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The morphology of the sphaeromatid brood pouch (Crustacea: Isopoda: Sphaeromatidae)

K. HARRISON, F.L.S.*

Department of Zoology, The University, Nottingham NG7 2RD

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The structure of the brood pouch and mouthparts of ovigerous female sphaeromatids is described. Taxonomically, these are shown to be important generic characters and some attempt is made to relate structure to function. Expanded maxillipeds (which produce a current of water through the marsupium) are shown to occur only in genera which have oostegites overlapping in the mid-line and reaching the mouthparts anteriorly. The reduction of the mouthparts of some genera cannot be explained, but it may conserve energy at the final moult. No platybranchiate genera (subfamily Cassidiniinae) have the mouthparts reduced but some have the maxilliped expanded. Some correlation between brood pouch structure and habitat is suggested. Genera with a brood pouch composed only of oostegites (and hence liable to disruption by turbulence and particle abrasion) occur sublittorally or, if intertidal, adopt a protected, crevice dwelling habit. Genera with a brood pouch composed of large opposing pockets (which are more able to resist disruption) occur intertidally or in shallow water, and may be found in wave-washed sand. Some wood-boring species of the genus *Sphaeroma* Latreille show a reduced number of oostegites when compared with non-boring species. This presumably relates to their burrowing habit.

KEY WORDS:—Isopoda – Sphaeromatidae – genera – females – morphology – brood pouch – mouthparts.

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*Present address: Department of Zoology, British Museum (Natural History), Cromwell Road, London SW7 5BD.

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INTRODUCTION

Representatives of the family Sphaeromatidae (the marine 'pill-bugs') are common in coastal waters world-wide. Recent taxonomic investigations of this family (e.g. Holdich & Harrison, 1981a; Harrison & Holdich, 1982a) have shown the form of the brood pouch of the adult ('ovigerous') female to be an extremely useful generic character. Unfortunately this structure has been much neglected by previous research workers, and for many genera brood pouch descriptions do not exist. The potential taxonomic usefulness of such descriptions has prompted a complete review and reassessment of ovigerous female sphaeromatids and the results of that investigation are presented here.

Prior to 1905 the brood pouch of ovigerous female sphaeromatids had virtually been ignored. In 1905, however, Hansen published his radical revision of the Sphaeromatidae in which he introduced two major features of taxonomic importance: (1) the structure of the pleopods (of all specimens); (2) the form of the brood pouch and mouthparts of ovigerous females. Hansen divided the family into major groups based on pleopod form. This character was instantly accepted by researchers and has been used continuously ever since. Unfortunately, the importance of the pleopod morphology appears to have overshadowed Hansen's work on the structure of the ovigerous female, which has received little subsequent attention.

For ovigerous specimens Hansen noted two important characters which appeared consistent at a generic level, (1) that while the mouthparts of ovigerous females of some genera resembled the mouthparts of males and immature specimens, the mouthparts of ovigerous females of other genera were considerably modified ('metamorphosed'), and (2) that the brood pouch could take a number of different forms for different genera.

In genera having all the mouthparts metamorphosed, during a cursory examination the modification is most obvious in the form of the mandibles. These appendages lose their usual dark brown incisor processes and are represented only by pale lobes which abut one another in the mid-line. Probably because this loss of coloration is so obvious, most authors since Hansen have included in their generic diagnoses statements to the effect, "ovigerous female with mouthparts metamorphosed" (or "not metamorphosed"). Unfortunately, few authors have followed Hansen's lead and described the form of the brood pouch; most have either ignored this structure or referred to Hansen's (1905) work.

A complete review here of the brood pouch descriptions which do exist might prove of little value beyond that of a checklist. Many authors' 'descriptions' are inadequate, while some are now known to be incorrect. It is worth noting that while Hansen's work on the brood pouch is by far the most important and extensive work to date, his brood pouch descriptions were inaccurate for 12 of the 19 genera he described! For these reasons it is not intended here to give a detailed discussion of the published literature. Rather than rely on this literature, the present author has examined preserved specimens belonging to as many genera as possible and the following descriptions are based on these personal observations unless otherwise stated. The descriptions given here are intended to supersede previously published descriptions and where discrepancies occur the current descriptions should (in the author's opinion) be accepted as the more accurate, regardless of whether the discrepancy has been discussed.

For the purpose of this work an 'ovigerous female' has been defined as any female with the brood pouch fully formed, regardless of whether a brood is present or not.

Ovigerous ('egg bearing') females retain the young, which are housed in specialized structures on the ventral percon. Several types of structure may be present, and different genera show different arrangements, but Fig. 1 gives a generalized view showing most of the possibilities. In the present work the sum of all the specialized features shown by any one female will be referred to as the 'brood pouch', regardless of the component structures.

The most common component in sphaeromatids (as in most peracarid crustaceans) is the 'oostegite' (or 'brood plate' or 'brood lamella'). This is a thin, flat plate of cuticle arising from the ventral surface near the base of a pereopod and extending towards the mid-line. Oostegites may be of various sizes and shapes, but always occur as a pair on any one segment.

Also present may be a fold of cuticle, either extending from the posterior margin of the ventrum and opening anteriorly, or extending from the anterior margin to open posteriorly. Such a structure is referred to here as a 'pocket' or 'ventral pocket', and may be short (e.g. sap in Fig. 1) or long (e.g. lpp in Fig. 1).

The enclosed space ventral to the sternites, produced by the presence of oostegites, pockets, or a combination of the two, is here referred to as a 'marsupium'.

