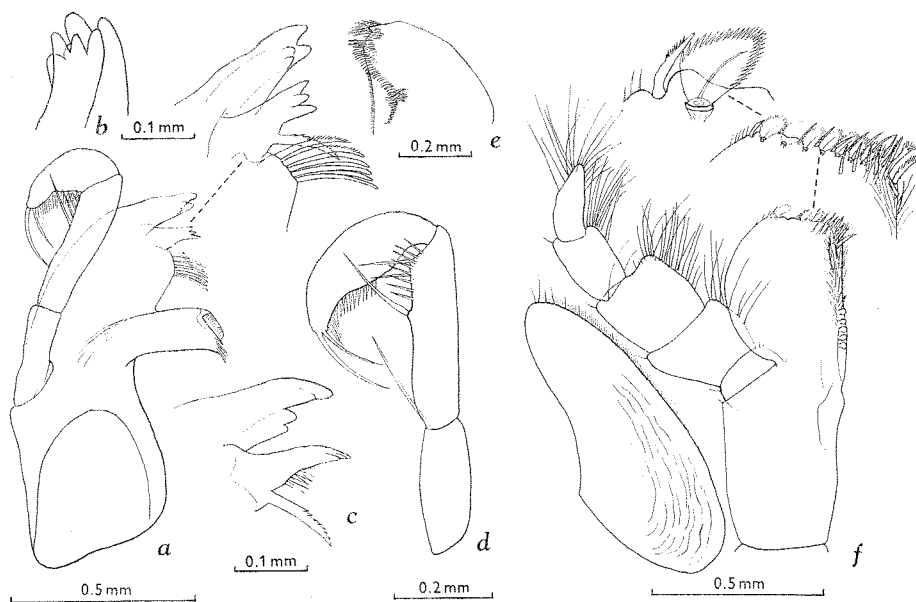


Fig. 3. *Stenetrium abyssale* n. sp., ♀ allotype; a-d, left mandible; a, seen almost in side-view; b, incisive part and end of movable lacinia from inside; c, incisive part and entire movable lacinia in side-view; d, frontal view of palp; e, labium; f, left maxilliped from inside.

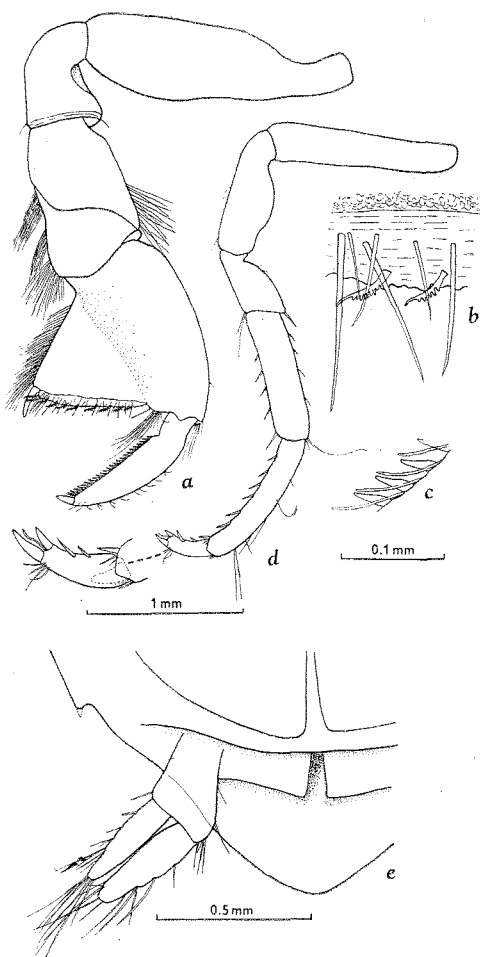


Fig. 4. *Stenetrium abyssale* n.sp.; a-d, ♂ holotype; e, ♀ allotype; a-c, right pereopod I; a, from outside; b and c, distal margin of hand (propodus) and inner margin of dactylus greatly magnified; d, right pereopod V; e, posterior end of pleon and uropod from below.

of prp. I does not exceed that of the succeeding legs.

Pereopods II-VII (4d) almost perfectly equal in shape and length, the posterior ones being only

slightly shorter. The proximal joints are only moderately furnished with short setae; propodus has some longer exterior setae, a row of spines along the interior margin, an interior spine distally, and a long and broad spine or process on the posterior side (dotted in Fig. 4d). Dactylus with two interior spines as well as the two strong claws.

Male pleopods 1 (5a) with the sympod almost twice as broad as long and with two slightly oblique convexities. These form a continuation of the rami which have one longitudinal convexity proximally and two further distally. The rami are two-fifths as broad as long and have somewhat convex inner margins so that one partially covers the other.

Male pleopod 2 (5b) typically shaped. The major part of the sympod forms an oval convexity. Exopod only slightly curved, distinctly 1-jointed. Endopod still larger than usual, with a few tiny, forward-directed spinules subterminally and with terminally, what seems to be a bowl-shaped concavity with centered spines or setae.

Female operculum (5c) one-third longer than broad. Proximally, the lateral margins are parallel, distally, slightly concave towards the subacute, entire apex. The dorsal surface with three low, longitudinal convexities and – as on the sympod of the male pleopods 1 – having proximally, inconspicuous, transverse lines.

Pleopod 3 (5d) with the operculum-like, 2-jointed exopod almost twice as long as broad. On the hyaline endopod are five feathered setae.

Pleopods 4 and 5 (5e and f) closely resembling those of *occidentale* (HANSEN 1905, pl. XX, 2k-l), which, however, has the exopod longer than the endopod and a shorter row of feathered setae on the second joint of the exopod.

Uropod (Fig. 4e) rather short, only reaching a

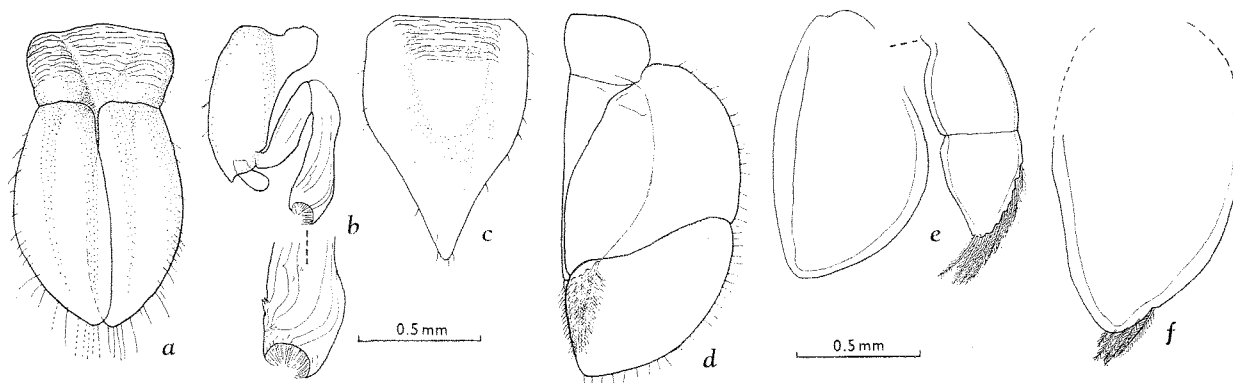


Fig. 5. *Stenetrium abyssale* n.sp.; a and b, ♂ holotype; c-f, ♀ allotype; a, pleopods 1; b, right pleopod 2; c, operculum; d-f, left pleopods 3-5.

little beyond the apex of pleotelson. Exopod about as long as peduncle, endopod a little longer and stouter.

Size: Length of ♂ holotype is 9.9 mm, greatest width 3.1 mm; length of ♀ allotype 8.6 mm.

Variation:

Apart from the sexual differences in antennulae and pleopods mentioned above I have found no other noteworthy differences between the only two specimens available.

The practically equal shape of the hand of pereopod I in the two sexes may indicate that the male is still subadult. In most cases where both sexes are known the hand of the adult male differs markedly from that of the female and of the subadult male whose hands are almost identical. However, in three other species (*saldanha*, *dagama*, and *glauerti*) the hands of the two sexes differ only in size; of the two latter of these species, six and four males, respectively, were collected.

Remarks:

Only two other species of *Stenetrium* have a similarly projecting, subacute rostrum. One of these, *S. syzygus* is well described and illustrated by BARNARD (1940, p. 432, fig. 20). This species differs from *abyssale* in the following main features: Rostrum much less projecting; pleon almost square in shape; flagellum of antennula apparently 1-jointed, short; sympod of male pleopods 1 very short, and outer margins of rami parallel almost throughout; pleopod 2

with 2-jointed exopod and an outer "short, sub-apical appendage" on the endopod; exopod of pleopod 4 considerably longer than endopod; endopod of uropod almost twice as long as exopod.

Of *S. saldanha* only male pereopod I and pleopods 1 are illustrated (BARNARD 1920, pl. XVI, 33-34). The following differences seem, however, sufficient to distinguish the two species: The prominent, acute teeth forming the inner angles of the sockets of the antennae in *saldanha* are present only as low convexities in *abyssale*; eyes reniform in the former, circular in the latter species; rather high, ventral keel with dentiform anterior or posterior apexes in the former, no trace of a ventral keel in the latter; width of hand of male pereopod I in *saldanha* three-fifths of its length according to fig. 33 (but according to the text (1. c., p. 403) "only a little longer than greatest width"), while in *abyssale* the width is very slightly less than the length; inner margins of rami of male pleopods 1 straight in the former, somewhat convex in the latter species; male pleopod 2 of *saldanha* according to BARNARD (1. c.) like that of *crassimanus* in which apex of the endopod is "acutely pointed" (BARNARD 1914, p. 218 and pl. XX), while in *abyssale* it is excavated and setiferous apically.

The significance of the presence of eyes is discussed on p. 19.

Occurrence:

Kermadec Trench (NE of New Zealand) and Tasman Sea, at a depth of 4510-4540 m and 1.1°C.

Subtribe Paraselloidea

Classification

As mentioned above (p. 17), G. O. Sars (1899) divided those asellotes, which HANSEN (1905) referred to Parasellidae, into four families. In 1914 VAN HÖFFEN established three more families which were, however, very arbitrary.

In his monograph on the *Ingolf* isopods, HANSEN (1916) found it impossible to divide the numerous genera belonging to his Parasellidae into moderately well defined families. As "a kind of arrangement", he made a subdivision into twelve groups without, however, the intention of giving them definite systematic value: "the name "group" being much more neutral and somewhat less exacting as to sharp diagnoses than the name "subfamily" or "family"" (1. c., p. 11).

The group names were retained by several later authors, i. a. NORDENSTAM (1933), who even divided some of them into subgroups. On the other hand, GURJANOVA (1933b) ranked the groups as families; while agreeing in the main with HANSEN's classification she united certain of his groups, which thus resulted in nine families.

In later years there has been an increasing tendency to rank HANSEN's groups as families (NIERSTRASZ & STEKHOVEN 1930; MENZIES 1952, 1956b, 1962a, 1962b; BOCQUET & LÉVI 1955; BIRSTEIN 1960), no better division having been proposed since HANSEN's work. The same procedure has been followed in the present paper (cf. p. 17).

HULT (1941) proposed to divide HANSEN's Parasellidae into two subfamilies, Parasellinae and Munn-

opsinae, according to the structure of the ventral ganglionic chain¹ and development of pereopod V-VII as walking or swimming legs. Although this subdivision seems to have a sound basis, I agree with HULT that a more detailed investigation is needed before it can be recognized.

Recently, MENZIES (1962b, p. 92) tentatively proposed two other means of dividing the Paraselloidea into two groups. One is based on whether the anal opening is separated from the branchial cavity or enclosed within it. He found, however, that the majority of asellote genera are too insufficiently described to utilize at present this character.

The other character, the number of pleonites in the Asellota was first introduced in the discussion by MENZIES *et al.* (1961). As mentioned above (p. 17), the authors divide the Stenetrioidea and Aselloidea from the Paraselloidea, not only according to the well known difference in the structure of the first pleopods, but also to the presence of three pleonites in the two former subtribes against only one or two in the latter; distinctly stating that "the Paraselloidea never have more than two somites comprising the pleon" (1962b, p. 92). However, in the family Ischnomesidae there are at least ten species which have three distinct, although fused pleonites. Five of them belong to *Stylomesus* and were recently described by MENZIES (cf. p. 72), two to *Haplomesus* (described by HANSEN and re-examined by me), one to *Heteromesus* (still unpublished), one to the new genus *Bactromesus*, and one to the new genus *Helomesus* (the two latter species were described by BIRSTEIN and GURJANOVA, respectively). In addition, there are three pleonites in at least, *Storhyngura novae-zelandiae* and *St. sp.* (cf. pp. 123 and 132).

