The Families and Genera of Hyperiidea (Crustacea: Amphipoda)

THOMAS E. BOWMAN
and
HANS-ECKHARD GRUNER

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY · NUMBER 146

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ABSTRACT

Bowman, Thomas E., and Hans-Eckhard Gruner. The Families and Genera of Hyperiidea (Crustacea: Amphipoda). *Smithsonian Contributions to Zoology,* number 146, 64 pages, 82 figures, 1973.—A synopsis of the amphipod suborder Hyperiidea is presented, including diagnoses of its 2 infraorders, 6 superfamilies, 21 families, and 71 genera. Diagnostic keys are given for the families and genera, and illustrations of significant characters are given for each genus. Several changes are made in the classification of the Hyperiidea. Tribes are changed to infraorders and subtribes to superfamilies, with the necessary nomenclatural changes being made. A new superfamily, Lycaeopsoidea, for the family Lycaeopsidae, and a new family, Anapronoidae, for *Anapronoe,* are proposed. A new genus, *Spinoscina,* is proposed for *Acanthoscina spinosa;* and *Vibilioides* and *Parascelus* are reduced to synonyms of *Vibilia* and *Thyropus,* respectively.

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Contents

The Families and Genera of Hyperiidea (Crustacea: Amphipoda)

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The Hyperiidea are, therefore, those species among the Amphipoda, in which nature indulges in her widest diversities of development. . . .

—JAMES DWIGHT DANA

Introduction

The hyperiid amphipods are important marine crustacean zooplankters, ranking third in abundance behind the Copepoda and Euphausiacea. Contrary to the statement of Hurley (1969), identification of hyperiids often is a frustrating task, not only because of the unsatisfactory state of our knowledge of such genera as *Eupronoe* and *Lycaea* but especially because of the scattered condition of the literature on hyperiid systematics. Much of the essential literature is contained in works of the late 19th century and in reports of the major oceanographic expeditions, which often are not readily available, especially at the smaller and newer marine laboratories. No attempt has been made at a summary of hyperiid systematics since the pioneer monographs of Bovallius (1887a, 1887b, 1887c, 1889, 1890) and Claus (1879a, 1879b), although many important works have since appeared. The need for an up-to-date synopsis has been made more urgent by the increased activity in plankton research in recent years.

A concurrent 2-month visit as consultants at the Indian Ocean Biological Centre, Cochin, India, afforded us the opportunity—free from the usual interruptions at our respective museums—to work closely together in preparing a large part of the present synopsis. Our goal has been to prepare a synopsis that will make it possible for a trained biologist to identify any hyperiid amphipod to genus without having to refer to other publications. We have attempted to write clear and unequivocal diagnoses and we include a section on morphology so that the meanings of terms will be unmistakable. All characters used in our diagnoses are illustrated. We have used published illustrations of other authors freely, sometimes modifying them by eliminating unnecessary or confusing lines or by spreading out overlapping appendages. When adequate illustrations were not available we prepared original drawings.

Sources of the illustration are given in the appendix. The following abbreviations are used in the illustrations:

H	head
A.1	antenna 1
A.2	antenna 2

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Md	mandible
Mx.1	maxilla 1
Mx.2	maxilla 2
Mxp	maxilliped
P.1 to P.7	pereopods 1–7
Up.1 to Up.3	uropods 1–3
T	telson
Us.1	urosomite 1
Us.2+3	double urosomite

Our diagnoses are based in part on published accounts, but we have examined numerous specimens in the collections of the Indian Ocean Biological Centre and our own museums in order to verify, correct, or supplement these accounts. Synonymies are omitted, since they will be given fully in a section on Hyperiidea in the *Catalogus Crustaceorum,* now being prepared. For each family or genus we list a few of the most useful taxonomic works, but we have not attempted to provide an extensive bibliography of the Hyperiidea.

This work is the result of equal effort by each of us, and we should be considered coauthors rather than junior and senior authors.

Morphology

Figure 1 shows a generalized hyperiid with the principal parts labeled.

The body form is quite varied. In some hyperiid amphipods, including the Physosomata and Cystisomatidae, the cuticle is thin and transparent and the muscles are weakly developed. These hyperiids often have rather globular bodies and are weak swimmers. They are mainly bathypelagic. Others, such as Pronoidae (Figures 54–59) and Lycaeidae (Figures 60–64), have rather compact bodies with strong musculature and can swim very rapidly. The plump Platyscelidae and Parascelidae can undergo conglobation (rolling into a ball) by bringing the operculate bases of the left and right pereopods 5 and 6 together ventrally and fitting them against the posteroventral margin of the head (Figure 74). The telson and uropods are tucked under the body and into a unnamed groove on the posterior margin of each pereopod 6 that we propose to call the "telsonic groove." The function of this conglobation is unknown; possibly it aids these strong swimmers to avoid predators by sinking.

The opposite extreme in body form from the conglobate families is found in the slender elongate Oxycephalidae, culminating in the needle-shaped *Rhabdosoma* (Figure 70).

The head is typically globular, with most of its surface occupied by the compound eyes. The dorsal midline is free from ommatidia and serves as a line of attachment for a muscle that inserts on the dorsal surface of the midgut. In the Physosomata the eyes are small or absent and situated on the sides of the rather short head. Among the Physocephalata the eyes are small or medium-sized only in *Vibilia* and *Bougisia* where they are located on the sides of the cuboidal head. In the Oxycephalidae the anterior part of the head in front of the eyes is drawn out into a short-to-long triangular rostrum.

The pereon comprises 7 segments (pereonites 1–7 =thoracic somites 2–8). Some of the anterior pereonites may be fused in certain genera. The coxae (= coxal plates), or the proximal segments of the thoracic legs, may be fused with the pereonites or separated from them by a suture; they are never enlarged as in many Gammaridea.

The abdomen is formed of the pleon and the urosome. The pleon contains 3 segments or pleonites. The urosome, which is composed of 3 segments or urosomites in most gammarideans is 2-segmented in hyperiids, urosomites 2 and 3 being fused to form the double urosomite. The abdomen ends in a thin triangular piece, the telson, which may be fused with the double urosomite. The telson is never divided or incised at its apex as it is in many Gammaridea.

The 2 pairs of antenna, antenna 1 and antenna 2, may be inserted on either the anterior or the ventral surface of the head. The site of insertion and the structure of antennae 1 and 2 are the major criteria by which the superfamilies of Physocephalata are distinguished (Figure 2). Each antenna consists of a basal part, the peduncle, followed by a flagellum. In the Gammaridea the peduncle is 3-segmented in antenna 1 and 5-segmented in antenna 2, but in the Hyperiidea the number of peduncle segments is often fewer in antenna 1 and always fewer in antenna 2. The second segment of antenna 2, which bears the gland cone on which the antennal gland opens, is fused to the head, hence the peduncle consists of only 3 (or fewer) segments.

The flagellum may be filiform and multisegmented, composed of a few long segments that fold upon

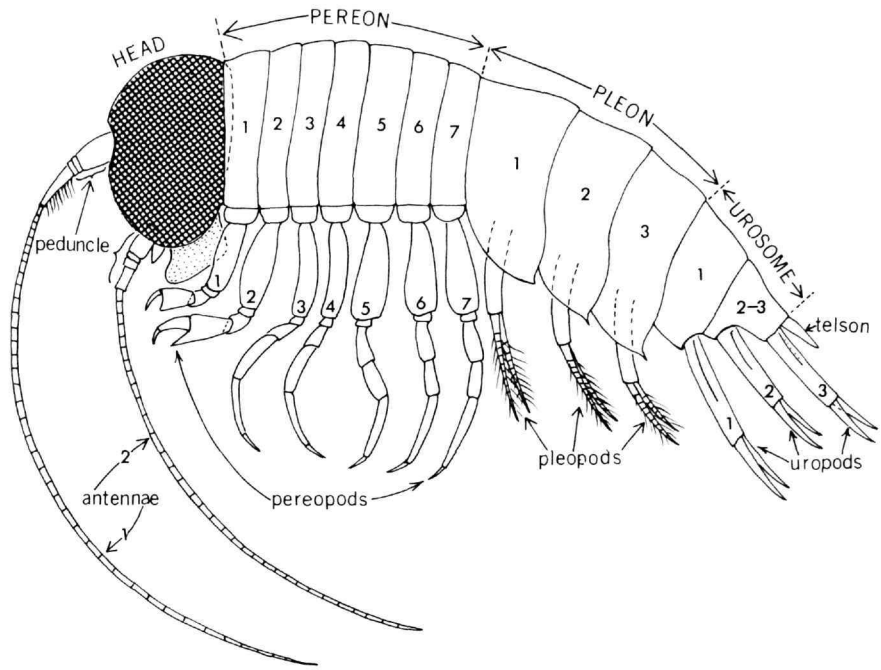

FIGURE 1.—Diagram of a hyperiid amphipod, based on ♂ *Hyperia*.