In addition to, or instead of, the above structures, the ovigerous females of

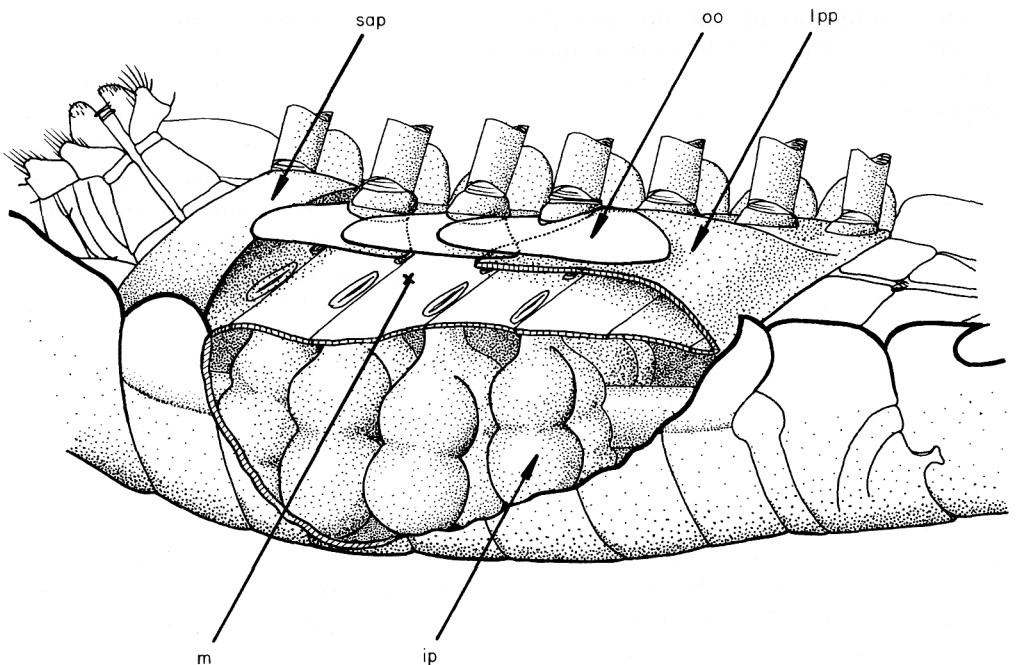


Figure 1. Generalized ovigerous female illustrating possible brood pouch components. (sap, short anterior pocket; oo, oostegite; lpp, large posterior pocket; m, marsupium; ip, internal pouch).

some genera bear paired invaginations of the ventral cuticle. These extend into the body cavity but open ventrally via narrow slits. Such invaginations are referred to here as 'internal pouches'.

As noted above, as well as bearing a brood pouch, ovigerous females of some genera have the mouthparts markedly modified. This metamorphosis usually takes the form shown in Fig. 2, but is more marked in species of *Dynamene* Leach (See Holdich, 1968a: 147) and less marked in some other genera (see Discussion below).

To avoid confusion when isolating ovigerous specimens, it should be noted that non-ovigerous females (i.e. females at the moult stage preceding the ovigerous condition) may bear indications of a developing brood pouch. In genera bearing oostegites, these are present in the non-ovigerous female as short, narrow, cylindrical, cuticular processes which may be referred to as 'oostegite buds'. In genera having internal pouches, these may be seen forming through the ventral cuticle of non-ovigerous females as faint discs. Pockets are not represented in non-ovigerous females, and non-ovigerous females never have the mouthparts metamorphosed.

In the present study it has been possible to trace or examine only a small number of ovigerous specimens for some genera, but where doubt exists as to the exact form of a structure, this has been indicated in the text. Particular problems exist in the determination of the precise number of internal pouches in females possessing this character. The number of pouches is represented by the number of ventral openings. Unfortunately, in many genera the pouch apertures are very small and are virtually invisible during most of the brood cycle. At one (unidentified) stage in the cycle, however, each aperture is rendered clearly visible. At this stage the aperture is surrounded by a thick circlet of white sub-cuticular tissue which emphasizes the opening and can be seen clearly through the sternites. In female specimens showing such a condition the number of pouches is obvious, but at other stages of the brood cycle—especially in females having thin, transparent sternites—the exact number of pouches is less clear, their existence being indicated only by the presence of the brood within the body. Accordingly, many of the following descriptions necessarily contain the phrase, "Brood held in internal pouches (number not known)".

In the following descriptions the museum location and reference numbers (if any) of the specimens examined have been indicated. The abbreviations for the museums are: AHF (Allan Hancock Foundation, University of Southern California); AM (Australian Museum, Sydney); AMBL (Amakusa Marine Biology Laboratory, Japan); BMNH (British Museum (Natural History)); CM (Zoological Museum, University of Copenhagen); EPML (Edward Percival Marine Laboratory, University of Canterbury, New Zealand); IBL (Institute of Biology, Ljubljana, Yugoslavia); NAIR (Personal loan from Professor Balakrishnan Nair, University of Kerala, India); NUZ (Nottingham University, Zoology Department); NZOI (New Zealand Oceanographic Institute); PM (Muséum National d'Histoire Naturelle, Paris); QM (Queensland Museum, Brisbane); SAfrM (South African Museum); SAustM (South Australian Museum, Adelaide); SM (Naturhistoriska Riksmuseet, Stockholm); USNM (United States National Museum); USSR (Zoological Institute, Academy of Sciences, Leningrad); VM (Natural History Museum, Vienna); WAM (Western



Figure 2. Illustrations of mouthparts showing usual form of metamorphosis in ovigerous female. Non-ovigerous specimen: A, maxilliped; B, incisor processes of mandibles; C, maxilla; D, maxillule. Ovigerous female: E, maxilliped; F, maxilla; G, incisor processes of mandibles; H, maxillule.

Australian Museum, Perth); and ZMUH (Zoological Museum, University of Hamburg).

The genera have been described below in alphabetical order and synonyms (if any) have been indicated. The subfamily to which each genus belongs has been indicated by one of the following codes placed in parentheses after the name: A (Ancininae Dana, 1852); T (Tecticipitinae Iverson, 1982); C (Cassidininae Iverson, 1982); S (Sphaeromatinae Milne Edwards, 1840); D (Dynameninae Bowman, 1981). The fossil subfamily Pleistosphaerominae Strouhal, 1954 is not represented in the present work.

The following results constitute a list of all known sphaeromatid genera except those containing only fossil forms. The fossil genera are: *Archaeosphaeroma* Novak, 1872; *Cyclosphaeroma* Woodward, 1890; *Eosphaeroma* Woodward, 1879; *Heterosphaeroma* Munier-Chalmas, 1872; *Palaeosphaeroma* Remeš, 1903; *Pleistosphaeroma* Strouhal, 1954; *Protosphaeroma* Bachmayer, 1949; *Unusuropode* Duarte & Silva Santos, 1962. Unfortunately nothing is known about the brood pouches of these fossil genera and they are included here only for completeness.

DESCRIPTIONS AND OBSERVATIONS

Genus Amphoroidea Milne Edwards, 1840 (D)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. In addition, large posterior pocket covering entire posterior ventrum and opening anteriorly between fourth pereopods; anterior lip bilobed and often pressed against sternites such that opening appears 'sealed'. Brood not held in marsupium thus formed but in 4 pairs of internal pouches.