I agree with MENZIES *et al.* (1961) that the presence of three pleonites would seem to be a primitive character. Thus, the Ischnomesidae should probably be considered the most primitive of all Paraselloidea. The family also differs from all others in having the head deeply embedded in and fused with the first pereonite.² I do not, however, consider this a primitive character. Moreover, *Storhyngura* is by no means a primitive genus, being probably one of the most specialized within the asellotes.

Regarding MENZIES' proposal of dividing the Paraselloidea according to the number of pleonites,

1. In addition to the genera examined by HULT, BONNIER (1896, p. 595) described the ganglia in *Munella danteci*.

2. The head is also fused with prn. 1 (although not embedded in it) in e. g. *Syneurycope heezeni* Menzies.

the presence of two or three pleonites within the well defined Ischnomesidae and of one or two within Janiridae, Ilyarachnidae, etc. seems to deter the use of this character in the taxonomy.

In the subdivision of the Paraselloidea, it thus seems as if we have not reached much further than HANSEN (1916) who "in vain ... attempted to find leading characters in the shape of any organ" (p. 11). Although in the diagnoses of most families I have given additional characters, the main conception follows that of HANSEN.

Fundamental distinguishing characters are found in the following features:

(1) Shape of body which is very characteristic in most major families, except Eurycopidae. (2) Shape and position of antennulae – e.g. the lamellar first joint in all families with natatory pereopods V-VII (except in Desmosomatidae and *Syneurycope*), and their characteristic position in Munnidae, Ilyarachnidae and Bathypsoinae. (3) Pereopods are distinctive in the mutual length of the first joints in Ilyarachnidae and Munnopsidae, in shape of prp. III in Macrostylidae, and in prps. V-VII being natatory or not. The number of claws is used to separate Thambematidae (p. 39) but otherwise much variation is found in this feature (pp. 34-38). (4) Male pleopods 1-2 have little significance (cf. p. 21) – apart from the important coalescence of plps. 2 in probably all Munnopsidae. (5) Shape of uropods is unique in Munnidae and Ilyarachnidae only, their insertion characteristic in Munnidae, Dendrotonidae and Macrostylidae.

In addition to HANSEN's groups (or families), which were based on genera occurring only in the North Atlantic and adjacent seas, several more families have been established. In my opinion their validity can, in short, be characterized as follows:¹

Thambematidae Stebbing, 1913 has, with some hesitation, been adopted here (cf. pp. 39 and 49).

Jaeropsidae (= Jaeropsini Nordenstam, 1933) is well defined and is no doubt valid.

Microparasellidae Karaman, 1934 is discussed in detail (pp. 35-39) and found to be invalid.

Janirellidae Menzies, 1956b is found to be invalid (cf. p. 33).

1. In doing so, I had the following citation in mind (HANSEN 1905, p. 313): "It is, in my opinion, to be preferred to keep a very large group of genera in the same family, a large number of species in the same genus, than to subdivide respectively the family or genus into families and genera with new names, when sharp lines of distinction are not to be found in nature."

Abyssianiridae Menzies 1956b is found to be invalid (cf. pp. 63 and 70).

Echinothambemidae Menzies, 1956b has been adopted here (cf. p. 49); the correct name is Echinothambematidae.

Pleurogonidae Menzies, 1962a (= Pleurogoniini Nordenstam, 1933) is found to be invalid (cf. p. 60).

Antiasidae Menzies, 1962a (= Antiasini Nor-

denstam, 1933) has been adopted here (cf. pp. 61, 63 and 69).

Dendrotionidae Menzies, 1962b (= Dendrotiinae Nordenstam, 1933) has been adopted here (cf. pp. 61 and 63-64); the correct name is Dendrotionidae (cf. p. 60).

Acanthaspididae Menzies, 1962b is found to be invalid (cf. p. 35).

Key to the families of Paraselloidea

Keys to the families of this subtribe have previously been provided only by GURJANOVA (1933b, p. 396) and MENZIES (1962a, p. 28 and 1962b, p. 94). All three keys are to a large extent based on characters of the pereopods, but since these are often completely missing except for the basipodites (especially in deep-sea specimens), the keys are useless for such fragmentary specimens. In my opinion, the keys are also too summary, and do not provide for notorious exceptions to rules. In addition, GURJANOVA's key necessitates the use of dissection and does not include later established families. MENZIES' keys unfortunately contain several misunderstandings. Some of these (entrance to Macrostylidae, Ischnomesidae ("Ischnosomidae") and Dendrotionidae ("Dendrotidae")) in the first key (1962a), were corrected in the second (1962b). However, the following comments to the 1962b key are considered necessary: (1) Entrance to Desmosomatidae ("Desmosomidae"): "All pereopods except first pair modified for swimming, similar in structure"; this is only so

with prps. V-VII. (2) Entrance to Janiridae: "Dactyls of pereopods 2-7 inclusive with one or two terminal claws and a smaller accessory claw"; some genera have only two claws and this also applies to all genera of Microparasellidae (*sens. lat.*) which MENZIES must have included in the Janiridae since it does not appear in the key as a separate family. (3) Entrance to i. a. Macrostylidae (couplet 14b): "Molar process normal, expanded apically and truncated, grinding"; as in Nannoniscidae (couplet 14a) the molar process in Macrostylidae is "reduced to short setiferous tubercle". (4) Entrance to Janirellidae ("Janirellidae"): "... uropoda uniramous"; the uropods are unknown in two of the three genera referred by MENZIES to Janirellidae. (5) Entrance to Schistosomatidae ("Schistosomidae"): "Coxal plates spiniform"; according to HANSEN (1916, p. 53) "the coxae have no processes", the projections emerging from the segments proper. (6) Pseudomesidae is not included in the key.

1. Antennulae terminal. Basis of pereopods I and II much longer than basis of prps. III and IV; ischium of prps. I and II shorter than basis of the corresponding leg, ischium of prps. III and IV much longer than basis of the corresponding leg. Prps. V-VI oar-shaped, with long, marginal setae. Uropods with large, flattened, setiferous peduncle, much smaller endopod and minute or missing exopod. Ilyarachnidae (p. 93)
1. Antennulae very rarely terminal. Mutual length of basis and ischium of prps. I-IV not as above. Uropods never with a flattened, leaf-like, setiferous peduncle 2
2. Basis of prps. I and II much longer than that of prps. III and IV. Prps. V-VII oar-shaped, without dactylus. Male pleopods 2 more or less fused. Uropods uniramous. Munnopsidae (p. 183)
2. Basis of prp. II never much longer than that of prps. III and IV. Dactylus always present on prps. V-VII (at least if these are oar-shaped)¹. Male pleopods 2 separated. 3
3. Frontal part projecting. Pereonite 4 almost quadrangular, with subparallel lateral margins (except *Echinopleura*). Flagellum of antennulae with very few joints. Prps. V-VII slightly expanded with marginal setae. Exopod of uropod lacking or small. Desmosomatidae
3. These characters never combined 4
4. Eyes absent. Joint 1 of antennulae expanded (except in *Syneurycope*); flagellum with several joints. Prps. V-VII oar-shaped, with long, marginal setae. Uropods biramous (except in *Acanthocope*). Eurycopidae (p. 108)
4. These characters never combined. Prps. V-VII slender walking legs, similar in shape to prps. II-IV 5

1. Not known in Bathyposurinae.

5. Eyes, when present, on lateral processes. Pleon longer than broad. Joints 1-3 of palp of maxilliped broad. Uropods minute, without peduncle, almost always with endo- and exopod..... Munnidae (p. 59)
5. Uropods with peduncle or totally absent; if (rarely) with a single joint, the body is either narrow and with subparallel margins or there are postero-lateral processes on pleon..... 6
6. Pereonites 1-3 more or less fused, together constituting a separate, subquadrangular section. Mandible without palp. Prp. III fossorial. Uropods uniramous, long.. Macrostylidae (p. 90)
6. Prns. 1-3 never constituting a separate section..... 7
7. Head generally (but not always) deeply embedded in and fused with prn. 1. Eyes and squama absent. Prn. 4 produced backwards, prn. 5 forwards, prn. 5 at least being longer than broad. Prps. II-VII very slender..... 8
7. Head not fused with prn. 1. If longer than broad, prn. 5 is not produced forwards..... 9
8. Head embedded in and fused with prn. 1. Prp. I prehensile, differs from prp. II. Uropods inserted terminally Ischnomesidae (p. 71)
8. Head free, not embedded. Prps. I and II subequal. Uropods inserted ventrally..... Pseudomesidae (p. 93)
9. Joints 1-5 of palp of maxilliped all narrow, less than half as wide as endite..... 10
9. Joints 1-3 of palp of mxp. (in *Schistosoma* joints 1-2) conspicuously broader than joints 4-5; joints 1-3 at least as broad as endite (except in *Acanthaspidia* and a few other Janiridae) 13
10. Coxal plates lacking. Movable lacinia of left mandible absent, molar process long and spiniform. Uropods inserted in incision of distal margin of pleotelson, with two very short rami. Jaeropsidae
10. Movable lacinia of left md. present, molar process subcylindrical, with truncated apex. Uropods not in terminal incisions..... 11
11. Coxal plates lacking. Pleon with one segment which has backward-pointing processes postero-laterally (in *Hydroniscus* very small and invisible from above); pleon often fused with prn. 7..... Haploniscidae (p. 49)
11. Coxal plates present at least on prns. 5-7 (except in *Munella*). Pleon with two segments (except in *Kuphomunna* and perhaps in *Pleurocope*). Pleon never fused with prn. 7; no backward-pointing processes postero-laterally on pleotelson..... 12
12. Flagellum of antennula with at most three joints, with sensory filaments. Pereopods with two claws. Uropods inserted laterally..... Antiasidae (*Antias* and *Kuphomunna*) (p. 69)
12. Flagellum of antennula with at least six joints. Pereopods with one claw. Uropods inserted dorsally or dorso-laterally (except in *Munella*)..... Dendrotionidae (p. 64)
13. Prns. 6 and 7 and pleon fused. Coxal plates absent. Two claws on dactylus..... Echinothambematidae (p. 49)
13. Prns. 6 and 7 sometimes fused (Nannoniscidae), but prn. 7 never fused with pleon..... 14
14. Body rather elongated, flattened, with subparallel margins or narrowest in the middle. Uropods inserted ventrally. Eyes absent. Antennula with at most six joints, the terminal usually forming an ovate vesicle (*Nannoniscus*). Molar process of md. small, triangular and setiferous..... Nannoniscidae
14. Body rarely narrow in the middle. Uropods inserted laterally or (rarely) dorsally. Antennula generally with more than six joints. Molar process of md. subcylindrical, with truncated apex 15
15. Prn. 5 narrowed anteriorly in the shape of a short stalk. Eyes absent. Joint 3 of palp of mxp. only about half as broad as joint 2. One claw on dactylus of prps. II-VII..... Schistosomatidae
15. Prn. 5 not narrowed anteriorly. Joints 2 and 3 of palp of mxp. subequal in width. Almost always two claws on dactylus..... 16
16. Frontal margin broad and finely serrated. Uropods inserted dorsally..... Antiasidae (*Abyssianira*) (p. 69)
16. If broad, the frontal margin is unserrated. Uropods inserted laterally 17
17. Prns. 3-7 longer than broad. One claw on dactylus..... Thambematidae (p. 49)
17. At least prns. 3-5 broader than long (except in *Microparasellus stygius* ♂). Two or three claws on dactylus..... Janiridae (p. 33)

FAMILY JANIRIDAE nov. comb.¹

Janiridae Sars, 1899, p. 98; MENZIES 1962a, p. 69; 1962b, p. 181.

Janiridae Stebbing, 1905, p. 48; RICHARDSON 1905, p. 448.

Jaeridae Stebbing, 1910, p. 224.²

Ianirini Hansen, 1916, p. 12.