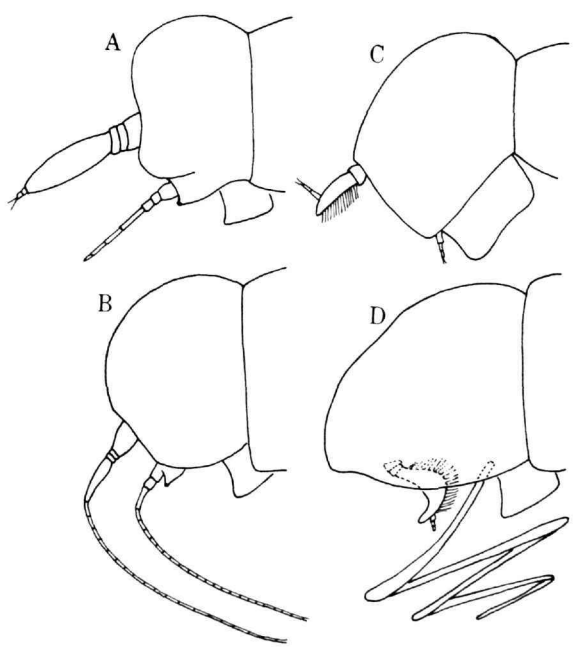

FIGURE 2.—Diagrams of ♂ heads of the 4 superfamilies of Physocephalata: A, Vibilioidea; B, Phronimoidea; C, Lycaeopsoidea; D, Platysceloidea.

each other, or reduced to a single large segment which may be followed by 1 or a few small or rudimentary additional segments. The distal segments may be inserted at the tip of the first segment (terminally) or proximally to the tip (subterminally). A secondary or accessory flagellum, present in many Gammaridea, is never found in Hyperiidea. Both antennae are usually reduced in the female, especially antenna 2, which may be rudimentary or absent. In a few instances antenna 2 is absent in the male.

The mouthparts of the Hyperiidea (Figure 3) are much reduced compared with those of the Gammaridea. The mandible may or may not have a 3-segmented palp. Frequently the palp is present in the male and absent in the female of the same species. Rarely it is reduced to 1 segment (*Pseudomimonectes*) or 2 segments (♀ *Tryphana*). The molar may be rudimentary or absent. Maxilla 1 has an inner lobe in the Physosomata, but not in the Physocephalata, and the palp is 1-segmented. Both maxilla 1 and maxilla 2 may be rudimentary (Lycaeidae) or absent (Oxycephalidae). In the maxillipeds the palp is usually absent, although a 1-

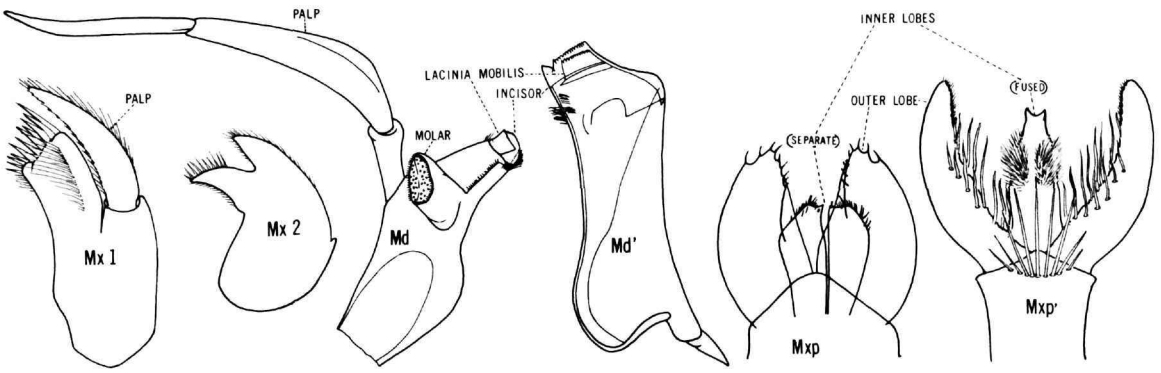

FIGURE 3.—Mouthparts of some Hyperiidea: Md, *Cyllopus magellanicus;* **Md', *Chuneola paradoxa*** (molar and palp absent); Mx.1, Mx.2, *Cyllopus magellanicus;* **Mxp, *Proscina magna*** (inner lobes separate); **Mxp'**, *Parathemisto gaudichaudii* (inner lobes fused).

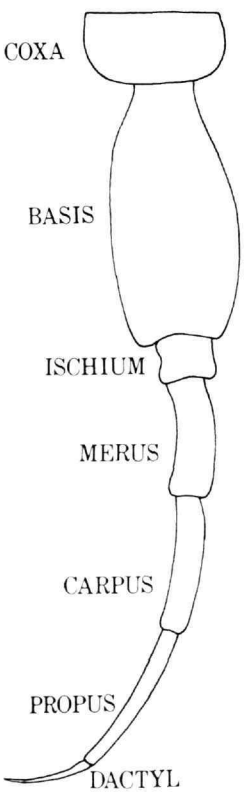

FIGURE 4.—Diagram of an amiphipod pereopod.

segmented rudiment is present in a few instances. The inner lobes are partly or completely separate in most of the Physosomata, but are completely fused into a single median lobe in other hyperiids.

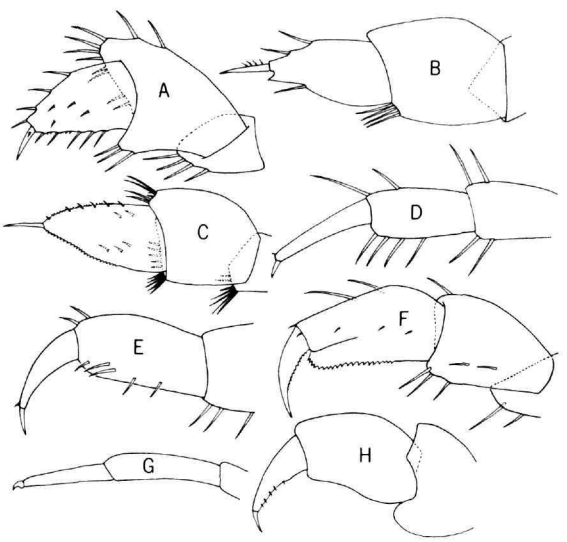

FIGURE 5.—Distal segments of simple hyperiid pereopods: A, *Lanceola*; B, *Tryphana*; C, *Pronoe*; D, *Paratyphis*; E, *Thyropus;* F, *Vibilia*; G, *Dairella*; H, *Sympronoe*. All drawings are of pereopod 1, except G, which is of pereopod 2.

In a few species the inner lobe is rudimentary or absent.

Each of pereonites 1–7 bears a pair of 7-segmented appendages, the pereopods. The proximal segment, or coxa, forms an immovable flat coxal plate fixed to the lateral surface of the pereonite and sometimes fused to it. The remaining 6 segments forming the functional leg are the basis, ischium, merus, carpus, propus, and dactyl (Figure 4). When a pereopod is not prehensile it is said to be simple (Figure 5). A prehensile pereopod may be either

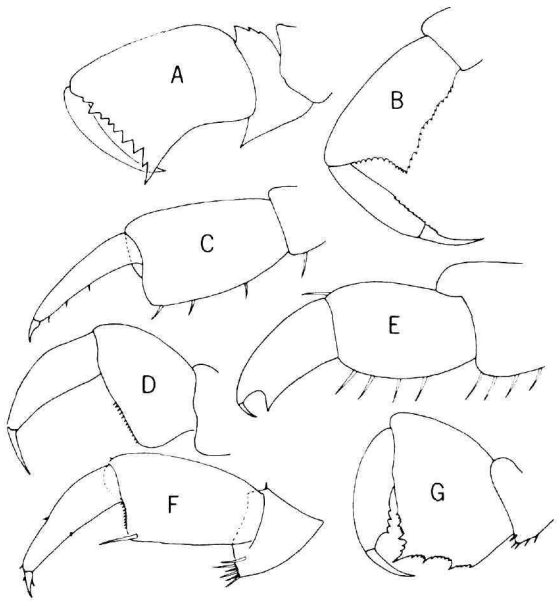

FIGURE 6.—Distal segments of subchelate hyperiid pereopods: A, *Phrosina*, pereopod 4; B, *Anchylomera*, pereopod 3; C, *Simorynchotus*, pereopod 2; D, *Eupronoe*, pereopod 1; E, *Tetrathyrus*, pereopod 2; F, *Paraphronima*, pereopod 1; G, *Brachyscelus*, pereopod 2.