Species examined: *A. falcifera* Thomson, 1879 EPML (KA497J). *A. media* Hurley & Jansen, 1971 EPML (KA497L). *A. longipes* Hurley & Jansen, 1977 (type specimens) EPML (KA497R).

Genus Amphoroidella Baker, 1908 (D)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. In addition, large posterior pocket covering entire posterior ventrum and opening anteriorly between fourth pereopods; anterior lip bilobed. Brood not held in marsupium thus formed but in internal pouches (number not known).

Species examined: *A. elliptica* (Baker, 1908) (type-species of genus) SAustM (C. 825).

Genus Ancinus Milne Edwards, 1840 (A)

Mouthparts: Not metamorphosed.

Brood pouch: Oostegites absent. Pouch formed from two opposing pockets covering entire ventral pereon and opening as narrow, transverse slit between

fourth pereopods. Brood housed in marsupium thus formed. Internal pouches absent.

Species examined: *A. panamensis* Glynn & Glynn, 1974 USNM (291052).

Remarks

The author has been able to examine only one ovigerous female specimen from museum collections. This specimen was not in perfect condition and, as the ventrum was torn, the brood pouch could not be detailed with certainty. However, the lack of oostegites in this specimen seemed to be the natural condition and not due to damage. Loyola e Silva (1971: 213) said of *Ancinus depressus* (Say, 1818) (the type-species of the genus) that the pouch took the form of "uma grande bolsa marsupial". His description of the opposing pockets of *Bathycopea* Tattersall (below) as "uma grande bolsa" supports the present observation that *Ancinus* also has two opposing pockets.

Genus Anoplocopea Racovitza, 1907 (C)

Specimens: Ovigerous female not seen.

Remarks

The author has seen only two syntype specimens of *A. hanseni* Racovitza (the type-species of the genus) (BMNH (1910.1.10.24–25)). One of these specimens was a male, the other a non-ovigerous female. The female bore rudimentary oostegites on pereonites 2, 3 and 4. There may also have been smaller oostegite buds on pereonite 1, but the specimen was very small, soft, and transparent, and details could not be seen with certainty. The ovigerous female will certainly bear at least three pairs of oostegites but the size of these, and the presence of other structures, is not known. *Anoplocopea* appears to be closely related to *Campecopea* Leach (below) and the brood pouches may be similar.

Genus Artopoles Barnard, 1920 (D)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4 and just overlapping in mid-line. In addition, large posterior pocket covering entire posterior ventrum; lateral margins of pocket terminating at base of fifth pereopods, but anterior lip extending anteriorly as broad, rectangular flap, reaching level of second pereopods. Internal pouches apparently present in anterior half of ventrum but number not known.

Species examined: *A. natalis* Barnard, 1920 (type-species of genus) SAfrM (A14860).

Remarks

The specimen examined bore a number of large ova, some of which were in the posterior pocket, while the remainder were held within the body.

Genus Bathycopea Tattersall, 1904 (A)

Ancinella Hansen, 1905

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4 and overlapping well in mid-line. In addition, large posterior pocket covering entire posterior ventrum and opening anteriorly between fourth pereopods; also, short anterior pocket covering sternite of pereonite 1 and opening posteriorly between second pereopods. Brood held in marsupium thus formed. Internal pouches absent.

Species examined: *B. typhlops* Tattersall, 1904 (type-species of genus) SAfrM (A15461).

Remarks

Hansen originally described his *Ancinella profunda* Hansen, 1905 (a junior synonym of *Bathycopea typhlops*) as having a large pocket and (three pairs of) marsupial lamellae (Hansen, 1905: 79) ['three pairs' implied by his earlier statement that all members of this family which bore oostegites bore three pairs (1905: 75)]. In 1916 Hansen stated that he had subsequently discovered a fourth pair of oostegites on the first pair of pereopods of this species (1916: 176). Loyola e Silva (1971 : 217) said that the ovigerous female of *B. typhlops* bore three pairs of oostegites and "uma grande bolsa de incubação, que apresenta uma única abertura de nascimento que é transversal e que fica entre o quarto e o quinto par de pereiópodes". The present study supports Loyola e Silva's findings and the suggestion is that Hansen (1916) mistook the short anterior pocket for a pair of oostegites.

Genus Botryias Richardson, 1910 (C)

Specimens: Ovigerous female not known.

Remarks

This genus contains only one species, *B. fructiger* Richardson, 1910, which is known only from one specimen (USNM (41024)). Richardson did not state the sex of this specimen but the present investigation revealed it to be an adult male. It should be noted here that while Richardson stated that "The pleopods of the fourth and fifth pairs have both branches similar, of fleshy appearance and without marginal setae... This genus belongs therefore to the section of eubranchiata Sphaeromidae of Hansen" (1910: 31), this specimen actually shows a platybranchiate condition. Pleopods 4 and 5 each have both rami thickened but none shows any indication of branchial folds.

Genus Caecocassidias Kussakin, 1967 (D)

Mouthparts: Mandible, maxillule and maxilla unmodified. Maxilliped with palp unmodified, lobes bearing setae, but endite greatly expanded with proximal flaps and lobes.

Brood pouch: 5 pairs of oostegites arising from pereonites 1, 2, 3, 4 and 5, and overlapping well in mid-line. Brood held in marsupium thus formed. Pockets and internal pouches absent.

Species examined: *C. patagonica* Kussakin, 1967 (type-species of genus) (type specimens) USSR (I. 2/46721).

Remarks

Caecocassidias is a remarkable genus and deserves more attention than Kussakin gave it. Three points are worthy of especial mention:

(1) This is the only known genus to possess five pairs of oostegites (The posterior half of the body is not known to produce oostegites in any other genus)

(2) The pleonal tergite (neither described nor illustrated in detail by Kussakin) bears indication of all five 'original' segments. Ancestral isopods are believed to have possessed five separate pleonal segments. This is the condition shown by the family Cirolanidae today, and is one of the reasons why that family is considered to represent the most 'primitive' condition within the Flabellifera. It is a characteristic of the family Sphaeromatidae that the pleon segments are fused to produce at most two, or occasionally one, pleonal tergite. Most genera, however, show indications of the fused segments in the form of lateral 'suture lines', most of which are obsolete in the mid-line (e.g. Fig. 1). No other known genus shows more than three such lines, indicating, at most, four of the (evolutionarily) original segments. *Caecocassidias* has four clear suture lines at each side of the pleonal tergite (Fig. 3) thus indicating all five segments. All four suture lines are obsolete in the mid-line.