Diagnosis:

Body oblong, depressed. Head and pereonites free, with the lateral parts lamellarly expanded in most genera and pereonites subequal in length. Pleon usually consists of two segments; when present, the first is narrow and inconspicuous, the second large and shield-shaped. Eyes often present, situated on the upper surface. Antennae almost always longer than antennulae, with six joints in peduncle and with squama on joint 3 generally well developed. Mandibles with palp, and normally, with well developed molar process. Palp of maxillipeds usually with joint 3 in particular, expanded; its width almost always equal to that of the endite or broader. First pair of pereopods usually more or less prehensile; the remainder are walking legs of moderate and almost equal length. Dactylus almost always with two or three claws. Uropods always on the lateral or the terminal margin, with peduncle, and biramous or, occasionally, uniramous.

Remarks:

This family has for some time contained a large number of genera, and several attempts have been made to split it up in a natural manner. VANHÖFFEN (1914) tried to unite genera with a more or less distinct rostrum and with lateral spines or projections on pereonites and pleotelson, into the family Jolellidae. However, this arbitrary division was, for obvious reasons, not adopted by later workers. NORDENSTAM (1933) correctly referred *Jaeropsis* Koehler to its own group (family) and *Antias* Richardson to the Munnidae (the latter genus is discussed below).

1. Some authors, the most recent being MENZIES (1962a, 1962b), spell the family name Janiridae, probably because this was used by SARS when he established the family. The name must, however, follow the name of the type genus which LEACH (1814) named *Janira*.
2. STEBBING wished to replace Janiridae with the name Jaeridae since LEACH (1914) listed *Jaera* as the 12th and *Janira* as the 13th genus of the isopods. But of course, the family name should always be that used by the original author (in this case SARS), as long as it is referable to a valid genus.

Janirellidae

MENZIES (1956b, p. 11) erected a new family, Janirellidae¹ for the single genus *Janirella*. He later (1962a, p. 80) made the diagnosis more liberal so that it could also include the following genera: *Ianthopsis* Beddard,² *Iolanthe* Beddard (synonym of *Ianthopsis*), *Acanthaspidia* Stebbing,³ and *Iolella*, *Rhacura* and *Microprotus* Richardson.

Again, shortly afterwards (1962b), he referred *Iolanthe*,² *Acanthaspidia* and *Microprotus* to a new family (Acanthaspidiidae – see below) and stated that Janirellidae contains *Janirella*, the simultaneously described genus *Spinianirella*, and possibly *Rhacura*. In the remarks on the composition of Acanthaspidiidae it is, furthermore, stated that *Ianthopsis* probably belongs to Janirellidae. No mention of the status of *Iolella* is given in the 1962b paper.

Preference has been given here to discussions on results arrived at in both the 1962a and 1962b papers.

According to the diagnoses, MENZIES' division was based on the following differences: (1) Pleon consisting of one segment in Janirellidae, two in Janiridae; (2) pereopods II-VII with only two claws in Janirellidae and additionally, a third accessory claw in Janiridae.

(1) Number of pleonites. This feature has been checked in the above mentioned genera, most of which (marked *) were represented in this Museum. The result was as follows:

**Iolella*. In the smaller species *laciniata* (G.O. Sars) and *spinosa* (Harger) (= *speciosa* Bovallius), I would *a priori* consider pleon as being 2-segmented, although with a very inconspicuous first segment. But in the two large species, *vilhelminae* (Stephensen, 1913)⁴ and *spinosissima* (Stephensen, 1936) it was very evident that in this genus pleotelson has a

1. In BONNIER's original description (1896, p. 587) the type genus is spelt *Janirella*, not *Ianirella*.
2. Not *Janthopsis* and *Jolanthe* (l. c.).
3. Not *Acanthaspidea* (i. a. HANSEN 1916, NORDENSTAM 1933, NIERSTRASZ 1941).
4. STEPHENSEN's material of *I. vilhelminae* is in this Museum. Together with the nineteen other specimens were two tubes, one with two large males, and one with a female. The description and the majority of the illustrations (pls. I-II) were based on these three specimens, the only ones in which mouthparts (♀) and pleopods (♂) were dissected. I have, therefore, selected the female as lectotype; it has a large number of eggs in the marsupium. The head is now missing, but the mouthparts are present. The drawings of pereonites 6-7 and pleotelson (pl. I) and "Segm. 5 ♀" (pl. II) are from another female.

slight elevation along the anterior border. In front of this elevation is the first pleonite, which is totally coalesced with pleotelson and separated from it by a fine suture only (Pl. I B). (*I. glabra* was drawn by RICHARDSON (1908 b, fig. 1) with two segments).

Rhacura. This genus (with one species, *pulchra*) has two pleonites (RICHARDSON 1908 b, fig. 2). According to RICHARDSON (l. c.) it is closest to *Iolella*, agreeing fairly closely in general shape (especially with *I. holmesi* and *sarsi*). However, only in the event of it being furnished with coxal plates on pereonites 5-7 only, should it be referred to *Iolella* (cf. p. 39). At my request, Dr. T. E. BOWMAN kindly examined the type specimen in Washington. He stated (*in litt.*) that coxal plates were not only found on pereonites 5-7 but also that "on pereonites 1-4 an acute process is visible anterior to the pleural expansion." HANSEN (1916, p. 13) regarded *Rhacura* as a possible synonym of *Janira*. I personally, cannot agree with this, partly because of the marked lateral projections on head, pereonites 5-7 and pleon in *Rhacura* (not found in *Janira*), and partly as the coxal plates are differently situated and shaped.

**Ianthopsis*. Specimens of *I. nasicornis* Vanhöffen, 1914 show exactly the same feature as *Iolella vilhelminae* and *spinosissima* (Pl. IC). NORDENSTAM (1933, p. 180) showed that *Iolanthe* Beddard is a synonym of *Ianthopsis*.

**Acanthaspidia*. In the – unfortunately very small – specimens of the type species *typhlops* (G. O. Sars, 1879) in this Museum, it seems that there is a minute segment in front of pleotelson. This segment is very similar to those found in the (probable) type specimens of the type species *Janira tricornis* (Krøyer) – which has a definite 2-segmented pleon. Cf. also pl. 10, fig. 27 (SARS 1895) which is in contradiction to his own statement (p. 119): "Posterior division of body consisting of a single scutiform segment." There are also two distinct segments in *A. bifurcata* Menzies, 1962 b – at least according to his fig. 60 A.

**Janirella*. In *J. bonnieri* Stephensen, 1915, and in *spongicola* and *laevis* Hansen, 1916, pleon has definitely only one segment. MENZIES (1962 b, fig. 53 A) has drawn the new species *J. bifida* with two distinct segments, but this is probably incorrect.

Spinianirella. In the only species, *S. walfishensis*, MENZIES (l. c., fig. 55 A) has shown a faint line across the anterior part of pleon which might be interpreted as the hind margin of a fused pleonite. Since, however, MENZIES referred the genus to Janirellidae (with one pleonite only) this line probably has another significance.

Microprotus. RICHARDSON stated (1909, p. 118) that in *M. caecus* "the abdomen consists of a single large segment" and this is also shown in her fig. 38.

Jaerella. This genus was not considered by MENZIES. It cannot be a synonym of *Janira* as suggested by HANSEN (1916, p. 13), since RICHARDSON (1911 b) both described and illustrated pleon in *armata* (the only known species) as consisting of one segment only. This character also distinguishes it from *Iolella*, which it otherwise resembles closely. It is also distinctly different from the other genera with one pleonite.

(2) Number of claws. Unfortunately, this character is unknown in a considerable number of species referred to Janiridae. In the new genus *Janthura* (which is a typical janirid – cf. p. 45) and in most of the genera of Microparasellidae (which I have found impossible to divide from Janiridae – cf. below) there are two claws only, but pleon is distinctly 2-segmented. Additionally, the third accessory claw is in several of the species of Janiridae (*s. str.*) so inconspicuous that it can easily be mistaken for a seta (and in some cases probably is a seta only).

Conclusion. Thus, due to the presence of a single pleonite, the following genera should be referred to Janirellidae: *Janirella* (with perhaps the exception of *bifida* Menzies), *Spinianirella*, *Microprotus*, and *Jaerella*. They also differ from the majority of Janiridae in having two claws only on prps. II-VII (unknown in *Jaerella*). The uropods are uniramous in *Janirella*, biramous in *Microprotus* and *Jaerella*, and not known in *Spinianirella*.

The two first characters are also combined in a fourth genus, *Katianira* Hansen, 1916 (with four species). MENZIES (1962 b) referred it to a new family, Acanthaspidiidae (cf. below), but it cannot belong there since the pleon is distinctly 1-segmented (shown in HANSEN's fig. 1 a (pl. II) and verified by me on the type material in this Museum). However, in other respects it differs essentially from *Janirella* and the other genera: Antennae are shorter than antennulae, molar process of mandible tapers towards the apex, palp of maxilliped has four joints only and is quite differently shaped, and pereopods I have a fully developed, slender chela in both sexes. Each of these characters is found only in the genus *Katianira*, while in the Janirellidae the structure of the corresponding organs is as in most genera of Janiridae.

Notwithstanding the status of *Katianira* (cf. p. 39) I find it impossible in this case to divide on the family level. As discussed previously, the number of

pleonites varies within well defined families and even within other genera in the Asellota (e.g. one or two in *Ilyarachna* and Eurycopidae, two or three in *Stylomesus* and other Ischnomesidae). Moreover, MENZIES has himself (1962b, p. 181) included another genus with one pleonite in Janiridae, viz. his new genus *Abyssijaera* which he considers closely related to *Jaera*, differing only in the number of pleonites and a reduced molar process. Therefore, albeit with regret, I find it impossible to accept Janirellidae.

In MENZIES' first key to the genus *Janirella* (1956b) he omitted *bonnieri* Stephensen and *caribbica* Menzies. All species described so far (eleven) were included in his next key (1962b, p. 168). A few comments to this key are deemed necessary: (1) Couplet 2a: "Body with dorsal spines" in i.a. *bonnieri*; this species has no dorsal spines but as it has four lateral projections on pleon, it can be distinguished from other species without dorsal spines. (2) Couplet 2b: "Body without dorsal spines"; it is not known whether *abyssicola* and *glabra* have dorsal spines or not (they were not figured by RICHARDSON 1911a). (3) Couplet 7a: "Rostrum with four apical spines" in *laevis* Hansen; only two of the spines are apical. Couplet 9a (for *spongicola* Hansen) may be misunderstood; it states: "Medial spine at front of cephalon as wide as long", but actually it is only the frontal process which is as wide as long (or a little longer than wide) while the terminating spine is very long and slender.

Acanthaspidiidae¹

MENZIES (1962b, p. 177) erected this family to include the genera *Acanthaspidia*, *Iolanthe*, *Microprotus* and *Katianira*. It was characterized by having two pleonites, two claws on pereopod VI, joint 2 of maxillipedal palp half the width of the endite, and a long peduncle in the uropods (in some species).

As stated above, *Katianira* has only one pleonite and cannot, therefore, belong to this family. If *Iolanthe* is included in Acanthaspidiidae *Ianthopsis* must also be included, not only because the former is most certainly a synonym of the latter (cf. NORDENSTAM 1933, p. 180) but also since *Ianthopsis* has two claws on the pereopods and a narrow maxillipedal palp.

As discussed above, it is impossible to use the number of claws (two or three) for separating on the family level within the Janiridae (*sens. lat.*). Nor can the other distinguishing character (the narrow maxillipedal palp) be applied. In the first place, I do

not find the latter character important enough to be the only separating feature between families. Secondly, although it unites *Ianthopsis* with *Acanthaspidia* and *Microprotus* these three genera differ in another, at least equally essential character: the former lacks coxal plates on all pereonites while they are visible, on at least prns. 5 and 6, in the two latter. I thus find it impossible to accept Acanthaspidiidae, which should also be cancelled.

MENZIES (l. c.) gave a key to the four species of *Acanthaspidia*. It should be noted that the frontal projection in *decorata* Hansen may also be bifid; it was broken near the base in the only specimen. If so, *decorata* can be separated from *typhlops* and *bifurcata* by the lateral projection on prn. 6 being single, not bifid or trifid.