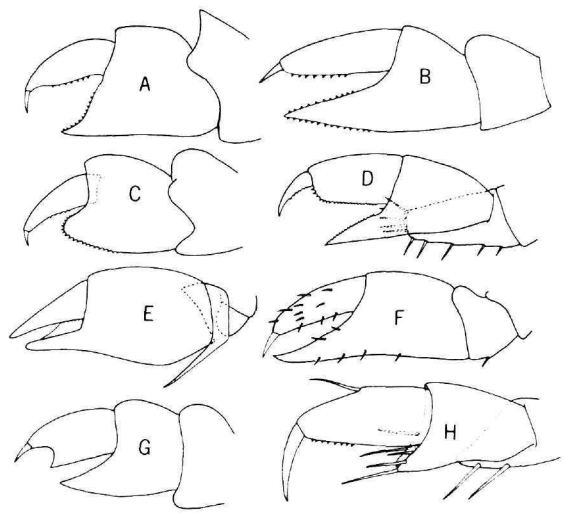

FIGURE 7.—Distal segments of chelate hyperiid pereopods: A, *Parapronoe*; B, *Platyscelus*; C, *Sympronoe*; D, *Vibilia*; E, *Phronimopsis*; F, *Oxycephalus*; G, *Amphithyrus*; H, *Lestrigonus*. A–G, pereopod 2; H, pereopod 1.

subchelate or chelate. In the Hyperiidea prehension is usually effected by closure of the propus against the expanded carpus, whereas in Gammaridea the dactyl closes against the expanded propus. In a subchelate pereopod (Figure 6) the prehensile surface of the carpus is its widened distal margin or its convex anterior or posterior margin, but in a chelate pereopod the carpus is produced distally into a carpal process against which the propus closes (Figure 7). When the carpal process is small it is difficult to decide whether the pereopod is chelate or subchelate. Here the term "weakly chelate" may be used, but illustrations show the condition far more clearly than words. Rarely, a chela or subchela is formed between the dactyl and propus (Figures 19, 35, 45) and a complex chela is found in *Amphithyrus* (Figure 7G).

Pereopods 3 and 4 are usually slender and simple, but in *Parathemisto* (Figure 43), *Phronimopsis* (Figure 45), *Anchylomera* (Figure 6B), and *Phrosina* (Figure 6A) they are prehensile. Pereopod 5 has a strong subchela in Phronimidae and Anchylomeridae. In pereopods 5 and 6 the basis is often quite broad, especially in the Parascelidae and Platyscelidae, where they form broad opercula covering the other pereopods during conglobation. In these families pereopod 6 is especially enlarged; on its posterior margin is the telsonic groove, and on its lateral surface is usually a pocket-shaped fissure of unknown function (Figure 74). Pereopod 7 is often smaller than the other pereopods, sometimes consisting only of the basipod (Figure 74).

In the Lanceolidae and Chuneolidae the apex of the propus in some pereopods is expanded into a hood surrounding the base of the dactyl (Figure 8). The dactyl can be flexed posteriad so that it lies within the spoon-shaped cavity within the hood, hence it has been called a "retractile dactyl," but we propose the term "hooded dactyl," which more accurately describes the structure.

The gills are hollow sacs arising from the medial surfaces of the coxae. Typically there are 5 pairs, on pereonites 2–6, but they may be reduced to 2, 3, or 4 pairs. The gills may have transverse pleats or folds, which increase the respiratory surface.

Medial to the gills, on mature females, are the oostegites, commonly on pereonites 2–5. Oostegites are thin plates which overlap to form a pouch beneath the pereon in which the eggs and young are brooded. In the Hyperiidea the oostegites

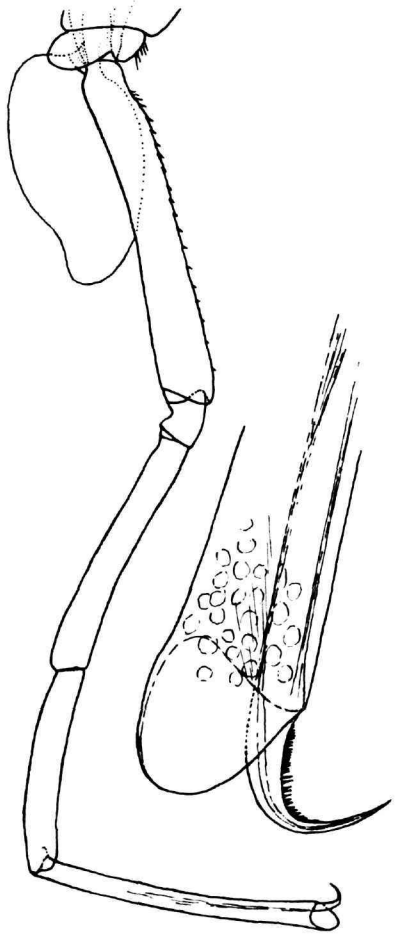

FIGURE 8.—Percopod 6 of *Scypholanceola vanhoeffeni*, showing hooded dactyl.

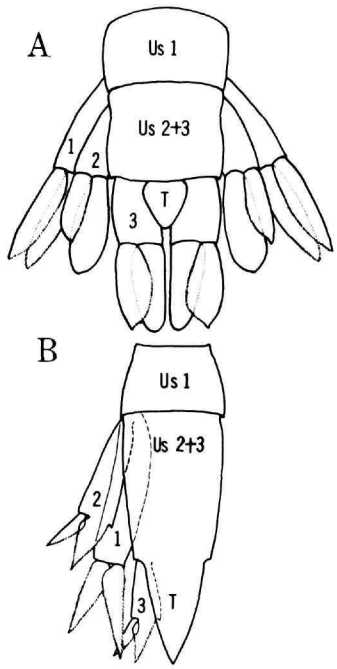

FIGURE 9.—Urosomes: A, *Pronoe capito* (telson not fused with double urosomite; endopods not fused with protopods); B, *Oxycephalus piscator* (telson fused with double urosomite; endopods of uropods 2 and 3 fused with protopods).

usually do not have marginal setae as in the Gammaridea. In *Rhabdosoma* the oostegites are reduced in size and their function is taken over by the gills.

Each pleonite bears a pair of biramous swimming appendages, the pleopods. Thus far they have not been shown to be useful in taxonomy, but they have not been closely studied.

The urosome bears 3 pairs of uropods, each consisting of a proximal segment, the protopod, bearing distally an exopod and an endopod (Figure 9).

The exopods and endopods are flattened, moderately to very broad, rarely quite narrow, but never styliform as in some Gammaridea. One or more of the endopods, and less commonly the exopods, may be fused with the protopod. In the Anchylomeridae each uropod is a single leaflike segment, and in the Cystisomatidae and the female *Phronimella* uropod 2 is entirely absent.

Natural History

The Hyperiidae are entirely pelagic, mostly oceanic, although a few species are found in coastal waters. The swimming ability, which we have observed in living specimens, varies from feeble movements of the limbs in the weakly muscled *Cystisoma* to very rapid swimming in *Parapronoe*, which has strongly developed pleonal muscles. Feeding habits are largely unknown. The appendages lack the rows of plumose setae found in filter-feeding Crustacea. Some species are definitely known to be associated with medusae or salps, e.g., *Hyperia* (Hollowday, 1947; Pirlot, 1932; Dahl, 1959a, 1959b; Bowman, Meyers, and Hicks, 1963; Laval, 1968a). Dahl (1959a, 1959b) identified

nematocysts from the host in the gut of *Hyperia galba* and concluded that it feeds on the medusa. But the observations of Pirlot (1932) and Bowman, Meyers, and Hicks (1963) suggested that the host tissues are not the only and perhaps not the principal source of nourishment. Possibly the medusa serves as a feeding platform from which the amphipod makes short excursions to collect food particles, including some from food captured by the medusa. Certainly the well-developed grinding surface on the molars of *Hyperia* mandible is fitted for chewing tougher material than the gelatinous tissues of a medusa.

Observations on living hyperiids have been made in recent years by Laval (1963, 1968a, 1968b, 1972), who raised *Lestrigonus schizogeneios* and *Bougisia ornata* with their host, the leptomedusa *Phialidium*. As long as the medusa was adequately fed (in this case on *Artemia*) the amphipod shared the food of its host. If the medusa did not capture enough food, the amphipod fed on the host tissues, beginning with the gonads.

The Phronimidae live in transparent "barrels," open at both ends, made by remodeling pyrosomes or siphonophores. Laval (1968b) describes how a nectophore of the siphonophore *Abylopsis* is fashioned into a barrel by *Phronima curvipes*. The *Phronima* resides in the barrel, capturing prey passing within reach with the 3rd pereopods. It probably feeds mainly on slow-moving and soft-bodied forms. By holding the abdomen outside of one of the barrel entrances and beating the pleopods, the *Phronima* can propel the barrel through the water.