(3) Not only do pleopods 4 and 5 each bear branchial folds over the entire surface of both rami, but the endopod of pleopod 3 also bears branchial folds over its entire surface.

Points (1)–(3) are not known for any other extant sphaeromatid genus.

Genus Caecosphaeroma Dollfus, 1896 (C)

Vireia Viré, 1903

Mouthparts: Mandible, maxillule and maxilla unmodified. Maxilliped with palp unmodified, but endite with one small, proximal, external lobe at base.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4. Anterior pair of oostegites just overlapping in mid-line; three remaining pairs large, overlapping well in mid-line. Brood held in marsupium thus formed. Pockets and internal pouches absent.

Species examined: *C. burgundum* Dollfus, 1898 PM (Is. 1188).

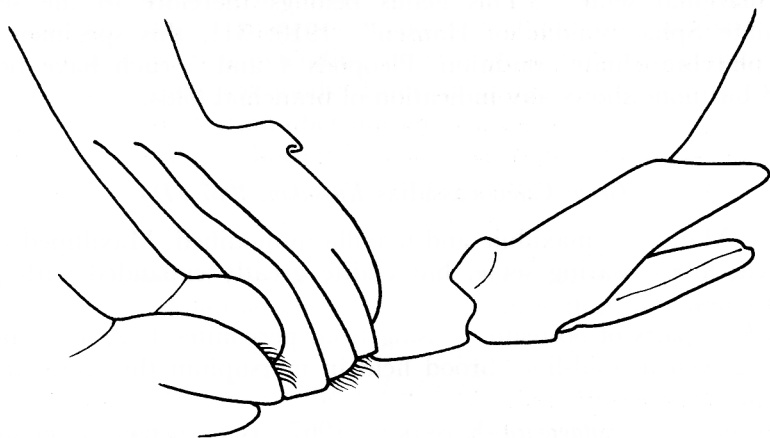


Figure 3. *Caecocassidias patagonica*. Dorso-lateral view of pleon and pleotelson of adult male paratype.

Remarks

Vireia is now treated as a sub-genus of *Caecosphaeroma*.

Genus Calcipila Harrison & Holdich, 1984 (S)

Mouthparts: Condition unknown.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 (see *Remarks*).

Species examined: *C. cornuta* Harrison & Holdich, 1984 (type-species of genus) (type specimen) (non-ovigerous female) QM (W. 9645).

Remarks

This genus is known only from the two type specimens (one adult male and one non-ovigerous female) of the type-species. The non-ovigerous female bears oostegite buds on pereonites 1, 2, 3 and 4, but it is not known whether these oostegites overlap in the mid-line in the adult. Also, it is not possible to tell whether the ovigerous female bears pockets and/or internal pouches.

Genus Campecopea Leach, 1814 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4. Anterior pair of oostegites very short, not reaching mid-line; three remaining pairs overlapping in mid-line. In addition, large posterior pocket covering entire posterior ventrum and opening anteriorly between fourth pereopods (although curved lip arcs posteriorly to level of fifth pereopods in mid-line); also, short anterior pocket covering sternite of pereonite 1 and opening posteriorly between second pereopods. Brood held in marsupium thus formed. Internal pouches absent.

Species examined: *C. hirsuta* (Montagu, 1804) (type-species of genus) NUZ.

Remarks

Some authors have stated that *C. hirsuta* was founded (as *Oniscus hirsutus*) on the male of this species, while *C. cranchii* Leach, 1818 (a junior synonym of *C. hirsuta*) was based on the female (Omer-Cooper & Rawson, 1934: 47; Panouse, 1940: 93). This is not so. Montagu founded *O. hirsutus* on the female, as his description and illustration clearly show (Montagu, 1804: 71, tab. VI fig. 7). Leach (1814: 405; 1815: 367) described the female under the name *Campecopea hirsuta* (Montagu) and in 1818 he gave the first description of the male, correctly assigning it to *C. hirsuta*. Without stating reasons he then erected a new species, *C. cranchii*, for the female (1818: 341, 342).

Genus Cassidias Richardson, 1906 (D)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 and overlapping in mid-line. Brood not held in marsupium thus formed, but in internal pouches (number not known). Pockets absent.

Species examined: *C. argentinea* Richardson, 1906 (type-species of genus) (type specimens) USNM (32249; 32627).

Remarks

The male of *C. argentinea* is not known and this genus is based on the ovigerous female. Of the two other species housed in this genus: *Cassidias trituberculata* Thielemann, 1910 was based on the female of *Holotelson tuberculatus* Richardson; examination of type specimens of *Cassidias africana* Barnard, 1920 (in the British Museum (Natural History)) has shown that the ovigerous female has only three pairs of oostegites, the brood is in internal pouches (number unknown) and the mouthparts are only partly metamorphosed (see Discussion). *Cassidias africana* cannot be retained in *Cassidias* but its correct generic placement is not known.

Genus Cassidina Milne Edwards, 1840 (C)

Mouthparts: mandible, maxillule and maxilla unmodified. Maxilliped with palp unmodified, but endite with one small, proximal, external lobe at base.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, overlapping in mid-line and increasing in size posteriorly. Posterior pair of oostegites large, virtually covering entire marsupium. In addition, short posterior pocket covering sternite of pereonite 7 and opening anteriorly between sixth pereopods. Brood held in marsupium thus formed. Internal pouches absent.

Species examined: *C. typa* Milne Edwards, 1840 (type-species of genus) EPML (KA504F).

Genus Cassidinella Whitelegge, 1901 (S)

Specimens: Ovigerous female not known.

Remarks

The genus has only one species, *C. incisa* Whitelegge, 1901, which is known from only three specimens, none of which is an ovigerous female (*vide* Hansen, 1905: 75).

Genus Cassidinidea Hansen, 1905 (C)

Cassidisca Richardson, 1905

? *Dies* Barnard, 1951

Mouthparts: Not metamorphosed.

Brood pouch: Oostegites absent. Pouch formed from two opposing pockets covering entire ventral pereon and opening as narrow transverse slit between fourth pereopods. Brood housed in marsupium thus formed. Internal pouches absent.

Species examined: None. Above description paraphrased from Hansen, 1905: 80, 82.