Microparasellidae

The status of the partly subterranean, partly marine genera *Microparasellus*, *Microcharon*, *Angeliera*, *Microjaera*, *Caecianiropsis*, *Protocharon*, and *MacKinia* has been a matter of some controversy in recent years. In 1934 KARAMAN erected a new family, Microparasellidae, for the two genera *Microparasellus* Karaman, 1933 and *Microcharon* n. gen. The definition was based on the following features: First pleonite free; no eyes; antennulae much shorter than antennae, which are less than half the length of body and furnished with a squama; all pereopods equal in length and shape and with two claws; small forms which live in subterranean freshwater. HULT (1941, p. 39) expressed serious doubt as to the validity of Microparasellidae. In 1943 CHAPPUIS rejected it as a separate family but in 1954 CHAPPUIS & DELAMARE adopted it without discussion. At the same time they erected a new genus, *Angeliera*, for a marine, sand-dwelling species. In addition, they showed that the (likewise marine) *Duslenia tessieri* Lévi, 1950, belonged to *Microcharon* and described some new species of this genus and *Microparasellus*. BOCQUET & LÉVI (1955) also established a new genus, *Microjaera*, which they referred to Microparasellidae, but which in many respects is close to Janiridae. For this and other reasons they preferred to regard the Microparasellidae as only a subfamily of Janiridae, dividing Janiridae into Microjanirinae and Macrojanirinae. In 1956 CHAPPUIS *et al.* erected the genus *Protocharon* for a new species from Réunion. CHAPPUIS (1958) described a new species of the same genus, referred *Brevipleonida gracilis* Gnanamuthu, 1954 from Madras to *Angeliera phre-*

aticola, and claimed that *Microjaera* should belong to Janiridae, since both have a well developed, sub-cylindrical molar process on the mandibles in comparison with the greatly reduced, conical process in Microparasellidae. Furthermore, CHAPPUIS claimed that *Caecianiropsis* Menzies & Pettit, 1956 should be referred to Janiridae, but found that the systematic position of *Ectias* Richardson, 1906, *Mackinia* Matsumotu, 1956, and *Protocharon* was still obscure. CHAPPUIS & DELAMARE (1960)¹ justly objected to BOCQUET & LÉVI's two new subfamily names, pointing out (p. 355) that not only should the name of the first describer be preserved, but according to the rules of nomenclature any name of taxons higher than genera must be referable to a valid generic name. Thus, the subfamilies should be termed Microparasellinae and Janirinae. As to the question of family or subfamily status, they agreed to some extent with BOCQUET & LÉVI but nevertheless, preferred to retain the Microparasellidae as a family. Furthermore, they referred only *Microparasellus*, *Microcharon* and *Angeliara* to this family and excluded *Protocharon* and *Microjaera*. Recently, BIRSTEIN (1961) has treated the systematic position of these genera and Thambematidae; this paper will be discussed below.

According to our present knowledge of the five above-mentioned genera (*Microparasellus*, *Microcharon*, *Angeliara*, *Protocharon*, and *Microjaera*), it is in my opinion, difficult enough to separate them from Janiridae on the subfamily level, not to mention the family level. The definition of Microparasellidae Karaman, as given by CHAPPUIS & DELAMARE (1960, p. 294) for *Microparasellus*, *Microcharon* and *Angeliara* runs as follows:

"Parasellides aveugles et dépigmentés d'une longueur de 2.3 mm au plus; corps composé d'une tête, sept péréionites, un segment pléonal libre et pléotelson. Sept péréiopodes se ressemblant entre eux, pas de patte préhensile. Pléopodes I mâles coalescents sur leur partie médiane, étroits. Pléopodes II mâles larges, recouvrant les pléopodes respiratoires; organe copulateur. Pléopodes I des femelles manque, le second forme un bouclier qui recouvre les pléopodes respiratoires. Uropodes s'insérant terminolateralement ou terminalement ne formant pas avec le telson d'éventail caudal".

1. According to the list of references in CHAPPUIS (1958) this paper was published in 1956 in "Vie et Milieu", Suppl. No. 6 with Dr. DELAMARE DEBOUTTEVILLE as the only author; actually it was not issued till in 1960, and with CHAPPUIS as co-author.

Blind and unpigmented species occur in all families of Asellota; even within the same genus, species both with and without eyes are to be found. These features are probably fairly easily acquired by deep-sea species as well as by subterranean and burrowing species (cf. above, p. 19 and J.L. BARNARD 1961, p. 26). Several species of Janiridae are less than 2.3 mm long (the genus *Caecijaera* and species of *Ianiropsis*, *Janira*, *Jaera*, etc.). The significance of a free pleonite 1 is discussed below. In Janiridae we also find several cases of genera with non-prehensile pereopods I, thus resembling the other legs: *Ianiropsis* (e.g. *analoga*), *Iais* (e.g. *californica*), *Jaera* (e.g. *sarsi*), etc. Male pleopods 1 and 2 are no different in any respects from those found in several genera of Janiridae such as e.g. *Janira* and *Iais*. The female operculum is as in other typical Asellota. Finally, the uropods are inserted in the same way as those in Janiridae and are very differently shaped within the three genera in question, those in *Angeliara* closely resembling uropods of e.g. *Ianiropsis*, *Janira*, etc.

CHAPPUIS & DELAMARE (l. c.) make no mention of the mandibles in their definition. The molar process is reduced; in *Microparasellus* and *Microcharon* it is pointed and setiferous, in *Angeliara* totally absent. A reduced molar process is, however, also found in e.g. *Katianira* and *Janthura* n. gen. Finally, it should be mentioned that in addition to the shape of the mandible and its palp, *Angeliara* differs considerably from the other two genera in having e.g. a 4-jointed palp on the maxillipeds (as *Katianira*) and quite another type of pleopods 1 in the male.

BOCQUET & LÉVI (1955, p. 132) admit that when including *Microjaera* with the other three genera in their "Microjanirinae", this subfamily is characterized by the following features only: very elongated body, small dimension, and reduction of the respiratory pleopods (3-5). The significance of the smaller dimension has been dealt with above, and the elongated body shape is synonymous with their sand-dwelling or subterranean life.¹ This latter feature is also quite pronounced in some Janiridae, e.g. *Protojanira perbrincki*, as well as in *Ectias*, which cannot belong to this subfamily for the reasons discussed below. Thus, only the lack of pleopods 5 (also pleopods 4 in *Angeliara*) remains. This reduction is certainly also a consequence of the small size and the special environment of these forms; a close examination will probably reveal a similar absence of pleopods 5 in other genera of the Asellota -

1. Cf. CHAPPUIS 1958.

which all lack the exopod on these appendages. Nevertheless, in my opinion this feature does not justify a separation of these four genera from the other Janiridae on the subfamily level.

It should also be mentioned that CHAPPUIS & DELAMARE (1954, p. 106) included *Ectias* (with the only species *turqueti* Richardson, 1906) in Microparasellidae because of its elongated body and in spite of its much larger size (7 mm) and the presence of eyes. BOCQUET & LÉVI (l. c.) supported this view, but in 1958 CHAPPUIS found it preferable to consider *Ectias* as *incertae sedis* until more information than that available in RICHARDSON's description was forthcoming. CHAPPUIS & DELAMARE (1960) did not mention *Ectias* at all. It seems that these carcinologists have overlooked the fact that *Ectias* was re-described by NORDENSTAM (1933, p. 186). He recorded the mandibles as "typically Janiridean" with the molar process "subcylindrical, widening towards the distal end" and made a description of pleopods 5.¹ Therefore, *Ectias* cannot possibly be ranged with Microparasellidae.

BIRSTEIN (1961) described a new genus *Microthambema*, and pointed out that the following genera are connected in having an elongated body shape and a relatively large, free pleonite 1 (which is never found in genera of Janiridae): *Thambema*, *Microthambema*, *Microparasellus*, *Microcharon*, *Angelieria*, *Microjaera*, *Caecianiropsis*, *Protocharon*, and *Mackinia*. In addition, all genera (except *Thambema*, *Microthambema*, and *Microjaera*) have pereopods I with the same, or almost the same shape, as all the succeeding legs. Consequently, these genera were grouped into three families by BIRSTEIN (l. c.):

1. Thambematidae Stebbing. Prp. I prehensile, different to the others. Dactyl of prps. II-VII with one claw. Molar process of mandible subcylindrical: *Thambema* Stebbing, 1913 and *Microthambema*.

2. Microparasellidae Karaman. Prp. I not prehensile, shaped like the others. Dactyl of prps. II-VII with two or three claws. Molar process conical or reduced. Male pleopod 1 broader at base than distally: *Microparasellus*, *Microcharon*, and *Angelieria*.

3. Microjaniridae Bocquet & Lévi (n. comb.). Prp. I slightly differentiated or not differentiated.

Dactyl of prps. II-VII with two claws. Molar process subcylindrical. Plp. 1 narrower at base than distally (except *Mackinia*): *Microjaera*, *Caecianiropsis*, *Protocharon*, and *Mackinia*.

BIRSTEIN admits that all three families are "closely connected with the family Janiridae, though each of them by different characters".

To these statements the following comments can be given:

(1) Elongated body. As pointed out above, a slender, elongated body is also found in a few Janiridae. The body in *Protocharon* is as flattened as in many Janiridae.

(2) Pleonite 1 relatively large and free. It is true that in all the genera mentioned above, the first pleonite is larger than in all Janiridae, except, however, in *Microjaera* and especially in *Microcharon latus* Karaman – where it is very short and on the dorsal side partly covered by pereonite 7. In addition, in *Protocharon* it is (at least in *arenicola*) fused with the pleotelson (personal communication from Dr. DELAMARE DEBOUTTEVILLE) – thus neither absent (as indicated by CHAPPUIS *et al.* 1956, fig. 2) or free. I agree with BIRSTEIN it is very likely that in *Mackinia* there is only one pleonite in front of pleotelson; it is not known whether it is free or fused with pleotelson.

Furthermore, I am not convinced that BIRSTEIN is right in claiming that the first pleonite is free in *Thambema*. Both he and MENZIES & PETTIT (1956) were of the opinion that STEBBING had probably made an error when he stated that the pleon only had one segment; contrariwise, STEBBING shows two segments on pl. XXVI. What STEBBING (1913) did write was: "– all segments of the pleon consolidated" and (in the description of the species): "The pleon is broadly oval." In addition, BIRSTEIN states: "indeed a slight indication of a first free somite can be discerned on the figure given by Stebbing himself." As is so often the case, it is impossible to judge from a drawing whether a segment is actually free or fused (in the latter case with the original separation indicated as a more or less conspicuous furrow). In such doubtful cases one must rely on the text and STEBBING expressly stated that the pleonites are "consolidated".

BIRSTEIN regards the fact of pleonite 1 being free in these genera (in contradistinction to the coalescence found in Janiridae) as very important. It is also claimed to be a primitive character. This does not seem very convincing when compared with the conditions in Ischnomesidae. In this well defined

1. At my request Dr. CHARLOTTE HOLMQUIST of the Stockholm Museum has kindly studied the specimen of *Ectias* from the Swedish Antarctic Expedition and found that pleon is distinctly 2-segmented. Neither RICHARDSON nor NORDENSTAM mentioned the presence of a pleonite in front of pleotelson.

family we find all transitions between genera with all pereonites and both pleonites free and movable, and genera with the pleonites fused with each other and with some or all the posterior pereonites. In a previous paper BIRSTEIN (1960) united, even in the same genus (*Stylomesus*), newly described species in which pleonite 1 was either free or fused with pleotelson. These species have here been referred to different genera (see p. 72), but I do not think the use of this character for dividing on the family level is justified, neither in Ischnomesidae nor in the families in question – the more so since the first pleonite is fused with pleotelson in, at least, *Protocharon arenicola* and probably also in *Thambema*.

(3) Pereopod I – differentiated or not. It does not seem advisable to attach much importance to this character either. It is true that prp. I is never prehensile in Microparasellidae. In Microjaniridae it is, as stated by BIRSTEIN, not prehensile in *Protocharon* and *Mackinia* and slightly prehensile in *Microjaera* and *Caecianiropsis*, but in the latter genus this only applies to *C. psammophila*. MENZIES & PETTIT (1956) also referred – in my opinion cor-

rectly – *Austroniscus ectiformis* Vanhöffen, 1914 to *Caecianiropsis*, and in *ectiformis* prp. I is distinctly prehensile. What is more important is the fact that – as pointed out above – in several genera of Janiridae we also find species with undifferentiated first pereopods.