In the genus *Vibilia*, ovigerous females attach themselves to salps during the approximately 20 days that the eggs are being incubated in the marsupium. After the eggs hatch, the mother reaches into her marsupium and grasps a larva with the digitiform dactyls of her 7th pereopods and places it on the surface of a salp. The larva, which cannot swim since the pleopods and uropods have not yet developed, enters the atrium of the salp by way of one of the siphons and feeds on the tissues of its host until it has developed to the stage where it can become planktonic (Laval, 1963).

Members of the deep-water family Lanceolidae are believed to live on deep-water medusae and siphonophores and feed on their tissues. The hooded dactyls of pereopods 5–7 (or of 6 and 7 in *Prolanceola*) enable them to clasp the host tissue firmly.

Vinogardov (1957) found the guts of Lanceolidae full of a detritus-like mass containing many small bodies that appeared to be nematocysts. In Lanceolidae stomachs, Woltereck (1927) found polychaete worms (Alciopidae), chaetognaths, and even the anterior end of a rather large cephalopod larva. He felt certain that such prey could not have been captured by the slow-moving Lanceolidae and must have been obtained secondarily from the medusa or siphonophore host.

Doubtless many more associations between hyperiids and their hosts, probably mostly gelatinous animals such as coelenterates and thaliaceans, remain to be elucidated. In particular the Platysceloidea, with their reduced mouthparts, must feed on soft tissues. However, some hyperiids appear to be entirely free-living. *Parathemisto* is predaceous on other plankters (Bigelow, 1926:107; Dunbar, 1946; Bowman, 1960); and unpublished studies of gut contents indicate that *Primno* is also to a large extent predaceous.

Classification

The classification used here is essentially that of Pirlot (1929) but incorporates the additions of Stephensen and Pirlot (1931). Our primary aim is not to revise the classification of the Hyperiidea, but certain nomenclatural changes have been necessary to bring the classification into harmony with modern taxonomic practice and the International Code of Zoological Nomenclature. Preparation of the diagnoses forced us to examine in detail the characters of all taxa of hyperiids at and above the generic level. As a result we have made the changes given below.

INFRAORDERS AND SUPERFAMILIES.—We consider the names "Hyperiidea Gammaroidea" and "Hyperiidea Genuina" of Woltereck (1909) and "Hyperiidea Physosomata" and "Hyperiidea Eugenuina" of Pirlot (1929) for their tribes (our infraorders; see below) to be singularly inappropriate and meaningless. Moreover, they are double words where single names are required. This legal technicality gives us the opportunity, which we gladly seize to propose the new infraorder

name Physocephalata (from "physos," swollen, plus "cephalon," head), referring to the large head of most of its members. The name has the advantage of similarity in construction to "Physosomata," the other infraorder, which is characterized by the swollen pereon.

Tribes have been changed to infraorders and subtribes to superfamilies. These changes were made to conform with the usual rank of the category "tribe," between family and genus. Since superfamily names are formed by adding a standard ending (usually "oidea") to the stem of one of the included families, we have replaced the old names of subtribes. Thus, Lanceoliformata and Sciniformata become Lanceoloidea and Scinoidea, using the original stems. We regret that it is necessary to replace Bovallius' (1890) Recticornia, Filicornia, and Curvicornia, which have been widely used since 1890, but they do not qualify as names of superfamilies. In place of Filicornia we have chosen Phronimoidea rather than Hyperioidea, in order to avoid confusion with Hyperiidea. For Curvicornia we have selected Platysceloidea over other possibilities because Claus (1879b, 1887) included all the families of Curvicornia in his "Platysceliden." Although the family Lycaeopsidae until now has been included in the Curvicornia, we are convinced that it differs sufficiently from the other families to warrant for it the establishment of a new superfamily, Lycaeopsoidea.

FAMILIES.—Stephensen (1925) assigned *Anapronoe* to the family Pronoidae without giving his reasons for placing it in that family rather than in the Lycaeidae. The principal criteria by which the two families may be distinguished are found in antenna 2 of the female, mandibular palp, maxillae 1 and 2, and pereopod 7. Of these, only pereopod 7 has been described for *Anapronoe*, and in this character *Anapronoe* agrees with the Lycaeidae rather than the Pronoidae. We have been unable to assign *Anapronoe* to either family, since it shares some characters with each and some with neither. Redefining either family to enable it to encompass *Anapronoe* would drastically alter that family's definition and increase the difficulty of distinguishing between the two families; hence, we have erected a new family, Anapronoidae, for Stephensen's genus.

GENERA.—We have reduced 3 genera to synonyms of older genera because the characters used to separate them seemed insufficient. *Vibilioides* Chevreux (1905) differs from *Vibilia* Milne Edwards (1830) only in the reduced number of segments on pereopod 7. Since Hurley (1955) has shown that this character is variable in *Cyllopus*, the only other genus of Vibiliidae, we do not believe it to have generic value. *Vibilioides* therefore becomes a synonym of *Vibilia*, and its type and only species becomes *Vibilia alberti* (Chevreux).

Similarly, as Stephensen (1925) pointed out, *Thyropus* Dana, 1852, differs from *Parascelus* Claus, 1879, only in the longer pereopod 6, a difference of less than generic significance. We are therefore combining the 2 genera under the older name *Thyropus*. The family name remains Parascelidae, in accordance with Article 40 of the International Code.

Metalycaea was proposed by Stephensen (1925) for a new species, *M. globosa*, represented by 3 females in the collections of the *Thor* expedition. We believe that *M. globosa* is the female of *Lycaea serrata* Claus, described by Claus (1879b) from the male. Stephensen had 5 males of *L. serrata* but did not associate them with his *M. globosa*, perhaps because they did not occur at any of the same stations. Shoemaker's (1945) 2 males and 1 female of *L. serrata* were obtained in 3 different net tows, but he recognized that they were conspecific and gave what he thought was the first description of a female *L. serrata*. His drawing of the whole animal does not resemble closely Stephensen's habit figures, since the latter are of immature specimens (4 and 5 mm), whereas Shoemaker's ovigerous female measured 10.5 mm. The appendages drawn by Stephensen were from his 8-mm female and show good agreement with those figured by Shoemaker. Shoemaker's males agree closely with Claus' description and illustrations of *L. serrata*.

We propose 1 new genus, *Spinoscina*. *Acanthoscina spinosa* Chevreux, 1914, placed in *Ctenoscina* by Wagler (1926), has been shown by Vinogradov (1957) to have characters of both *Ctenoscina* and *Acanthoscina*. Rather than combine these genera, we have elected to establish the new genus *Spinoscina* for *S. spinosa*.

We have omitted from this synopsis the genera *Cyllias* Bovallius, 1887, and *Daira* Milne Edwards, 1830 (synonyms: *Dairilia* Dana, 1953; *Eudaira*

Bovallius, 1889). *Cyllias* was proposed as a genus of Cyllopodidae (now included in Vibiliidae) by Bovallius (1887b) for *Hyperia tricuspidata* Streets (1877). Both *Dairilia* and *Eudaira* were substituted for *Daira* in the mistaken belief that the latter name was preoccupied by *Daira* Leach, a genus of crabs. In fact, no such genus was ever published by Leach, and the crab genus *Daira* de Haan (1833) is a junior homonym of *Daira* Milne Edwards. However, the International Commission on Zoological Nomenclature (1957) has placed *Daira* Milne Edwards on the Official Index, thereby suppressing it, and has placed both *Daira* de Haan and *Dairilia* Dana on the Official List, making them the valid names for the crab and amphipod genera respectively. Both *Cyllias* Bovallius and *Daira* Milne Edwards were described in vague terms and were not illustrated, and we are unable to assign them even to families.