Remarks

It has never been conclusively shown that *Dies* is a junior synonym of *Cassidinidea*. From the literature it would appear that the only major difference between the two genera is that the adult male of *Dies* has the penes fused as a single process. A detailed comparison of specimens belonging to these genera is needed, however, before the problem can be resolved.

Genus Cassidinopsis Hansen, 1905 (D)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4 and overlapping in mid-line. Brood not held in marsupium thus formed, but in internal pouches (number not known). Pockets absent.

Species examined: *C. emarginata* (Guérin-Méneville, 1843) (type-species of genus) BMNH.

Genus Ceratocephalus Woodward, 1877 (S)

Bregmocerella Haswell, 1884

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 and overlapping in mid-line. Anterior pair of oostegites narrow; remaining pairs increasing in size posteriorly. Brood not held in marsupium thus formed but in 5 pairs of internal pouches. Pockets absent.

Species examined: *C. grayanus* Woodward, 1877 (type-species of genus) BMNH.

Remarks

The species *Cymodopsis wardii* Baker, 1926 was apparently founded on a female specimen of *Ceratocephalus grayanus* (W. F. Seed, pers. comm.) and *C. wardii* is a junior synonym of *C. grayanus*.

Genus Cerceis Milne Edwards, 1840 (D)

Paradynamene Richardson, 1905

Circeis Baker, 1908 (*non Circeis* Saint-Joseph: Annelida)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 and overlapping in mid-line. Oostegites increasing in size from anterior to posterior. Brood (at least initially) not held in marsupium thus formed but in 4 pairs of internal pouches. Pockets absent.

Species examined: *Cerceis* sp. ZMUH (two ovigerous specimens of a species of *Cerceis* from Australia were examined, but these specimens could not be assigned to any known species with certainty).

Remarks

Hansen (1905: 108) stated that in *Cerceis* the brood was held in the marsupium. The ovigerous females examined here bore the brood in internal pouches. However, Hansen (loc. cit.) also said that in the related genus *Paracerceis* Hansen the brood was held in internal pouches, but the author has seen a female specimen of *Paracerceis* with a late stage brood in the marsupium. It seems possible that the early brood in both these genera is held in the internal pouches, while the later brood is held (at least for a short time prior to release) in the marsupium. This may also be true for some other genera which bear both internal pouches and a ventral marsupium.

Genus Chitonopsis Whitelegge, 1902 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 and overlapping well in mid-line. Oostegites increasing in size from anterior to posterior. Brood held in marsupium thus formed. Pockets and internal pouches absent, but sternite of pereonite 7 dilated ventrally as 'shelf' preventing posterior movement of ova out of marsupium.

Species examined: *C. spatulifrons* Whitelegge, 1902 (type-species of genus) (type specimen and non-type specimens) AM (G. 2152); SAustM.

Genus Cilicaea Leach, 1818 (S)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 and overlapping in mid-line. Brood not held in marsupium thus formed but in 5 pairs of internal pouches. Pockets absent.

Species examined: *C. latreillei* Leach, 1818 (type-species of genus) BMNH. *C. crassicaudata* Haswell, 1881 NUZ.

Genus Cilicaeopsis Hansen, 1905 (S)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4 and overlapping in mid-line. Brood not held in marsupium thus formed but in 5 pairs of internal pouches. Pockets absent.

Species examined: *C. whiteleggei* (Stebbing, 1905) NUZ.

Genus Clianella Boone, 1923 (S)

Paradynoides Loyola e Silva, 1960

Dynoidella Pillai, 1965

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and

overlapping well in mid-line. Brood not held in marsupium thus formed but in internal pouches (number not known). Pockets absent.

Species examined: *C. elegans* Boone, 1923 (type-species of genus) USNM (154967). *C. brucei* Harrison & Holdich, 1984 (type specimens) NUZ.

Genus Cymodetta Bowman & Kühne, 1974 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4. Oostegites short, not overlapping in mid-line (extending only two-thirds of distance to mid-line). Brood held in 4 pairs of internal pouches. Pockets absent.

Species examined: *C. gracilipes* Holdich & Harrison, 1983 (type specimens) NUZ.

Remarks

Bowman & Kühne (1974: 236), describing *C. gambosa* Bowman & Kühne (the type-species of the genus), incorrectly stated that the ovigerous female bore four pairs of oostegites on pereonites 2, 3, 4 and 5. In fact, in common with all sphaeromatid genera except *Caecocassidias*, *Cymodetta* lacks oostegites on pereonite 5.

Genus Cymodoce Leach, 1814 (S)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping in mid-line. Brood not held in marsupium thus formed but in 5 pairs of internal pouches. Pockets absent.

Species examined: *C. truncata* Leach, 1814 (type-species of genus) NUZ. *C. bipapilla* Harrison & Holdich, 1984 (type specimens) NUZ. *C. pelsarti* Tattersall, 1922 NUZ.

Remarks

Loyola e Silva (1963), in his paper on the mouthparts of *Cymodoce*, incorrectly stated that the genus bore three pairs of oostegites. He was presumably following Hansen (1905) who also made this mistake. Loyola e Silva's illustration (1963: 5) of the maxilliped of the ovigerous female of *Cymodoce brasiliensis* Richardson shows this appendage lacking external lobes on the endite. However, *C. brasiliensis*, like many species currently housed in the genus *Cymodoce*, bears little morphological resemblance to *C. truncata* (the type-species) and its congeneric status must be questioned. The present author sees no reason at present to suggest that the presence of such lobes is a variable character for species of *Cymodoce sensu stricto*.

Genus Cymodocella Pfeffer, 1887 (D)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. In addition, large posterior pocket covering entire

posterior ventrum and opening anteriorly between fourth pereopods. Brood not obviously housed in marsupium thus formed but embedded in ventral body wall.

Species examined: *C. tubicauda* Pfeffer, 1887 (type-species of genus) NZOI (Z1795). *C. egregia* (Chilton, 1892) EPML (KA497G).

Remarks

The brood appears to occupy a strange position in this genus (and in the closely related genus *Ischyromene* Racovitza—see below). Although the brood does not appear to be held in discrete internal pouches, it is embedded in the ventral cuticle either side of the nerve cord.

Genus *Cymodopsis* Baker, 1926 (*S*)

Specimens: Ovigerous female not known.

Remarks

The author has been unable to trace any ovigerous female specimens belonging to this rather ill-defined genus.