(4) Number of claws. This feature is only peculiar to Thambematidae in which both known species have one claw only on prps. II-VII.

(5) Width of pleopods 1. As stated by BIRSTEIN, *Mackinia* differs from the other genera within Microjaniridae; however, also in both species of *Protocharon* plps. 1 are broader at the base than distally. *Microcharon marinus* differs from the other Microparasellidae in having plps. 1 narrower at the base than distally.

Protocharon antarctica differs also from the species of the other three genera of Microjaniridae in having a squama on joint 3 of the antenna (this joint is not known in *P. arenicola*).

In Table 1 are listed all the characters which have been used by KARAMAN, CHAPPUIS & DELAMARE, BOCQUET & LÉVI, and BIRSTEIN to separate the said

Table 1. Separating characters of genera of Thambematidae, Microparasellidae, Microjaniridae and Janiridae.

| Families (acc. to BIRSTEIN 1961) | Thambematidae | Microparasellidae | Microjaniridae | | | | Janiridae | | | |
|--|--|---|------------------|-------------------|-----------------------|--------------------|-----------------|---------------|------------------|----------------|
| Genera | <i>Microthambema</i> and <i>Thambema</i> | <i>Microparasellus</i> and <i>Microcharon</i> | <i>Angellera</i> | <i>Microjaera</i> | <i>Caecianiropsis</i> | <i>Protocharon</i> | <i>Mackinia</i> | <i>Ectias</i> | <i>Kuttanira</i> | Others |
| No. of species | 2 | 10 | 2 | 1 | 2 | 2 | 1 | 1 | 4 | many |
| Smaller (○) or larger (●) than 2.3 mm in body length | ● | ○ | ○ | ○ | ○ ● | ○ ● | ● | ● | ● | ○ ● |
| Body elongated (—) or flattened (◐) | — | — | — | — | — | ◐ | — | — | ◐ | ◐ ¹ |
| Pleonite 1 free (□), fused with pleotelson (■) or absent (○) | □ ? ■ | □ | □ | □ | □ | ■ | ? □ | ■ | ○ | ■ ² |
| Molar process of mandible subcylindrical (■), reduced (▲) or absent (○) | ■ | ▲ | ○ | ■ | ■ | ■ | ■ | ■ | ▲ | ■ ³ |
| Palp on maxilliped 4-jointed (4) or 5-jointed (5) ... | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 |
| Pereopod I not prehensile (○), slightly prehensile (◐), prehensile in most (◑) or prehensile (●) | ● | ○ | ○ | ◐ | ◐ | ○ | ○ | ● | ○ | ◐ |
| No. of claws on prps. II-VII | 1 | 2-3 | 3 | 2 | 2 | 2 | 2 | ? | 2 | 2-3 |
| Male pleopods 1 at base narrower (○), as broad as (◐) or broader (●) than distally | ○ ◐ | ● ⁴ | ◐ | ○ | ○ | ● | ● | ○ | ● | ○ ● |
| Pleopod 5 absent (○) or present (●) | ○ | ○ | ○ | ○ | ● | ○ ? ● | ● | ● | ● | ● |

1. Elongated in *Protojanira perbrincki*.

2. Absent in *Janirella*, *Spinianirella*, *Microprotus*, *Jaerella*, and *Abyssijaera*.

3. Reduced in *Abyssijaera*.

4. Narrower in *Microcharon marinus*.

genera on the family or subfamily level and which were discussed above. The table shows that only the elongated body shape in all Microparasellidae and almost all Microjaniridae and the presence of a free pleonite 1 in most of them separate these two families from the great majority of the Janiridae. As stated previously, I do not accept these characters as sufficient reason for retaining the two former families.¹ This is regrettable in view of the fact that Janiridae already contains a great number of rather divergent genera, but this does not *ipso facto* justify an arbitrary division.

In actual fact, it would be more advisable to transfer the four species of the genus *Katianira* to a separate family. Although first and foremost, it agrees with the other genera of Janiridae (*s. str.*) in the shape of the body, it differs from all of them in having a reduced molar process, a 4-jointed palp on the maxilliped and, in particular, a very aberrant pereopod I which terminates in a fully developed, slender chela.

Caecianiropsis Menzies & Pettit, 1956 should (as also claimed by CHAPPUIS 1958) most certainly be referred to Janiridae. In body shape it closely resembles *Ectias*, while the male pleopods 1 and 2 are very much as in *Pseudasellus* Chappuis.

In regard to Thambematidae, this family differs from all others in at least one character: presence of one claw only on prps. II-VII. This character may seem a rather insignificant one for distinguishing on the family level, but the presence of two or three claws in all genera of Janiridae is so characteristic that for the time being I follow my colleagues in adopting STEBBING's Thambematidae (see p. 49 for diagnosis and key to the genera).

Comments on separate genera of Janiridae

HANSEN (1916, p. 13) cancelled i.a. *Iolella* Richardson and divided the *Ingolf* material of *Janira* into three groups according to the presence or absence of coxal (epimeral) plates (processes). TATTERSALL (1921, p. 199) considered this character to be of generic value, adopting HANSEN's three divisions under the following names, to which I have added the synonyms:

1. *Janira* Leach, 1814 (= *Oniscoda* Latreille, 1829; *Henopomus* Krøyer, 1846; *Asellodes* Stimpson,

1. If the family Microjaniridae is, nevertheless, to be preserved, the name must for nomenclatorial reasons be changed to one derived from a valid genus of the family, becoming e.g. Microjaeridae.

1853): Coxal plates developed on all thoracic segments.

2. *Ianthopsis* Beddard, 1886 (= *Ianthe* Bovallius, 1886 (pars); *Iolanthe* Beddard, 1886): Coxal plates totally absent.

3. *Iolella* Richardson, 1905 (= *Ianthe* Bovallius, 1881; *Tole* (misprint for *Iole*) Ortmann, 1900): Coxal plates developed on the three posterior segments, but absent on, at least, second and third segments.

NORDENSTAM (1933, p. 177) and MENZIES (1951a, p. 138) acknowledged this division which is also in my opinion a very natural one.

The generic status of *Iolella glabra* remained doubtful, since Miss RICHARDSON in her description (1908b) did not mention or figure coxal plates. At my request, Dr. T. E. BOWMAN kindly examined the type specimen in Washington. He stated (*in litt.*) that "the coxal plates are visible dorsally on pereonites 5-7, as very inconspicuous bulges posterior to the pleural expansions; that of pereonite 7 may be covered by the pleon and hence even less obvious. Coxal plates are not discernible dorsally on pleonites 1-4". This means that *glabra* is definitely referable to *Iolella*.

List of the genera of Janiridae

(Synonyms, not mentioned in the preceding, are given in paranthesis).

Microparasellus Karaman, 1933; *Microcharon* Karaman, 1934; *Angeliara* Chappuis & Delamare, 1954; *Microjaera* Bocquet & Lévi, 1955; *Protocharon* Delamare & Chappuis (CHAPPUIS *et al.* 1956); *Jaera* Leach, 1814 (= *Iaira* Meinert); *Caecijaera* Menzies, 1951b; *Abyssijaera* Menzies, 1962b; *Neojaera* Nordenstam, 1933; *Ectias* Richardson, 1906; *Xostylus* Menzies, 1962b; *Caecianiropsis* Menzies & Pettit, 1956; *Protojanira* Barnard, 1927; *Pseudasellus* Chappuis, 1951; *Heterias* Richardson, 1904 (= *Janirella* Sayce, 1900); *Mackinia* Matsumoto, 1956; *Bagatus* Nobili, 1906; *Pseudojanira* Barnard, 1925; *Carpias* Richardson, 1902; *Janthura* n. gen.; *Janirala* Menzies, 1951a; *Rhacura* Richardson, 1908; *Janira* Leach, 1814; *Iathrippa* Bovallius, 1886¹ (= *Notasellus* Pfeffer, 1887, = *Jorina* Nierstrasz, 1918); *Ianiropsis* G. O. Sars, 1899; *Iais* Bovallius, 1886;

1. *Iathrippa chilensis* Menzies, 1962a should not be confused with *Jorina chilensis* Nierstrasz, 1918 which according to NORDENSTAM (1933) is synonymous with *Iathrippa longicauda* (Chilton, 1884).

Ianthopsis Beddard, 1886b; *Iolella* Richardson, 1905; *Trichopleon* Beddard, 1886a; *Acanthaspidia* Stebbing, 1893 (= *Acanthoniscus* G. O. Sars, 1879); *Jaerella* Richardson, 1911b; *Janirella* Richardson, 1911a; *Spinianirella* Menzies, 1962b; *Microprotus* Vanhöffen, 1914; *Katianira* Hansen, 1916.

Genus *Jaera* Leach, 1814

The species of this genus require some attention and it is intended here to briefly discuss them.

In his excellent revision of the genus, KESSELYAK (1938) acknowledged the following species of *Jaera*:

- J. albifrons* Leach, 1814¹
- J. nordmanni* (Rathke, 1837)
- J. hopeana* Costa, 1853
- J. sarsi* Valkanov, 1936²
- J. schellenbergi* Kesselyak, 1938
- J. italica* Kesselyak, 1938
- J. wakishiana* Spence Bate, 1865.

KESSELYAK described a subspecies (*casgica*) of *J. sarsi*. Later, VERHOEFF described the following two species:

- J. hospitalis* Verhoeff, 1943
- J. sorrentina* Verhoeff, 1943.

In the same paper he referred to a subgenus, *Metajaera*, and to the following species which he apparently previously described himself:

- J. stagnoensis* Verhoeff
- J. buchneri* Verhoeff
- J. sulcata* Verhoeff
- J. dalmatica* Verhoeff.

J. buchneri was in his 1943 paper declared to be a synonym of *stagnoensis*.

Since that date only two more species have been added, viz. —

- J. balearica* Margalef, 1953
- J. petiti* Schulz, 1953.

The first was regarded by LEMERCIER (1960) to be a definite synonym of *J. nordmanni nordmanni*, and the second a possible synonym of *J. n. massiliensis*. A number of subspecies of *J. albifrons* were described by FORSMAN (1949) and BOCQUET (1950,

1953) and subspecies of *J. nordmanni* were described by KARAMAN (1953) and LEMERCIER (1958, 1960).

None of the authors who, in some detail, dealt with the species of *Jaera* mention *J. stagnoensis*, *sulcata* and *dalmatica*, nor has any reference to the species been made in the Zoological Record. BIRSTEIN listed them all in his key (1951, p. 133),¹ but gave no further details. A personal inquiry to some of the authors mentioned above produced no supplementary information.

However, Dr. H.-E. GRUNER, Berlin, was ultimately able to solve the problem. The descriptions were — probably owing to the war — published posthumously in 1949, long after VERHOEFF's first reference in 1943. Unfortunately, these new species were described exclusively on females, although KESSELYAK (1938) had shown that the taxonomy of the genus *Jaera* is based almost entirely on the male pleopods 1. VERHOEFF found differences between the new species and *hopeana* in clypeus being considerably vaulted, shape and position of frontal organs, number of joints in the antennae and shape of their fourth joint, shape of the head, setae on the pereonites, position of the uropods, and in pigmentation. None of these differences seem to justify a separation on the species level (the more so since VERHOEFF had only one or a few specimens of each) and I agree with GRUNER (*in litt.*) that *stagnoensis*, *sulcata* and *dalmatica* Verhoeff, 1949 are certainly synonyms of *hopeana*. This should also apply to *hospitalis* Verhoeff, 1943 which was also based entirely on female material. VERHOEFF's drawing of the male pleopods 1 of *sorrentina* (fig. 7), the last of his species, is so incomplete that it is impossible to decide whether *sorrentina* is genuine or belongs to another species — in the latter event, probably *albifrons*.

Jaera nordmanni (Rathke, 1837)

When preparing Table 18 on the distribution, etc. of the asellotes (p. 249) I came across the following misunderstanding: LEMERCIER (1960, p. 22) stated that *Jaera nordmanni nordica* occurs in Danish waters, referring to MEINERT 1890 (not 1893) who recorded *nordmanni* from "some places in the Kattegat ... 16-9 ft.". In 1909 HANSEN discussed the Danish species of *Jaera* and found that MEINERT's *nordmanni* probably belonged to *albifrons* although they differed in some respects. I have gone through the material of *albifrons* in this Museum and found

1. *Jaera albifrons* should be substituted in place of *Jaera marina* (Fabricius, 1780) — cf. HEEGAARD & HOLTHUIS 1960.
2. This description is very brief. More detailed descriptions were published by VALKANOV (1938), KESSELYAK (1938), BIRSTEIN (1951), and KARAMAN (1953).