REVISED CLASSIFICATION.—With the above changes, our classification is as follows:

Order Amphipoda
- Suborder Hyperiidea
  - Infraorder Physosomata
    - Superfamily Lanceoloidea
      - Family Lanceolidae
      - Chuneolidae
      - Microphasmidae
    - Superfamily Scinoidea
      - Family Archaeoscinidae
      - Scinidae
      - Mimonectidae
      - Proscinidae
  - Infraorder Physocephalata
    - Superfamily Vibilioidea
      - Family Cystisomatidae
      - Vibiliidae
      - Paraphronimidae
    - Superfamily Phronimoidea
      - Family Hyperiidae
      - Dariellidae
      - Anchylomeridae
      - Phronimidae
    - Superfamily Lycaeopsoidea
      - Family Lycaeopsidae
    - Superfamily Platysceloidea
      - Family Pronoidae
      - Anapronoidae
      - Lycaeidae
      - Oxycephalidae
      - Platyscelidae
      - Parascelidae

Suborder HYPERIIDEA H. Milne Edwards, 1830

Body form ranging from extremely slender and elongate to nearly globular. Head and pereon generally tumid and round in cross section or somewhat flattened dorsoventrally. Eyes sometimes small, more often enormously developed, frequently covering most of surface of head. Pereonite 1 never fused with head. Coxae small, often fused with pereonites. Pleon usually powerfully developed; urosomites 2 and 3 fused (=double urosomite). Telson entire, never cleft or incised, without setae. Antenna 1 without accessory flagellum. Antennae 1 and 2 often reduced in female. Maxilla 1 with or without inner lobe; palp 1-segmented. Maxilliped with inner lobes usually fused; palp absent. Pereopods 1 and 2 infrequently simple, usually subchelate or chelate or intermediate between these 2 conditions; prehension almost always between carpus and propus rather than between propus and dactyl as in Gammaridea. One or more of pereopods 3–7 also sometimes prehensile. Pereopod 7 often reduced in size and number of segments. Uropods never with 2-segmented rami; without long marginal setae. Gills varying in number from 5 pairs (on pereonites 2–6) to 2 pairs (on pereonites 5 and 6). Gut with 1 pair of digestive caecae and no rectal glands. Heart with 2 (rarely 3) pairs of ostia.

Infraorder PHYSOSOMATA Pirlot, 1929

Head small, usually shorter than pereonite 1. Eyes small, composed of few facets, often completely absent. Mandible without molar. Maxilla 1 with inner lobe. Maxilliped almost always with inner lobes separate. Pereopods 1 and 2 simple; rarely, pereopod 1 chelate.

References: Stephensen and Pirlot, 1931:501; Vinogradov, 1957:186.

The infaorder is divided into 2 superfamilies. Since the characters used to separate the superfamilies are sometimes difficult to see, we give a key to the seven families of the infraorder.

Key to the Families of Physosomata

1. Mandible with 3-segmented palp 2
   Mandible without palp, rarely with rudimentary 1-segmented palp 4
2. At least pereopods 6 and 7 with spoon-shaped propus and hooded dactyl ..... VII. LANCEOLIDAE
   Pereopods without spoon-shaped propus and hooded dactyl 3
3. Carpus of pereopods 1 and 2 not broadened distally. Mandible with narrow serrate incisor and well-developed lacinia mobilis ..... I. ARCHAEOSCINIDAE
   Carpus of pereopods 1 and 2 broadened distally. Mandible with broad incisor, nearly as broad as body of mandible; lacinia reduced ..... V. MICROPHASMIDAE
4. Antenna somewhat shorter than head. Pereopods 3–7 with spoon-shaped propus and hooded dactyl ..... VI. CHUNEOLIDAE
   Antenna 1 much longer than head. Pereopods 3–7 without spoon-shaped propus; pereopods 5–7 rarely with hooded dactyl 5
5. Pereopod 5 longer than other pereopods; basis usually with serrate margin (s). Endopods of all uropods fused with protopods. Inner lobes of maxilliped always fused; more or less reduced, sometimes completely lacking ..... IV. SCINIDAE
   Pereopod 5 not longer than other pereopods; basis with smooth margins. Uropods with free exopods and endopods. Inner lobes of maxilliped well developed and separate 6
6. Anterior pereonites of female much inflated. Antenna 1 inserted in middle of anterior surface of head. Antenna 2 of male at most one-third as long as antenna 1 ..... II. MIMONECTIDAE
   Body form of female like that of male; anterior pereonites not inflated. Antenna 1 inserted on dorsal part of anterior margin of head. Antenna 2 of male as long as antenna 1 ..... III. PROSCINIDAE

Superfamily SCINOIDEA, new name

Synonym: Sciniformata Stephensen and Pirlot, 1931.

Male always with body of normal form, not inflated. Mandible with well-developed lacinia mobilis. Maxilla 2 with only a few distal spines on inner and outer lobes. Maxilliped with inner lobes either completely separate or completely fused. Pereopods 5–7 very rarely with hooded dactyls. Gills on pereonite 2, when present, as large as those of following pereonites; gills rarely absent on pereonite 2 or 3. Oostegites on pereonites 2–5, usually with marginal setae.

Four families (Archaeoscinidae, Mimonectidae, Proscinidae, Scinidae).

I. Family ARCHAEOSCINIDAE Stebbing, 1904

Body form very different in male and female. Male slender, similar to *Scina;* total length close to 2 mm. Female with pereonites 1–5 inflated into a spherical form; head immersed in pereonite 1; pereonites 6 and 7 and pleon narrow; total length up to 6 mm. Cuticle transparent. Coxae distinct from pereonites. Telson very small, triangular, not fused with double urosomite. Eyes very small or absent. Antenna 1 with large, densely setose 1st flagellar segment; distal segments short, slender. Antenna 2 about half as long as antenna 1, 5- or 6-segmented. Mandible with long, 3-segmented palp; incisor very narrow; lacinia mobilis well developed. Maxilliped with large outer lobes; inner lobes small, fused proximally, separate distally. All pereopods simple, without chela or subchela; dactyl not hooded; carpus of pereopods 1 and 2 not broadened distally. Uropods long and very narrow; all rami free. Gills on pereonites 3–6.

One genus.

1. *Archaeoscina* Stebbing, 1904

FIGURE 10

Type-species: *Archaeoscina bonnieri* Stebbing, 1904.

With the characters of the family.

References: Bovallius, 1889:70; Woltereck, 1906: 190; Stephensen and Pirlot, 1931:534; Vinogradov, 1956:200.

II. Family MIMONECTIDAE Bovallius, 1885

Body form different in male and female. Male slender; head as high as pereonite 1. Female with pereonites 1–6 strongly inflated; pereonite 7 and

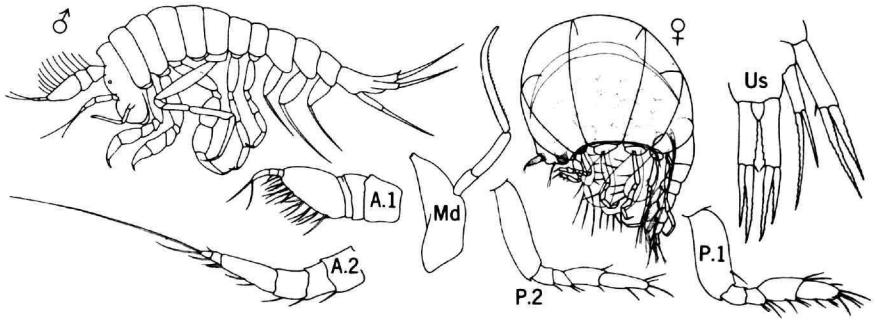

FIGURE 10.—*Archaeoscina.*

pleon slender; head much smaller than pereonite 1. Total length 6–24 mm. Eyes very small and composed of few facets or completely lacking. Coxae distinct from pereonites. Telson small, triangular, not fused with double urosomite. Antenna 1 much longer than head, inserted in middle of anterior margin of head; with short peduncle, large 1st flagellar segment and a few short distal flagellar segments. Antenna 2 in male composed of few segments, not more than one-third as long as antenna 1; in female rudimentary, with inflated proximal segment and 1 or 2 stubby distal segments. Mandible without molar or palp, rarely with rudimentary 1-segmented palp; lacinia mobilis well developed. Maxilliped with large rounded outer lobes (sometimes with 1-segmented rudimentary palp); inner lobes small, separate. Pereopods all simple, without chela or subchela; dactyls not hooded. Uropods long, narrow; exopods and endopods free. Gills on pereonites 2–6.

Two genera.

Key to the Genera of Mimonectidae

Mandible without palp ..... 2. ***Mimonectes***
Mandible with 1-segmented rudimentary palp ..... 3. ***Pseudomimonectes***

2. *Mimonectes* Bovallius, 1885

FIGURE 11

Type-species: *Mimonectes loveni* Bovallius, 1885 (by present designation).

Mandible without palp. Pereopods 6 and 7, propus slender; dactyl at most weakly curved.

References: Stephensen and Pirlot, 1931:503; Vinogradov, 1957:205.