Genus *Discerceis* Richardson, 1905 (*D*)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed. *Brood pouch:* 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. Brood not held in marsupium thus formed but in internal pouches (number not known). Pockets absent.

Species examined: *D. granulosa* (Richardson, 1899) (type-species of genus) USNM (144660).

Genus *Dynamene* Leach, 1814 (*D*)

Nesaea Leach, 1814

Naesa Leach, 1815

Prochonaesea Hesse, 1873

Sorrentosphaera Verhoeff, 1944

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp much reduced; endite greatly expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. Brood held in marsupium thus formed, but ventrum displaced dorsally such that brood appears to fill entire body. Pockets and internal pouches absent.

Species examined: *D. bidentata* (Adams, 1800) (type-species of genus) NUZ. *D. bifida* Torelli, 1930 NUZ. *D. curalii* Holdich & Harrison, 1980 (type-specimens) NUZ. *D. edwardsi* (Lucas, 1849) NUZ. *D. magnitorata* Holdich, 1968b NUZ. *D. torelliae* Holdich, 1968b NUZ. *D. tubicauda* Holdich, 1968b NUZ.

Remarks

Dynamene has the maxillipedal palp of the ovigerous female more reduced than any other known genus.

Genus Dynamenella Hansen, 1905 (D)

Mouthparts: Not metamorphosed.

Brood pouch: Oostegites absent. Pouch formed from two opposing pockets covering entire ventral pereon and opening as narrow, transverse slit between fourth pereopods. Brood housed in marsupium thus formed. Internal pouches absent.

Species examined: *D. perforata* (Moore, 1901) (type-species of genus) (type specimen) USNM (32649). *D. liochroea* Harrison & Holdich, 1982a (type specimens) NUZ. *D. ptychura* Harrison & Holdich, 1982a (type specimens) NUZ. *D. trachydermata* Harrison & Holdich, 1982a (type specimens) NUZ.

Remarks

Hansen's statement "marsupial lamellae overlap each other somewhat" for this genus (1905: 107) appears to have arisen by his confusing specimens of *Ischyromene* (which had not been described at that time) with his new genus *Dynamenella*. He did not examine ovigerous female specimens of *Dynamenella perforata* (*vide* Hansen, 1905: 78, 126) but assigned *Ischyromene eatoni* (Miers) (at that time placed in *Dynamene*) to *Dynamenella* (1905: 125). Hansen may have used ovigerous females of species of *Ischyromene* when compiling his description of *Dynamenella*.

Genus Dynameniscus Richardson, 1905 (C)

Mouthparts: Mandible, maxillule and maxilla unmodified. Maxilliped with palp unmodified, lobes bearing long setae; endite expanded with proximal lobes.

Brood pouch: 4 pairs of large oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. Oostegites increasing in size from anterior to posterior. Brood held in marsupium thus formed. Pockets and internal pouches absent.

Species examined: *Dynameniscus* sp. CM.

Remarks

This genus is known from only two specimens, the non-ovigerous female type specimen of *D. carinatus* (Richardson, 1900) (the type-species of the genus) and the ovigerous female *Dynameniscus* sp. mentioned here. This second specimen of *Dynameniscus* is to be described in the near future by Mr E. W. Iverson (pers. comm.).

Genus Dynamenoides Hurley & Jansen, 1977 (D)

Specimens: Ovigerous female not known.

Remarks

This genus was erected for two new species from New Zealand, but no ovigerous female specimens were collected (*vide* Hurley & Jansen, 1977: 36).

Genus Dynamenopsis Baker, 1908 (D)

Mouthparts: Not metamorphosed (*vide* Hurley & Jansen, 1977: 38, 39).

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4. Brood held in 4 pairs of internal pouches (see Remarks).

Species examined: *Dynamenopsis* sp. (non-ovigerous female) WAM (57-80).

Remarks

The author has seen no ovigerous females of this genus. Ovigerous females are not known for *D. obtusa* Baker, 1908 (the type-species of the genus), and Hurley and Jansen did not describe the ovigerous female of *D. varicolor* Hurley & Jansen, 1971 (the only other species in this genus) beyond including "Female mouthparts not metamorphosed" in their description of the genus. The present description is based on a specimen of a species of *Dynamenopsis* from Western Australia (see Harrison & Holdich, 1982a). This non-ovigerous female bore rudimentary oostegites on pereonites 2, 3 and 4, and four pairs of developing pouch openings were visible through the ventral cuticle. It is not known whether the oostegites overlap in the mid-line in the ovigerous female, or whether pockets are present.

Genus Dynoides Barnard, 1914 (S)

Dynoidella Nishimura, 1976 (*non Dynoidella* Pillai, 1965)

Specimens: Ovigerous female not known.

Remarks

The author has been unable to trace any ovigerous females belonging to this genus, but due to their similarity it seems unlikely that the brood pouch and mouthparts will differ from those of the closely related genus *Clianella* Boone.

Genus Exocerceis Baker, 1926 (D)

Specimens: Ovigerous female not known.

Remarks

This genus is known only from the type specimens of the type-species *E. nasuta* (Whitelegge, 1902) (AM (G.2277; G. 2279)). There are no ovigerous females among these specimens (*pers. obs.*).

Genus Exosphaeroides Holdich & Harrison, 1983 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 2 pairs of oostegites arising from pereonites 3 and 4. Oostegites short, not reaching mid-line. Brood held in 4 pairs of internal pouches. Pockets absent.

Species examined: *E. fluvialis* Holdich & Harrison, 1983 (type-species of genus) (type specimens) NUZ.

Genus Exosphaeroma Stebbing, 1900 (S)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4. Oostegites short, not reaching mid-line. Brood held in 4 pairs of internal pouches. Pockets absent.

Species examined: *E. gigas* (Leach, 1818) (type-species of genus) BMNH.

Genus Geocerceis Menzies & Glynn, 1968 (D)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite not expanded.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and just overlapping in mid-line. Brood not held in marsupium thus formed but in internal pouches (number not known). Pockets absent.

Species examined: *G. barbarae* Menzies & Glynn, 1968 (type-species of genus) (type specimen) USNM (269486).

Remarks

Menzies & Glynn (1968: 56) were not correct in saying that female specimens belonging to this genus do not have the mouthparts metamorphosed.

Genus Gnorimosphaeroma Menzies, 1954 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4; anterior pair short, not reaching mid-line; remaining three pairs overlapping well in mid-line. Brood not held in marsupium thus formed but in 4 pairs of internal pouches. Pockets absent.