1. It should be noted that the list of references is in the middle of the paper (pp. 44-48), not at the end of it.

one sample only which HANSEN labelled "*Jæra marina* Fabr. forma *Nordmanni*. Denmark. Meiner's specimens" (translated). They belong to *J. albifrons praeahirsuta* Forsman, 1949, but have fewer setae distally on carpus of pereopods VI and VII than shown on FORSMAN's figs. 9 and 10. Thus, *nordmanni* is not known north or west of the British Isles.

Genus *Janira* Leach, 1814

Janira Leach, 1814, p. 434; BEDDARD 1886b, p. 5; TATTERSALL 1905, p. 49; STEBBING 1910, p. 224; MENZIES 1951a, p. 138.

Janira Leach, G.O.SARS 1899, p. 98; HANSEN 1916, p. 13; NIERSTRASZ 1941, p. 282; MENZIES 1962b, p. 181.

Oniscoda Latreille, 1829, p. 141.

Henopomus Krøyer, 1847, p. 372.

Asellodes Stimpson, 1853, p. 41.

Diagnosis:

Head subquadrangular, with or without frontal projection. Pereonites 1-4 or 2-4 with concave lateral margins and the bilobed coxal plates visible from above. Prns. 5-7 with the antero-lateral corners slightly projecting, and the coxal plates visible behind them. Pleon roundish, with two segments. Eyes present (except in *abyssicola* and perhaps in *operculata*). Squama present on antenna. Pereopods with three claws (perhaps occasionally two). Uropods biramous, from about half as long to as long as pleon.

Remarks:

The shape of the pereonites and the coxal plates was not mentioned by previous authors; it appears to be very characteristic.

In his diagnosis of *Janira* (which includes several of the characters of the family) MENZIES (1962b) states: "Exopod of third pleopod narrower than endopod"; this is so in the vast majority of Asellota, including Janiridae. Further: "Apex of male first pleopod without lateral expansions"; in *J. capensis* the lateral rami are very distinct (BARNARD 1914, pl. XX B) and also in *tricornis* they are prominent (see Fig. 6a of the first pleopods of a male from Lindenov Fjord, S.E. Greenland).

Since I could find only two claws in *J. operculata* n.sp. (cf. p. 44) I have examined the number of claws on pereopods II-VII in the other species which I refer to *Janira*. According to the literature there

are three claws in *maculosa*, *tricornis*, and *capensis* and two in *alta* (RICHARDSON 1905), *japonica* (RICHARDSON 1909) and *tristani* (BEDDARD 1886b). A study of specimens of *alta* in this Museum showed that it has three claws – as have probably *japonica* and *tristani*, which were not available.

The following species do not belong to *Janira*:

Janira exul Müller, 1892 (a freshwater species from Brazil) differs from *Janira* in several respects (shape of body, coxal plates not visible from above, shape of male pleopods 1 and 2, etc.). W. VAN NAME (1942) transferred it, although provisionally, to *Ianiropsis*. He found that it differed from *Ianiropsis* in lack of prehensile pereopod I, and in shape of body and male pleopods 1 and 2. On the evidence of this, it would be justifiable to establish a new genus for it. However, I have little doubt that it belongs to *Heterias* Richardson, 1904, being very close to the only species, *H. pusilla* (Sayce, 1900), a freshwater species from Australia.

NIERSTRASZ (1941, p. 283) listed "*Janira monodi* Nordenstam (1933, p. 24)" from 10°S, 80°48'W, 500 m depth; this must be an error, since NORDENSTAM does not describe or even refer to "*monodi*" in any of his papers. It is evidently a *nomen nudum*.

A large number of other species have been described under the name *Janira* or have later been referred to this genus. The following species have already been or should now be transferred to the genera listed:

To *Janiralata*: *Janira alascensis* (Benedict, in: RICHARDSON 1905); *erostrata* (Richardson, 1899); *holmesi* (Richardson, 1905); *occidentalis* Walker, 1898; *sarsi* (Richardson, 1905); *solasteri* Hatch, 1947; *sol-datovi* Gurjanova, 1933.

To *Iolella*: *Janira extans* Barnard, 1914; *laciniata* G.O.Sars, 1872; *spinosa* Harger, 1879; *spinosissima* Stephensen, 1936; *vilhelminae* Stephensen, 1913.

To *Ianthopsis*: *Janira pulchra* Hansen, 1916; *caudata* Richardson, 1910b; *neglecta* Chilton, 1909; ? *J. sp.* Vanhöffen, 1914.

To *Iathrippa*: *Janira inerme* (Haswell, 1881); *longicauda* (Chilton, 1884); *sarsi* (Pfeffer, 1887).

To *Bagatus*: *Janira* (?) *nana* Stebbing, 1905; *algicola* Miller, 1941; *minuta* Richardson, 1902.

To *Jaera*: *Janira nordmanni* Rathke, 1837.

Janira angusta Barnard, 1920 cannot possibly belong to *Janira*, the shape of the pereonites and the male pleopods 1 being very different (l. c., pl. XVII) and the pleon apparently consisting of one segment only. Since nothing has been stated about the coxal

plates it is at present impossible to refer this species to any genus within the Janiridae.

Janira abyssicola Beddard, 1885 is also rather dubious. It was not figured by BEDDARD (1886b) and only one female is known. It was stated that the

lateral margins of the pereonites are rounded, but presence of coxal plates was not mentioned. Having not seen the specimen I find it impossible to decide its generic relationship and prefer to keep it in *Janira* for the time being.

Key to the species of *Janira*

1. Uropods less than half as long as pleotelson. Pleon broader than long, with 3-4 serrations on each side; pereopods I with the margin of propodus unarmed, that of carpus with only a few spines midway; female operculum as large as pleotelson *operculata* n. sp. (p. 44)
1. Uropods longer than half the length of pleotelson. The other characters not combined 2
2. Frontal margin with a distinct rostrum which is at least as long as broad 3
2. Frontal margin straight, convex or with a very small median rostrum 5
3. Antero-lateral corners of head rounded. Pereonites 2-4 with at most a very faint concavity laterally. Postero-lateral margins of pleotelson smooth *tristani* Beddard, 1886
3. Antero-lateral corners of head angular or pointed. Prns. 2-4 distinctly concave laterally. Postero-lateral margins of pleotelson serrated or with incisions 4
4. Antero-lateral processes of head strongly produced and ending in an articulated spine. Prn. 1 with deep incisions laterally. Each postero-lateral margin of pleotelson with 5-6 small, rounded incisions, shaped as the number "3" *tricornis* (Krøyer, 1847)
4. Antero-lateral processes of head angular or slightly produced. Prn. 1 laterally rounded. Postero-lateral margins of pleotelson serrated *alta* (Stimpson, 1853)
5. No eyes. Prn. 7 longer than any other segment. Pleotelson longer than broad *abyssicola* Beddard, 1886
5. Eyes present. The two other characters never combined 6
6. Frontal margin and apex of pleon triangularly produced. A deep incision in front of the eyes *japonica* Richardson, 1909
6. Frontal margin slightly concave, straight or if somewhat produced, straight in centre. Apex of pleon rounded or truncated. At most a slight concavity in front of the eyes 7
7. Frontal margin somewhat produced. Body with small slender spines. Apex of pleon with a row of close-set spines *capensis* Barnard, 1914
7. Frontal margin straight or slightly concave. Body and apex of pleon without spines *maculosa* Leach, 1814

Janira maculosa Leach, 1814
and *J. hanseni* Menzies, 1962

When examining the large material of *J. maculosa*, HANSEN (1916, p. 14) noted that specimens from greater depths (up to about 2000 m) differed in several respects. The deep forms were colourless and the lateral parts of the head were more expanded and excavated. The frontal margin was excavated and turned upwards, the eyes proportionately smaller and more removed from the lateral margins. The elevations on pereonites 5-7 were more pronounced and the pleon slightly less rounded. However, HANSEN stated that *every possible transition* in the shape of the heads and size and position of the eyes was found between specimens from moderate and great depths (pl. I, figs. 1a and 1c-d).

MENZIES (1962b, p. 181) established a new species, *hanseni*, on the deepest male and female on record (Thor St. 164, 1902-2146 m), based on HANSEN's fig. 1d of the head of the female and fig. 1f of the first pleopods of the male. His diagnosis was as follows: "*Janira* with a quadrate cephalon. Eyes removed from lateral border of cephalon. Apex of male first pleopod trilobed. Postero-lateral margin of pleon spinulate". His remarks on the species were: "This species, an eye-bearing abyssal species, shows a close resemblance to *I. maculosa* Leach from the shallow water. It is based only on Hansen's description and not on specimens examined by me. It differs markedly from *maculosa* in having the apex of the male first pleopod trilobed and not simply bilobed (viz. G. O. Sars, 1897 [1899], Pl. 40). It was not captured by *Vema*".

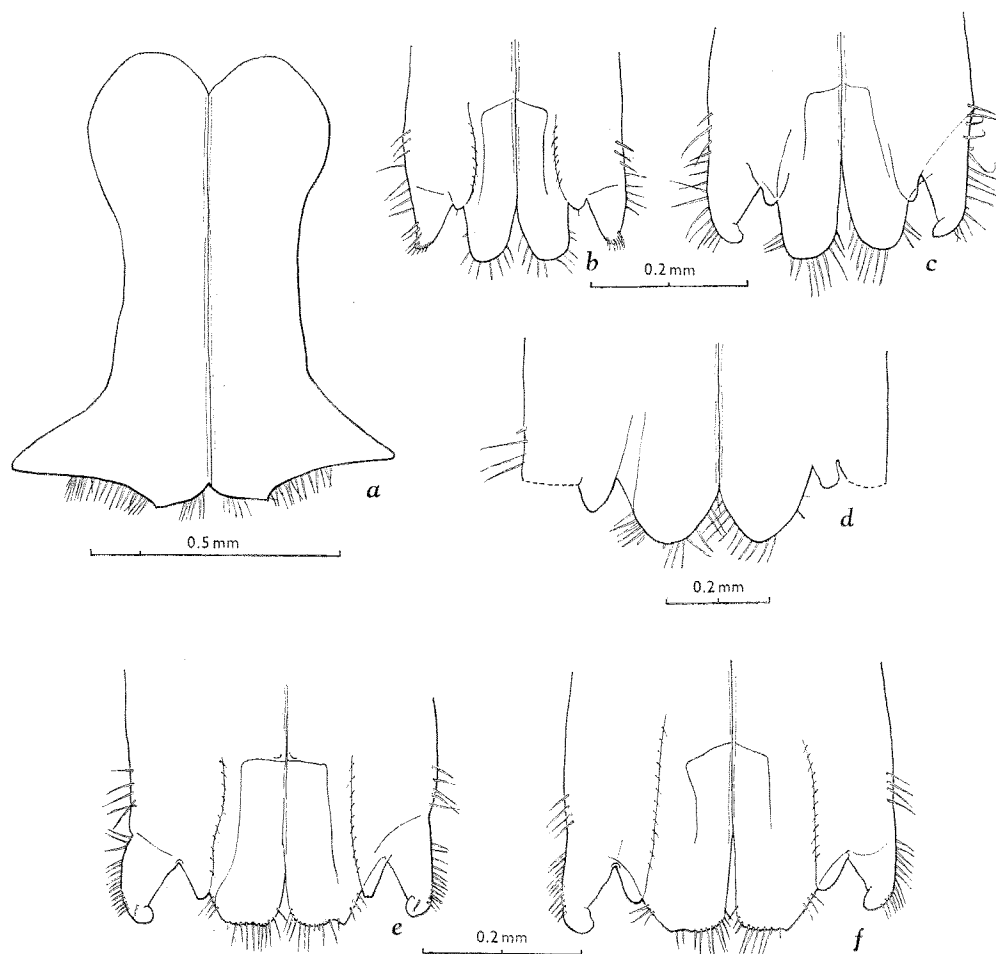


Fig. 6. a, *Janira tricornis* (Krøyer) from Lindenov Fjord, S.E. Greenland; male pleopods 1 from outside (below); b-f, *J. maculosa* Leach; apex of male plps. 1 from inside; b, Trondheim Fjord, Norway, 70-90 m; c, the Faroes, 188 m; d, Lindenov Fjord, S.E. Greenland, 400-600 m; e, Ingolf St. 44, 1026 m; Thor St. 164, 1902-2146 m (= *J. hanseni* Menzies).