3. *Pseudomimonectes* Vinogradov, 1960

FIGURE 12

Type-species: *Pseudomimonectes robustus* Vino-

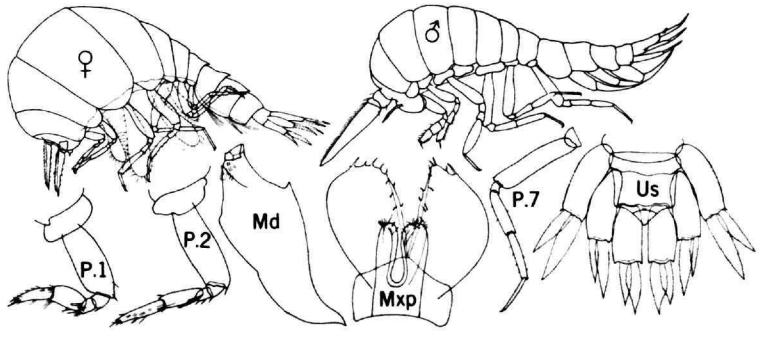

FIGURE 11.—*Mimonectes.*

gradov, 1960a. (The genus is based on a single, sexually immature specimen.)

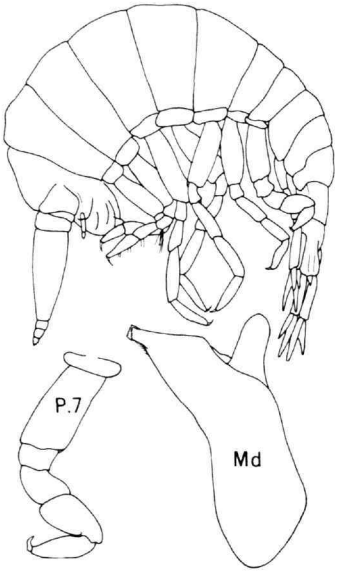

FIGURE 12.—*Pseudomimonectes*.

Mandible with rudimentary 1-segmented palp. Pereopods 6 and 7 with broad propus and strong, claw-shaped dactyl forming a prehensile organ.

Reference: Vinogradov, 1960a:219.

III. Family PROSCINIDAE Pirlot, 1933

Body in both male and female normal, not at all or only slightly inflated; total length 4.5–18 mm. Coxae separate from pereonites. Telson small, not fused with double urosomite. Eyes absent. Antenna 1 much longer than head, inserted on dorsal part of anterior surface of head, with large 1st flagellar segment and a few short distal segments. Antenna 2 in male slender, about as long as antenna 1; in female short or rudimentary. Mandible without palp or molar; incisor serrate. Maxilliped with large outer lobes; inner lobes separate. Pereopods 1 and 2 simple; carpus not broadened. Pereopods 5–7 sometimes with hooded dactyls. Uropods long and slender, with free exopods and endopods. Gills on pereonites 2–6.

Two genera.

Reference: Pirlot, 1939:24.

Key to the Genera of Proscinidae

Antenna 1 with 1st flagellar segment conical. Antenna 2 of female reduced to unsegmented knob. Pereopods 5–7 without hooded dactyls ..... 4. ***Proscina***

Antenna 1 with 1st flagellar segment having nearly parallel margins. Antenna 2 of female 4-segmented. Pereopods 5–7 with hooded dactyls ..... 5. ***Mimoscina***

4. *Proscina* Stephensen and Pirlot, 1931

FIGURE 13

Type-species: *Parascina stephenseni* Pirlot, 1929.

Both sexes with normal body, not inflated. Antenna 1 with 1st flagellar segment long and conical. Antenna 2 of female reduced to an unsegmented knob. Lacinia mobilis of left mandible as broad as incisor. Pereopods 5–7 without hooded dactyls.

References: Pirlot, 1939:25; Vinogradov, 1956: 202; 1957:208; 1960a:222; 1964:127.

5. *Mimoscina* Pirlot, 1933

FIGURE 14

Type-species: *Mimoscina gracilipes* Pirlot, 1933.

Body of female weakly inflated. Antenna 1 with 1st flagellar segment very long, with nearly parallel margins. Antenna 2 of female composed of 4 free segments. Lacinia mobilis of left mandible not as broad as incisor. Pereopods 5–7 with sharply curved, hooded dactyls.

References: Pirlot, 1933:2; 1939:29; Vinogradov, 1960a:222; 1962:13.

IV. Family SCINIDAE Stebbing, 1888

Body slender, usually flattened dorsoventrally; total length including antennae and uropods, 5–30 mm. Head small, wider than long. Eyes small, sometimes absent. Pereon always broader than pleon, both sometimes with middorsal spines. Pereonites 1 and 2 occasionally fused. Coxae dis-

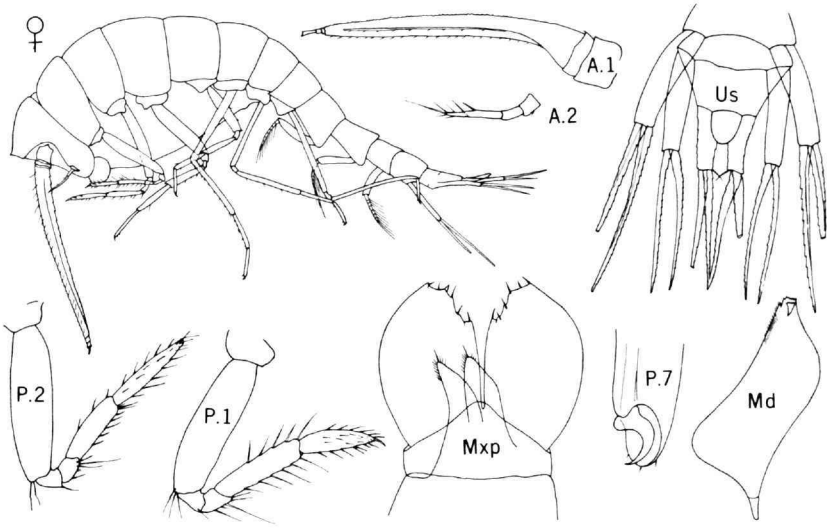

FIGURE 13.—*Proscina.*

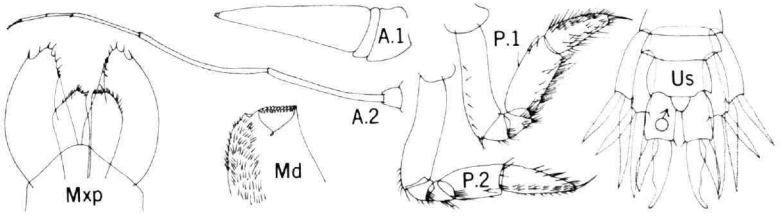

FIGURE 14.—*Mimoscina.*

tinct. Telson quite small. Antennae 1 as long as pereon or as pereon and pleon combined, rod-shaped, inserted on dorsal anterior margin of head, 2- or 3-segmented, with very long 2nd segment, 3rd segment minute or absent. Antenna 2 inserted on ventral anterior margin of head; in male long, slender, and folded beneath body, or sometimes rudimentary; in female always rudimentary. Mandible without palp or molar. Maxilliped with outer lobes well developed, rarely reduced; inner lobes completely fused, sometimes absent. Pereopods slender, without spoon-shaped propus and hooded dactyls; pereopod 1 simple, rarely chelate; pereopod 2 always simple. Pereopod 5 the longest; basipod of pereopod 5 often broadened and armed with marginal teeth. All uropods with endopods fused with protopods; exopods short, spiniform. Gills on pereonites 2–6, 3–6, or 4–6. Oostegites with marginal setae.

References: Wagler, 1926:319; 1927:85; Vinogradov, 1960a:224.

Four genera.

Key to the Genera of Scinidae

1.	Body segments without middorsal spines	6. ***Scina***
	Body segments with middorsal spines	2
2.	Pereonites 1 and 2 fused; pereon with 6 middorsal spines	3
	Pereonites 1 and 2 separate; pereon with 5 or 7 middorsal spines	8. ***Ctenoscina***
3.	Pereopod 1 simple	7. ***Acanthoscina***
	Pereopod 1 chelate	9. ***Spinoscina***

6. *Scina* Prestandrea, 1833

FIGURE 15

Type-species: *Scina ensicorne* Prestandrea, 1833.

Body segments without middorsal spines. Pereonites 1 and 2 separate. Antenna 2 of male well developed, folded beneath body. Maxilliped with inner lobe present; outer lobes well developed. Pereopod 1 simple. Pereopod 5 without fusion of segments. Gills on pereonites 2–6 or 3–6.

References: Wagler, 1926:324; 1927:85; Hurley, 1956:4; Vinogradov, 1960a:224.