Species examined: *G. luteum* Menzies, 1954 USNM (293047). *G. ovatum* (Gurjanova, 1933) NUZ.

Genus Haswellia Miers, 1884 (D)

Calyptura Haswell, 1881 (*non Calyptura* Swainson: Aves)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. Oostegites increasing in size from anterior to posterior. Brood not held in marsupium thus formed but in 4 pairs of internal pouches. Pockets absent.

Species examined: *H. cilicoides* Baker, 1908 SAustM (C. 1046). *H. emarginata* (Haswell, 1882) SAustM (C. 1337).

Genus Hemisphaeroma Hansen, 1905 (S)

Specimens: Ovigerous female not known.

Remarks

This genus is known only from the two type specimens (one adult male and one sub-adult male (CM)) of the type-species *H. pulchrum* Hansen, 1905. However, as indicated by Hansen (1905: 75, 76) this genus is closely related to *Sphaeroma* Latreille (pers. obs.) and it is unlikely that the brood pouch will differ from the more usual form for that genus (see below).

Genus Holotelson Richardson, 1909 (D)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed. *Brood pouch*: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. In addition, large posterior pocket covering entire posterior ventrum and opening anteriorly between fourth pereopods (although curved lip arcs posteriorly to level of fifth pereopods in mid-line). Brood not held in marsupium thus formed but in internal pouches (number not known).

Species examined: *H. tuberculatus* Richardson, 1909 (type-species of genus) USNM (112369).

Remarks

Comparison of the description of *Cassidias trituberculata* Thielemann (Thielemann, 1910: 56–59) with female specimens of *H. tuberculatus* shows the two to be identical. *Cassidias trituberculata* is a junior synonym of *Holotelson tuberculatus*.

Genus Ischyromene Racovitza, 1908 (D)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. In addition, large posterior pocket covering entire posterior ventrum and opening anteriorly between fourth pereopods. Brood not obviously housed in marsupium thus formed but embedded in ventral body wall.

Species examined: *I. lacazei* Racovitza, 1908 (type-species of genus) NUZ.

Remarks

As in the closely related genus *Cymodocella* (which bears an identical brood pouch) the brood does not appear to be held in discrete internal pouches, but is embedded in the ventral cuticle either side of the nerve cord.

Genus Isocladus Miers, 1876 (S)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4. Oostegites short, not reaching mid-line. Brood held in 4 pairs of internal pouches. Pockets absent.

Species examined: *I. armatus* (Milne Edwards, 1840) (type-species of genus) BMNH (1921.11.29.163–177). *I. excavatus* (Baker, 1910) NUZ.

Genus Leptosphaeroma Hilgendorf, 1885 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 2 pairs of oostegites arising from pereonites 3 and 4. Oostegites short, not reaching mid-line (extending only two-thirds of distance to mid-line). In addition, two opposing pockets covering entire ventral pereon and opening as narrow, transverse slit between fourth pereopods. Brood held in marsupium formed by these pockets. Internal pouches absent.

Species examined: *L. gottschei* Hilgendorf, 1885 (type-species of genus) AMBL (Isopoda 34–36).

Remarks

Hansen (1905: 79, 80) stated that he examined an ovigerous female of a "new species of *Leptosphaeroma*" in which it was "impossible to detect even the slightest vestige of marsupial lamellae". As no species of *Leptosphaeroma* other than *L. gottschei* have been described, it must be assumed that Hansen's specimen belonged to a different genus, the identity of which remains unknown. (Any assumption that Hansen was examining a species of *Paraleptosphaeroma* Buss & Iverson (see below) must remain speculation.)

Genus Monolistra Gerstaecker, 1856 (C)

Spelaeosphaeroma Feruglio, 1904

Microlistra Racovitza, 1929

Mouthparts: Either (1) mandible, maxillule and maxilla unmodified, but maxilliped with endite bearing small external, proximal lobe (subgenera *Typhlosphaeroma* Racovitza, 1910 and *Microlistra* Racovitza, 1929); or (2) not metamorphosed (remaining subgenera).

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. Brood held in marsupium thus formed. Pockets and internal pouches absent.

Species examined: *Monolistra (Monolistra) caeca* Gerstaecker, 1856 (type-species of genus) IBL (2155).

Remarks

Microlistra is now treated as a subgenus of *Monolistra*. Ovigerous females belonging to the subgenera *Microlistra* and *Typhlosphaeroma* have a slightly expanded maxilliped (with the palp unmodified); adult females of other species in this genus have all the mouthparts as in male and immature specimens.

Genus Moruloidea Baker, 1908 (D)

Vallentinia Stebbing, 1914a (non *Vallentinia* Browne: Coelenterata)

Evallentinia Stebbing, 1914b

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. Brood not held in marsupium thus formed but in 4 pairs of internal pouches. Pockets absent.

Species examined: *M. darwini* (Cunningham, 1871) BMNH. *M. tumida* Harrison, 1984 (type specimen) WAM (259-82).

Remarks

In the specimens examined by the present author the exact number of internal pouches was not obvious. That there are four pairs is cited on the authority of Loyola e Silva (1974: 17).

Genus Naesicopea Stebbing, 1893 (D)

Mouthparts: Condition unknown.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4. (See Remarks.)

Species examined: *N. abyssorum* (Beddard, 1886) (type-species of genus) (type specimen) (non-ovigerous female) BMNH.

Remarks

The genus is known only from the two type specimens (one adult male and one non-ovigerous female) of the type-species. The non-ovigerous female bears oostegite buds on pereonites 1, 2, 3 and 4, but it is not known whether these overlap in the mid-line in the ovigerous female. Also, it is not possible to tell whether the ovigerous female bears pockets and/or internal pouches.

Genus Neocassidina Roman, 1974 (D)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. Oostegites extending anteriorly to level of mouthparts. (See Remarks.)

Species examined: *N. perlata* Roman, 1974 (type-species of genus) (type specimen) NUZ.