The total material is stored in this Museum. I have been able to verify the even transition in the shape of the head and pleon and the position of the eyes stated by HANSEN. The postero-lateral margin of pleon is also spinulate in shallow water specimens. Thus, only the shape of apex of the male pleopods 1 remains. It is true that SARS' small drawing of the pleopods gives the impression that they are bilobed. However, an examination of five specimens from varying depths and localities (Fig. 6b-f) clearly shows that they are always trilobed, variation being found only in the shape of the outer and inner lobes. When arranged according to increasing depth the variation is:

(1) Skarnsund, Trondheim Fjord, Norway, 70-90 m (of all the specimens found in this Museum, this one is from the closest geographical locality to the place where SARS' specimen (1. c.) originated): Although the outer lobes are bent somewhat downwards at the apex, as in the following specimens,

they also bend slightly outwards (instead of inwards) and have setae right to the distal end. Middle lobes rather short, inner lobes rounded distally (Fig. 6b).

(2) North end of Nolsø, the Faroes, c. 188 m (c. 100 fathoms): Middle lobes rather short, inner lobes rounded distally (6c).

(3) Lindenov Fjord, S.E. Greenland, 400-600 m: Middle lobes moderately long, inner lobes rounded distally (6d).

(4) Ingolf St. 44 (61°42'N, 9°36'W), 1026 m: Middle lobes long, inner lobes truncated distally (6e).

(5) Thor St. 164 (62°11'N, 19°36'W), 1902-2146 m (*hanseni*): Middle lobes moderately long, inner lobes truncated distally (6f).

Apart from the apex of the inner lobes being differently shaped (and the gradual transition in shape of head, etc.), it was not possible to find other varying characters. I do not think it justifiable to establish a new species on this particular difference in

the pleopods, the more so since variation in the shape of the *outer* lobes is found within shallow water specimens with rounded inner lobes (Fig. 6b and c). Under these circumstances, I find it impossible to accept *hanseni*.

Janira operculata n.sp.

(Text-figs. 7-8)

Material:

Galathea St. 726, Gulf of Panama (5°49'N, 78°52'W), 3270-3670 m, 13 May 1952. In a water-logged tree trunk. Bottom temp.: c. 2.0°C. - 1 female without head.

Description:

Body flattened and smooth, head not preserved.

Pereonites 1-3 (Fig. 7) broad and short. The first is broadest medianly and has a slight convexity on the postero-lateral corners. The second and the third

equally large and of the same shape, with a broad, rounded process on the antero-lateral corners. There are several spines on the corners. Laterally, the coxal plates are visible on all three pereonites: on the first as a conspicuous, rounded process with two spines, on the second and third appearing more or less as bilobed convexities with spines.

Pereonite 4 about as broad as 2 and 3, but somewhat shorter. Antero-lateral corners produced as broad convexities with a row of spines. Coxae with one spine each. Developing oostegites present on prns. 1-4.

Pereonites 5-7 broader than the preceding segments, especially prns. 5 and 6; these are equally short medianly. Prn. 7 is as long medianly as 2 and 3. Lateral margin on prns. 5 and 6 only slightly produced, but on prn. 7 furnished with a backward-pointing, rounded process. Several lateral spines present. Coxal plates are visible at postero-lateral corners of all three segments.

Pleon with a very short and inconspicuous first segment. Pleotelson almost circular, only slightly broader than long, faintly serrated along the lateral margins, with postero-lateral concavities and with a median, rounded convexity posteriorly. There are a few lateral spines and many along the posterior margin.

Pereopod I (8a) not typically prehensile. It is rather short and strong, basis especially being very short, but propodus comparatively longer than usual. Lower margin of propodus is quite smooth throughout. Two well developed claws.

Pereopod VII (8b) about one-fourth longer than prp. I. On the inner margin of carpus is a row of very fine setae distally, and on propodus a row of short spines. A very thorough examination of the distal end showed only two claws and a number of setae on dactylus. However, proximal to the claws there is a slight concavity between them which may be the insertion point for a third claw which has been broken off. In addition to one prp. I, the right prp. VII was, unfortunately, the only leg preserved.

Operculum (dotted line in Fig. 7) almost circular, only about one-ninth broader than long. It covers the total ventral part of pleon, even reaching beyond it along the posterior margin. It is rather flattened, but with a low and rounded, inconspicuous proximal keel. There is a dense row of short setae along the lateral and posterior margins (not shown in Fig. 7).

Pleopod 3 (8c) with the second joint of the inner branch short and broad, almost squarish. In the outer branch both joints are oval, and the distal,

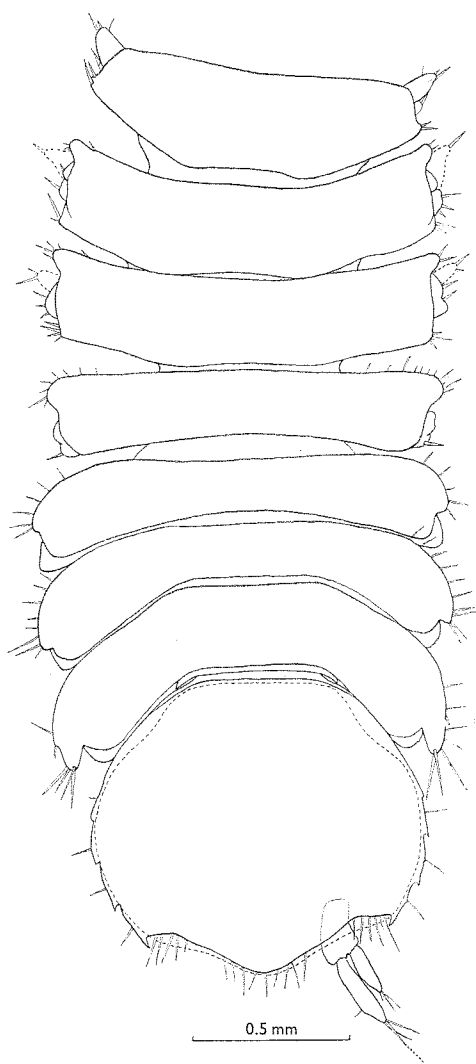


Fig. 7. *Janira operculata* n.sp.; ♀ holotype.

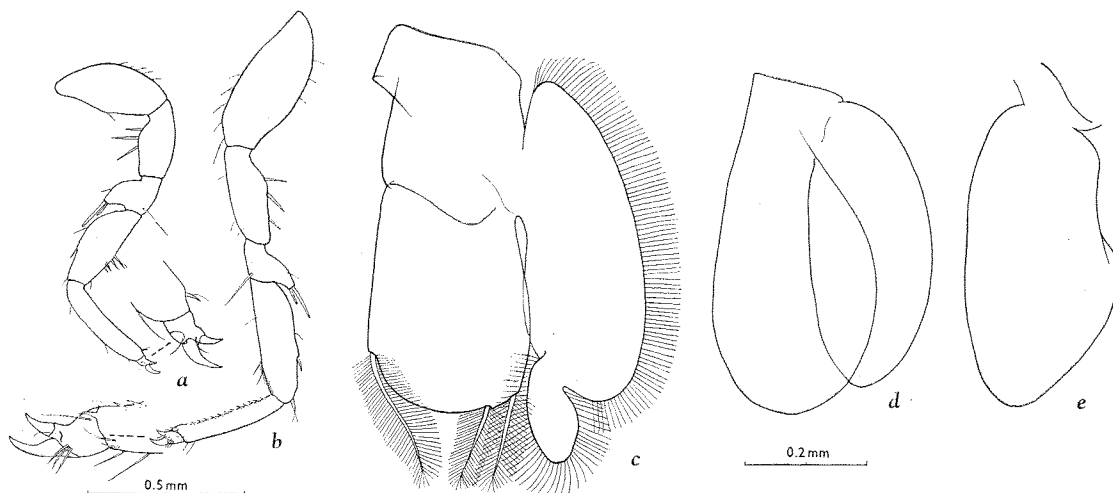


Fig. 8. *Janira operculata* n.sp.; a, pereopod I; b, pereopod VII; c-e, pleopods 3-5.

much shorter joint is inserted on the interior side of the basal joint. Outer branch abundantly furnished with long, fine setae.

Pleopods 4 and 5 (8d-e) of the same shape as in *Janira maculosa*, i.e. with the outer branch (of plp. 4) 1-jointed.

Size: The length of the fragment is 2.7 mm. In the very similarly shaped *J. maculosa* the head is one-seventh of the total length, indicating that this specimen of *operculata* was probably about 3.1 mm originally, provided it was not furnished with a rostrum.

Remarks:

The fact that the head is missing makes reference to genus of this species somewhat dubious. However, by the shape of the body, the visible coxal plates on all segments, and the unserrated lower margin of propodus of pereopod I, it certainly belongs to *Janira*. Whenever they have been mentioned or figured, two features in *operculata* are, however, different from those found in all other species of *Janira*. The first pereopods are not typically prehensile and the uropods are shorter by half than pleon. The first of these characters is, however, rather vague – the degree of prehensility varying greatly in the other species of the genus, and the uropods are by no means as short as in genera such as *Jaera* and *Neojaera*.

The present species is so well defined by the large operculum which covers the total ventral part of pleon, the extraordinary shape of pleopods 3, and the moderately short uropods, that, despite its being very fragmentary, I do not hesitate to describe it as a new species. The shape of its body is rather similar

to that of *maculosa* and *alta*, but these have i.a. typically prehensile pereopods I and much longer uropods.

Occurrence:

Gulf of Panama, 3270-3670 m, c. 2°C.

Janthura n. gen.

Diagnosis:

Body broad and flattened, coxal plates not visible from above. Pleon with two segments, a very short anterior and a large posterior one which is broader than long. Antennula with six joints in all. Antenna with six joints in peduncle, and flagellum with numerous joints; distinct squama on joint 3 of peduncle. Mandibles with vestigial molar process. Endite of maxilliped narrower than second joint of palp. Pereopods with one distinct claw and a short auxiliary claw. Male pleopods 1 broad, with distinct exopod. Uropods well developed, about as long as pleon.

Remarks:

This new genus is unique in combining the above features, the shape of the mandibles and maxillipeds being particularly remarkable. In *Carpas bermudensis* Richardson, 1905 (p. 452), the only species of that genus, the mandible seems to be totally without molar process according to fig. 505a, but Miss RICHARDSON does not mention this feature in her description. *Carpas* is, however, quite unlike the present genus and differs i.a. in the following respects: Many joints in antennula, endite of maxilliped as broad as the proximal joints of the palp,

pereopod I longer than the body and greatly enlarged distally, and uropods much longer than pleon. Agreement with the genus *Ianiropsis* is found in the narrow endite of the maxilliped, the peculiar spines on second joint of the mandibular palp, the shape of the uropods, and to some extent, that of the body and the male pleopods 1 (SARS 1899, pl. 42). On the other hand, *Ianiropsis* has many joints in the antennula, a typical molar process in the mandible, a circular pleon and fairly different male pleopods 2. *Janirella* has also a very small accessory claw, but has i.a. quite another body shape, 1-segmented pleon and small, uniramous uropods. In the shape of body and male pleopods 1 and in the shortness of antennula *Janthura* resembles *Jaera* and *Neojaera*, but the mouthparts, the uropods and claw armament are very different. Finally, it has the same shape of body and male pleopods 1 and 2 as in most species of *Janiralata* and the same conspicuous squama and serrated spines on joint 2 of the mandibular palp. It differs in the coxal plates not being visible from above, two claws only, the maxillipedal endite narrow, very different mandibles, etc.

The very aberrant mandibles should perhaps justify the removal of *Janthura* from the Janiridae. The genus possesses, however, so many features characteristic of this family that for the time being it would be futile to erect a higher taxon, the more so since only one specimen is known and a revision of the whole family is badly needed.

Janthura abyssicola n.sp.
(Text-figs. 9-12)

Material:

Galathea St. 52, Bay of Guinea (1°42'N, 7°51'E),
2550 m, 30 November 1950. Bottom: muddy clay.
Bottom temp.: c. 3.0°C. – 1 male.