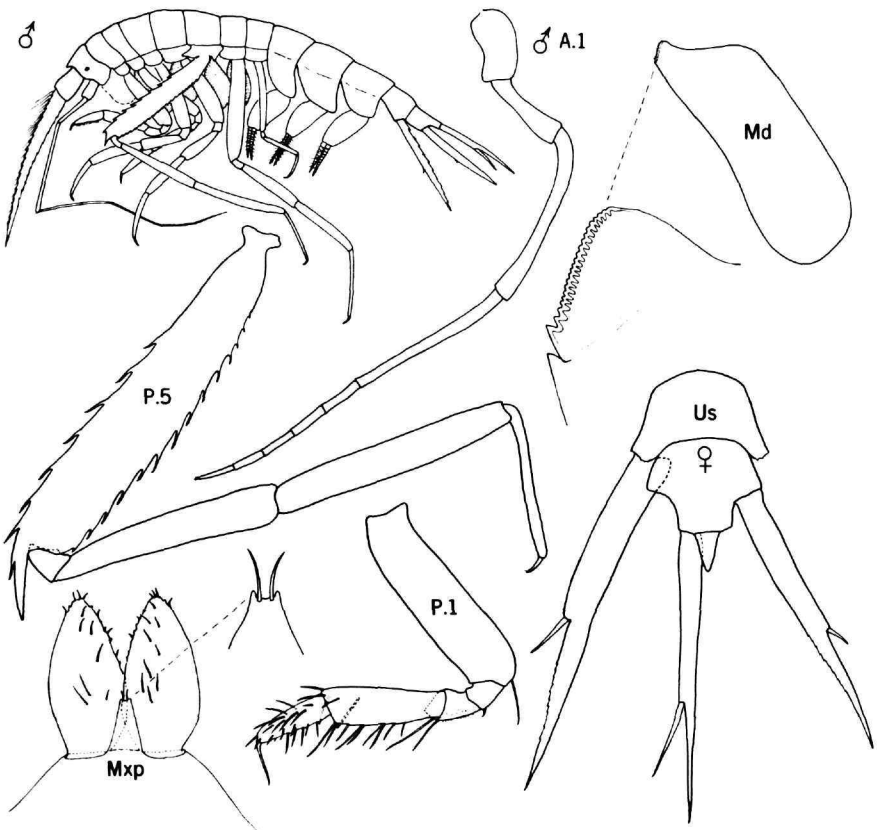

FIGURE 15.—*Scina*.

7. *Acanthoscina* Vosseler, 1900

FIGURE 16

Type-species: *Scina acanthodes* Stebbing, 1895.

Body segments with middorsal spines, 6 on pereon, 3 on pleon. Pereonites 1 and 2 fused. Second segment of male antenna 1 expanded at base. Antenna 2 of male and female represented by a pair of long sharp spines. Maxilliped without inner lobe; outer lobes reduced to two small oval plates. Pereopod 1 simple. Pereopod 5 with carpus, merus, and propus fused. Gills on pereonites 2–6.

Reference: Wagler, 1926:424.

8. *Ctenoscina* Wagler, 1926

FIGURE 17

Type-species: *Ctenocina tenuis* Wagler, 1926 (by present designation).

Body segments with middorsal spines, 5 or 7 on pereon, 3 or 4 on pleon. Pereonites 1 and 2 separate. Antenna 2 of male and female represented

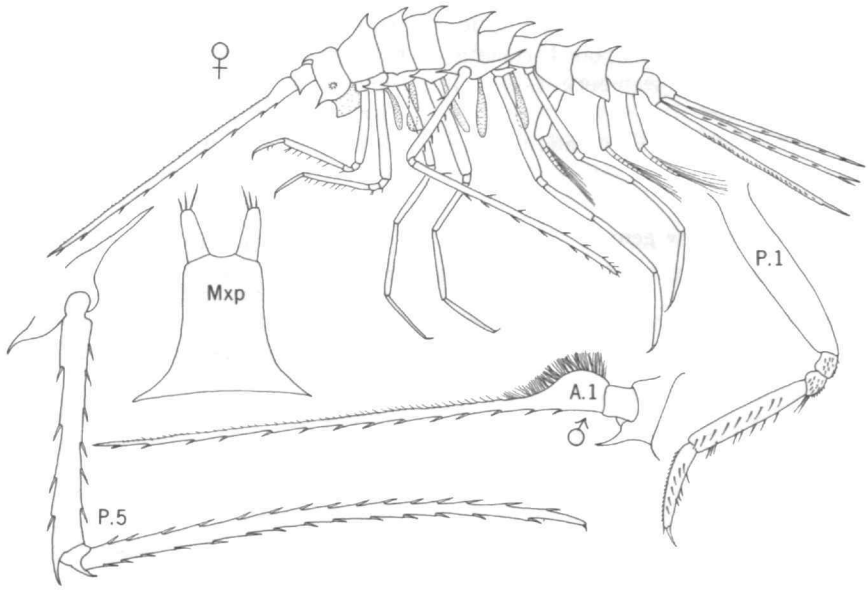

FIGURE 16.—*Acanthoscina.*

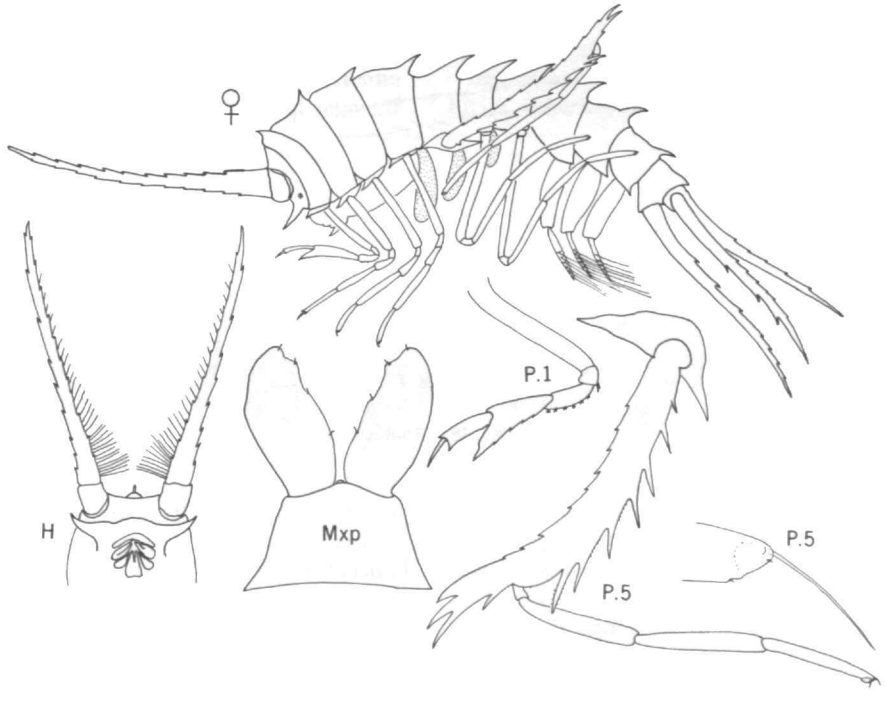

FIGURE 17.—*Ctenoscina.*

by a pair of long sharp spines, except in the male *C. macrocarpa*, which has antenna 2 composed of 5 short segments. Maxilliped without inner lobe; outer lobes well developed. Pereopod 1 chelate. Pereopod 5 without fusion of segments. Gills on pereonites 4–6.

References: Wagler, 1926:430; Vinogradov, 1964: 140.

9. *Spinoscina*, new genus

FIGURE 18

Type-species: Acanthoscina spinosa Chevreux, 1914.

Body segments with middorsal spines, 6 on pereon, 4 on pleon. Pereonites 1 and 2 fused. Antenna 2 of female (male unknown) represented by a pair of long sharp spines. Maxilliped with inner lobe present; outer lobes well developed. Pereopod 1 chelate. Pereopod 5 without fusion of segments. Gills on pereonites 3–6.

Reference: Vinogradov, 1957:219.

Superfamily LANCEOLOIDEA, new name

Synonym: Lanceoliformata Stephensen and Pirlot, 1931.