Remarks

Roman said, for *N. perlata* (the only species known in this genus), that the ovigerous female lacked oostegites (even reduced oostegites) and that the brood was in internal pouches (1974: 357). This is not so. The present author has seen one ovigerous female paratype of this species. This female lacked a brood and was not in good condition. For this reason it is not possible to state with certainty that pockets were absent, although none were seen. With regard to internal pouches: the oostegites on pereonite 4 are extremely large, reaching the opposite side of the body and covering the other oostegites. It seems likely that Roman, finding a continuous ventral surface of cuticle, assumed this to represent the pereonal sternites. This would explain why she stated that the female lacked oostegites (as all the remaining oostegites would be obscured by one of the posterior pair). On finding the brood dorsal to this continuous sheet of cuticle, Roman may have assumed that the brood was held in internal pouches. As the present author has not examined a female with brood it is not possible to say

whether pouches are present, but now that it is known that large oostegites are present it must be considered possible that the brood is held in the marsupium formed by these, and not in pouches.

Genus Neonaesa Harrison & Holdich, 1982b (D)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule as two simple lobes. Maxilla as three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping well in mid-line. Oostegites increasing in size from anterior to posterior. Brood held in marsupium thus formed, but ventrum displaced dorsally such that brood appears to fill entire body. Pockets and internal pouches absent.

Species examined: *N. rugosa* Harrison & Holdich, 1982b (type-species of genus) (type specimens) NUZ.

Genus Neosphaeroma Baker, 1926 (S)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and just overlapping in mid-line. Brood held in internal pouches (number not known). Pockets absent.

Species examined: *N. laticaudum* (Whitelegge, 1901) (type-species of genus) AM (P. 9524). *N. australe* (Whitelegge, 1902) QM (W. 8082).

Remarks

Like *Caecocassidias*, *Neosphaeroma* has the endopod of pleopod 3 folded, but in *Neosphaeroma* these folds do not cover the entire ramal surface and *Neosphaeroma* is otherwise a hemibranchiate, not a eubranchiate, form.

Genus Paracassidina Baker, 1911 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3, and 4, and overlapping in mid-line. In addition, short posterior pocket covering sternite of pereonite 7 and opening anteriorly between sixth pereopods. Brood held in marsupium thus formed. Internal pouches absent.

Species examined: *P. pectinata* Baker, 1911 (type-species of genus) (type specimen and non-type specimens) SAustM (C. 381); NUZ.

Genus Paracassidinopsis Nobili, 1906 (D)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4, and overlapping well in mid-line. Oostegites extending anteriorly to level of

mouthparts. Brood not held in marsupium thus formed but in internal pouches (number not known). Pockets absent.

Species examined: *P. sculpta* Nobili, 1906 (type-species of genus) (type specimens) PM (Is. 1187).

Genus Paracerceis Hansen, 1905 (D)

Paracerceis Nierstrasz, 1931

Sergiella Pires, 1980

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed. *Brood pouch:* 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4. Anterior pair of oostegites just reaching mid-line; remaining three pairs overlapping well in mid-line. Brood (at least initially) not held in marsupium thus formed but in internal pouches (number not known). Pockets absent.

Species examined: *P. beddardi* (Stebbing, 1905) (type specimens) BMNH.

Remarks

See remarks following *Cerceis* (above).

Genus Paracilicaca Stebbing, 1910a (S)

Mouthparts: Metamorphosed. Mandible simple, fused with cephalosome. Maxillule with two simple lobes. Maxilla with three simple lobes. Maxilliped with palp lobes lacking long setae; endite large, proximally expanded and lobed. *Brood pouch:* 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4. Anterior pair of oostegites just reaching mid-line; remaining three pairs overlapping well in mid-line. Brood not held in marsupium thus formed but in 5 pairs of internal pouches. Pockets absent.

Species examined: *P. stebbingi* Baker, 1926 QM (W. 8059).

Genus Paradella Harrison & Holdich, 1982a (D)

Mouthparts: Not metamorphosed.

Brood pouch: 1 pair of oostegites arising from pereonite 4. Oostegites short, not reaching mid-line. In addition, two opposing pockets covering entire ventral pereon and opening as narrow, transverse slit between fourth pereopods. Brood housed in marsupium formed by these pockets. Internal pouches absent.

Species examined: *P. octaphymata* Harrison & Holdich, 1982a (type-species of genus) (type specimens) NUZ. *P. bakeri* (Menzies, 1962a) (type specimens) SM (Isopoda 9468). *P. diana*e (Menzies, 1962b) NUZ.

Remarks

The size of the oostegites may vary between species, those of *P. diana*e being shorter than those of the other two species mentioned. In none of the three species, however, did the oostegites reach the mid-line.

Genus Paraleptosphaeroma Buss & Iverson, 1981 (C)

Mouthparts: Not metamorphosed.

Brood pouch: Oostegites absent. Pouch formed from two opposing pockets covering entire ventral pereon and opening as narrow, transverse slit between fourth pereopods. Brood housed in marsupium thus formed. Internal pouches absent.

Species examined: *P. glynni* Buss & Iverson, 1981 (type-species of genus) (type specimens) AHF (782).

Genus Parasphaeroma Stebbing, 1902 (C)

Mouthparts: Not metamorphosed.

Brood pouch: 4 pairs of oostegites arising from pereonites 1, 2, 3 and 4, and overlapping in mid-line. Brood not held in marsupium thus formed but in internal pouches (number not known). Pockets absent.

Species examined: *P. prominens* Stebbing, 1902 (type-species of genus) (type specimen and non-type specimens) BMNH.

Remarks

On the type specimen examined two pairs of pouch openings were obvious, but others may also be present. The number of pouches could not be ascertained for the non-type specimens. All sphaeromatid genera which bear internal pouches, and for which the number of pouches is known, possess four or five pairs (see Discussion). It seems probable that *Parasphaeroma* also bears four or five pairs.

Genus Parisocladus Barnard, 1914 (S)

Mouthparts: Not metamorphosed.

Brood pouch: 3 pairs of oostegites arising from pereonites 2, 3 and 4. Oostegites short, not reaching mid-line. Brood held in 4 pairs of internal pouches. Pockets absent.

Species examined: *P. stimpsoni* (Heller, 1865) (type-species of genus) BMNH. *P. perforatus* (Milne Edwards, 1840) BMNH.

Remarks

Barnard (1914: 399) said for this genus "Marsupial plates overlapping in middle line". Only two species are known for this genus, and in the specimens examined by the present author the oostegites extended only half way to the mid-line.

Genus Pistorius Harrison & Holdich, 1982b (D)

Mouthparts: Not metamorphosed.

Brood pouch: Oostegites absent. Pouch formed from two opposing pockets covering entire ventral pereon and opening as narrow, transverse slit between fourth pereopods. Brood housed in marsupium thus formed. Internal pouches absent.