Description:

Body (Fig. 9) flattened, broadly oval, a little less than twice as long as wide. Integument only moderately calcified, colour greyish.

Head basin-shaped, with a broad concavity in front. The lateral plates are flat and the dotted line in Fig. 9 indicates the limit between the flattened part of the head and the convex central part which corresponds with the area covered by the buccal cavity on the ventral side. The spines on the lateral margins are well preserved on the left side; some of them end in a thin hair (Fig. 10a).

Pereonites broadest laterally, except the first one. The lateral margin of prns. 4-7 is entire while prn.

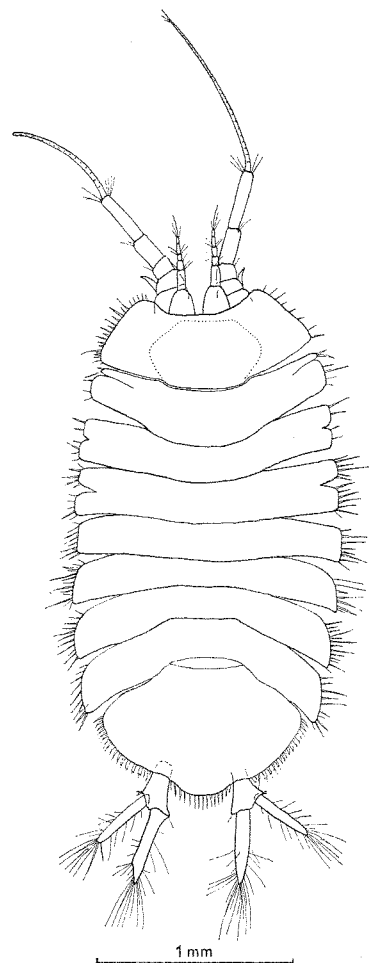


Fig. 9. *Janthura abyssicola* n. gen., n.sp.; ♂ holotype.

1 has a deep incision near the anterior margin and 2 and 3 a cut in the middle of the lateral margins. Abundant short or longer spines are found on all lateral margins.

Pleon consists of two segments, the first being very short and the second 1.5 times broader than long. The posterior margin evenly rounded (except between the uropods where a convexity is found). Along the posterior margin is a row of ordinary spines, while the postero-lateral margins are furnished with about 16 short, stout spines each. The latter all end in a fine hair which, on the distal spines, adjoins the bent point of the spine (10b).

Antennula (10c) with six joints. The basal one is large and swollen and a little more than two-thirds of rest of the antennula. The tiny distal joint has a stout sensory hair as well as a few setae.

Antenna (10d) almost four times as long as antennula and a little less than two-thirds as long as the body. The two basal joints are difficult to distinguish. On the exterior side of the third joint is a stout, articulated squama with an apical seta; the exact

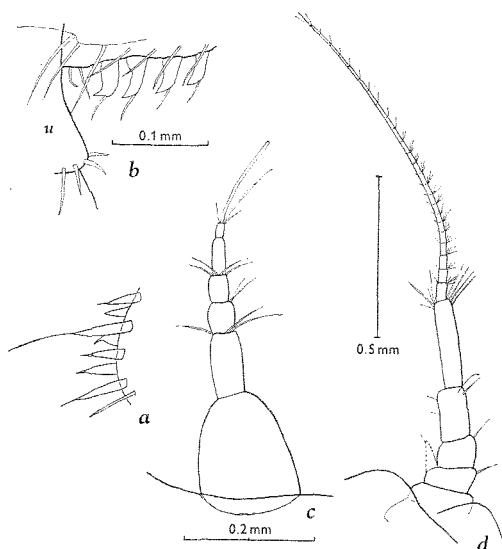


Fig. 10. *Janthura abyssicola* n.sp.; a, setae on postero-lateral side of head; b, lateral part of first joint of left uropod (u) and postero-lateral margin of pleon with spines and setae, seen from below; c, left antennula; d, left antenna.

shape of the squama could not be made out. Joint 4 about as long as broad, joint 5 almost twice as long as broad. Joint 6 considerably narrower and several times longer than broad. Flagellum long and tapering, with 24 joints.

Mandibles. These are extraordinary in several ways. The molar process is in almost all Janiridae typically shaped: "Mandible normal; molar process well developed, directed a little forwards, with the end cut off" (HANSEN 1916, p. 12). In this species, however, it is extremely compressed and rather triangular in shape (Fig. 11a, e and f), with an apical tuft of four or five very slender setae or spines. Moreover, both mandibles between the mo-

lar process and the insertion of the palp have a high abruptly cut off keel which is seen in an almost direct side view in Fig. 11a and f. Finally, the movable lacinia of the left mandible seems to be missing. Not only the molar process, but also the entire distal part of the mandible is strongly compressed. Cutting edge of left mandible with only three distinct teeth, and the spine-row (or what is presumably the spine-row) consists of three short, cut off spines (11b). Right mandible with four teeth on the cutting edge (11e-g); the spine-row has one rather short and two longer, somewhat bent spines (all unserrated) and one short, serrated spine (11e). Palp of the usual shape, with joint 3 somewhat bent and furnished with a row of unequally long, strong, serrated spines (11c). Distally, on joint 2 are two long, serrated spines with an oddly shaped process between them (11d), almost as in *Ianiropsis breviremis* (SARS 1899, pl. 42).

Maxillula (11h) with the two branches of equal length. The spines on the outer are vertical and unserrated. – **Maxilla** (11j) with an unusually narrow endopod – as in *Ianiropsis pulchra* (HANSEN 1916, pl. I, 4d). – **Labium** (11k) almost triangular, with a closely-set tuft of setae apically.

Maxilliped (11l) extremely narrow, particularly the endite, which is only a little more than half as broad as the second joint of the not especially dilated palp. Two coupling hooks. Epipod triangular, with a distinct outer corner.

Pereopods with at most two claws. At the base of the terminal claw there is a short, thick claw present on at least the four anterior pairs of legs (12a). This is substituted by a slender spine (claw?) on prp. VII (12b). All legs short and the anterior ones consider-

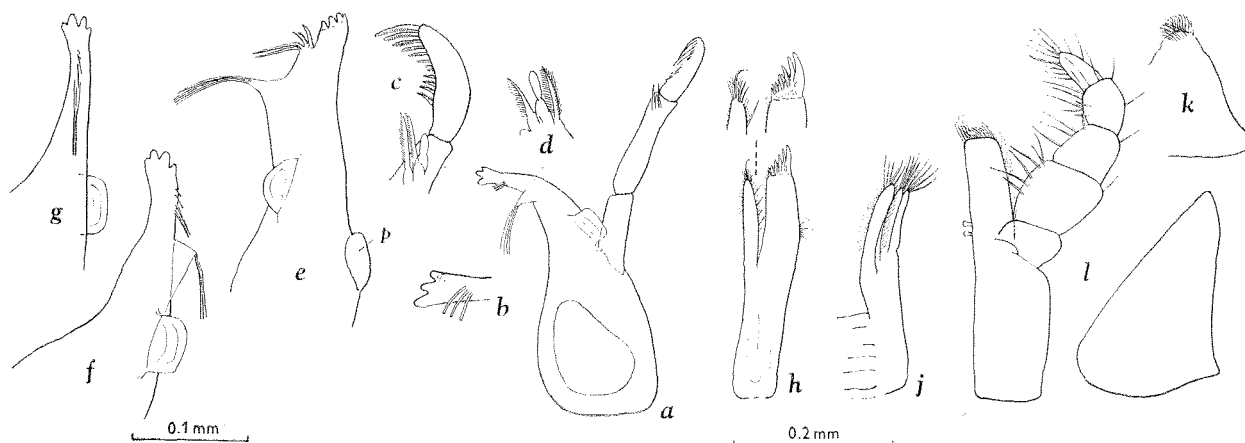


Fig. 11. *Janthura abyssicola* n.sp.; a-d, left mandible; a, from the edge; b, frontal view of incisive part and spine-row; c, outer part of palp; d, spines and process on second joint of palp; e-g, right mandible, e, seen obliquely from the edge (p indicates insertion of palp); f, from the edge; g, frontal view of incisive part; h, maxillula; j, maxilla; k, labium; l, maxilliped.

ably shorter and stronger than the posterior. Propodus of prp. I does not seem to be prehensile and the row of fine setae along its inner margin is also found in, at least, prp. VII.

Pleopod 1 (12c) very broad at the base and distally, the total width thus being three-fifths of the greatest length. Exopods of sympod point directly outwards and are furnished proximally with what appears to be a low keel with a row of small spines. The semi-circular inner lobes have many long and slender setae.

Pleopod 2 (12d) semi-circular, but with a convexity at the distal end. On the outer margin both long setae and finer hairs. Copulatory organ short and strong, not reaching beyond the sympod. Exopod also strong.

Pleopod 3 (12e) with the two joints of the inner branch broad and almost squarish; distal joint with three feathered setae. Outer branch also broad and joint 2 not placed apically but on the distal, inner side of the first joint, i.e. almost as in *Janira operculata* n. sp. and somewhat similar to the arrange-

ment in *Ianthopsis bovallii* and *nasicornis* (NORDENSTAM 1933, figs. 42d and 43j). Outer branch abundantly furnished with long, fine setae.

Pleopod 4 (12f) of the normal shape. Outer branch with setae.

Uropod (9) almost as long as pleon, with a rather short and broad peduncle and endopod a little longer and broader than exopod.

Size: 2.5 mm long and 1.3 mm broad.

Remarks:

Differences to other Janiridae are given in the remarks on the genus. One species, *Janira tricornis*, has – apart from the rostrum – a body shape very similar to that of *J. abyssicola* (HANSEN 1916, pl. I, 4a). The maxillae are also very much alike. The antennulae of *tricornis* are, however, many-jointed, its mandibles are typically shaped, the male pleopods 1 are somewhat different, etc.

Occurrence:

Bay of Guinea, 2550 m, c. 3.0°C.

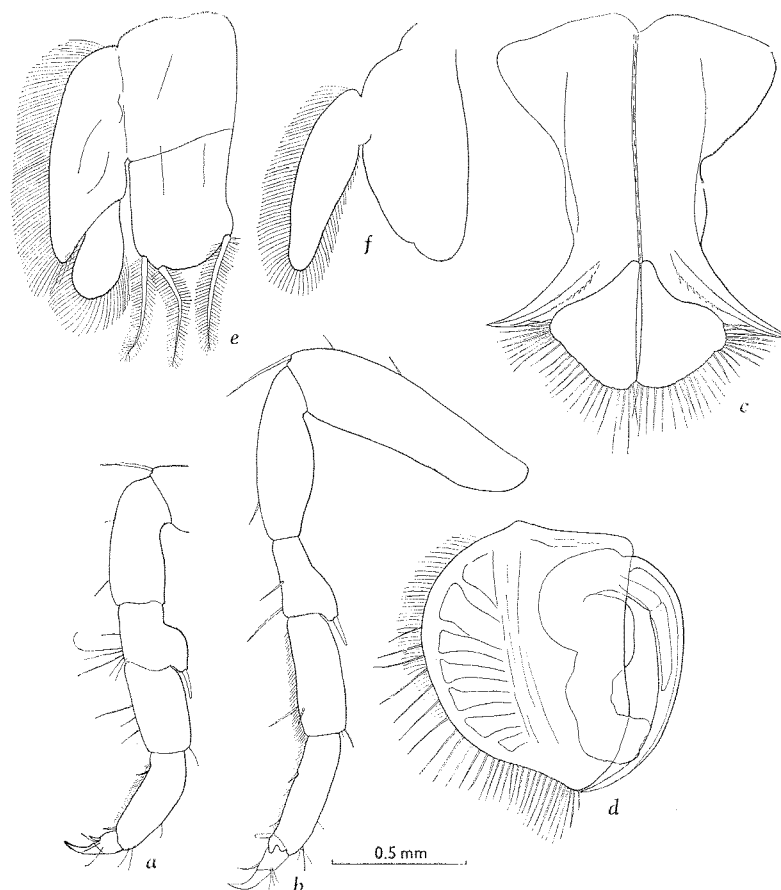


Fig. 12. *Janthura abyssicola* n.sp.; a, pereopod I; b, pereopod VII; c, pleopods 1; d-f, pleopods 2-4.