Body in both sexes more or less inflated. Mandible

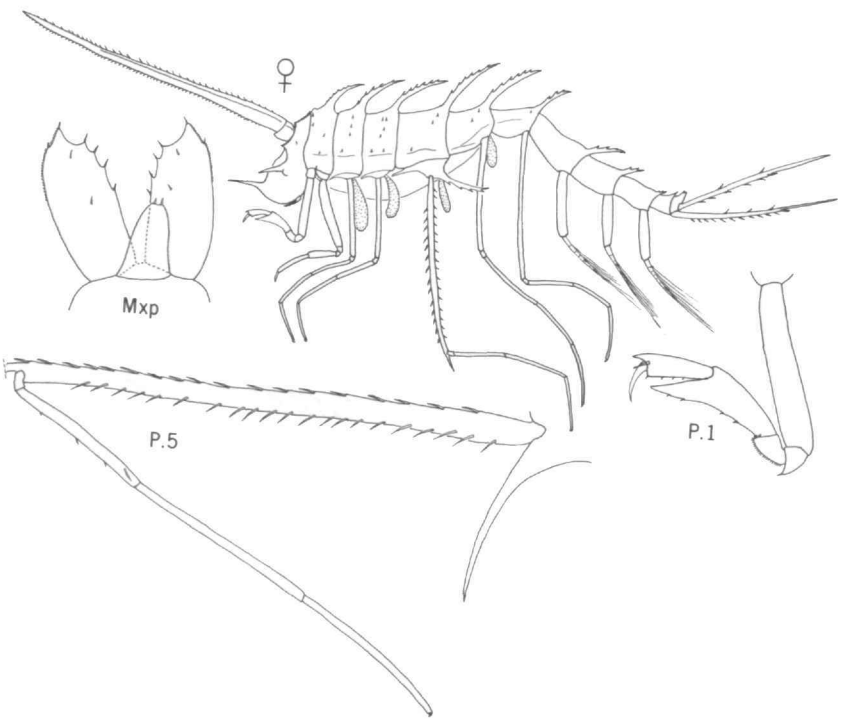

FIGURE 18.—*Spinoscina*.

usually with weakly developed lacinia mobilis. Maxilla 2 with numerous, usually very large spines on both lobes. Maxilliped with inner lobes fused proximally, separate distally. Pereopods 6 and 7 with spoon-shaped propus and hooded dactyl, or some of posterior pereopods subchelate; rarely all pereopods simple. Gills on pereonites 2–6 or 4–6, those of pereonite 2 very small. Oostegites on pereonites 2–5, usually without marginal setae.

Three families (Microphasmidae, Chuneolidae, Lanceolidae).

V. Family MICROPHASMIDAE Stephensen and Pirlot, 1931

Pereonites 2–4 strongly inflated; pereonites 5–7

and pleon slender; total length 3–25 mm. Cuticle transparent. Coxae separate from pereonites. Telson small, triangular, not fused with double urosomite. Head about as long as pereonite 1, with massive mouthpart region. Eye very small or absent. Antenna 1 flagellum with large 1st segment and a few very small distal segments, the latter sometimes missing. Antenna 2 5- or 6-segmented, shorter or slightly longer than antenna 1. Mandible with long, 3-segmented palp; incisor broad, lacinia mobilis very narrow. Maxilliped with large outer lobes; inner lobes fused proximally, separate distally. Pereopods 1 and 2, carpus broadened distally; propus conical. Pereopods 3–5 and 7 often prehensile. Pereopods never with hooded dactyls. Uropods narrow, with free exopods and endopods.

Three genera.

Key to the Genera of Microphasmidae

1. Antennae 1 and 2 very long, both reaching far beyond anterior margin of head; antenna 2 somewhat longer than antenna 1. All pereopods with carpus as long as or almost as long as propus ..... 12. ***Mimonecteola***

   Antennae 1 and 2 short; antenna 2 distinctly shorter than antenna 1. All pereopods with carpus distinctly shorter than propus 2

2. Antenna 1 reaching beyond anterior margin of head. Pereopods 3–5 subchelate ..... 10. ***Microphasma***

   Antenna 1 not reaching beyond anterior margin of head. Only pereopod 5 subchelate ..... 11. ***Microphasmoides***

10. *Microphasma* Woltereck, 1909

FIGURE 19

Type-species: *Microphasma agassizi* Woltereck, 1909.

Eye very small. Antenna 1 short, inserted on and extending beyond anterior margin of head. Antenna 2 much shorter than antenna 1; proximal segment much inflated; gland cone very large. All pereopods with carpus distinctly shorter than propus. Pereopods 3–5 subchelate; propus broad, distal part of closing margin with row of strong spines; dactyl curved, on pereopods 3 and 4 almost half as long as propus, on pereopod 5 somewhat shorter.

References: Woltereck, 1909:153; Stephensen and Pirlot, 1931:539; Shoemaker, 1945:218.

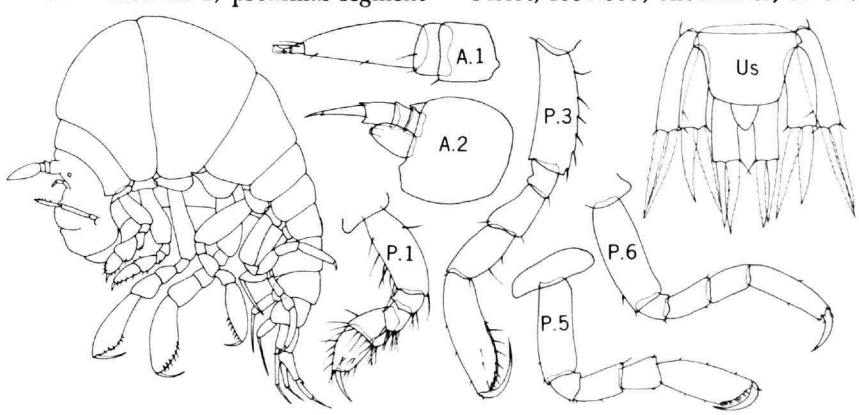

FIGURE 19.—*Microphasma*.

11. *Microphasmoides* Vinogradov, 1960

FIGURE 20

Type-species: *Microphasmoides vitjazi* Vinogradov, 1960a.

Eye absent. Antenna 1 small, inserted on lateral surface of head and not reaching anterior margin of head. Antenna 2 shorter than antenna 1; proximal segment much inflated; gland cone very large.

All pereopods with carpus distinctly shorter than propus. Pereopods 3 and 4 with long narrow propus. Pereopod 5 subchelate; propus with subparallel margins; distal margin with row of strong spines; dactyl short, hook-shaped. Pereopods 6 and 7 with propus narrowing distally.

Reference: Vinogradov, 1960a:213.

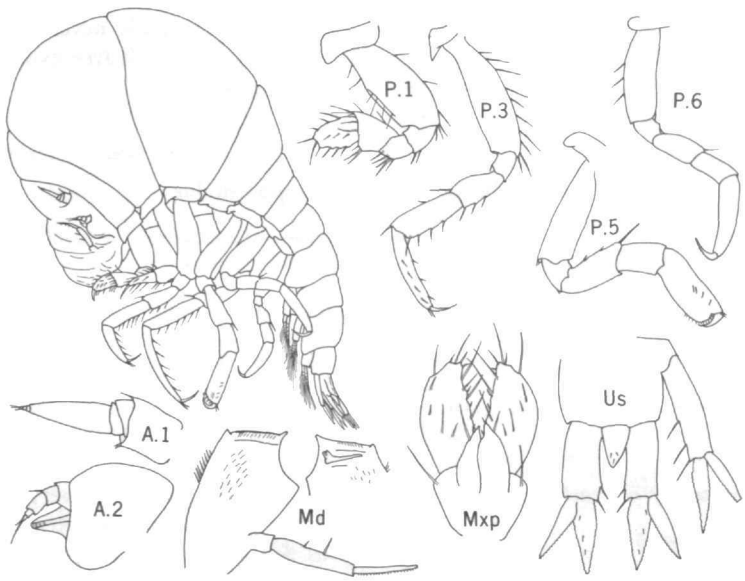

FIGURE 20.—*Microphasmoides.*

12. *Mimonecteola* Woltereck, 1909

FIGURE 21

Type-species: Mimonecteola diomedeae Woltereck, 1909.

Eye lacking or very small. Antennae 1 and 2 very long, inserted on and extending far beyond anterior surface of head. Antenna 2 somewhat longer than antenna 1; proximal segment not inflated; gland cone small. All pereopods with carpus as long as or nearly as long as propus. All pereopods usually simple; pereopods 5 and 7 rarely subchelate, but propus only slightly broadened.

References: Woltereck, 1909:153; Shoemaker, 1945:224; Vinogradov, 1964:118.

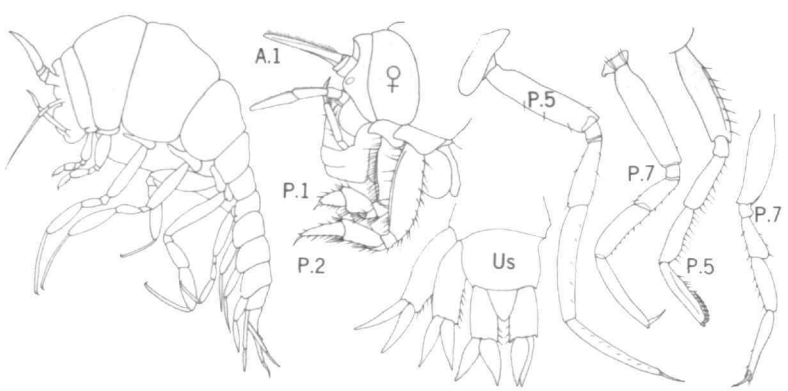

FIGURE 21.—*Mimonecteola.*

VI. Family CHUNEOLIDAE Woltereck, 1909

Body weakly arched, somewhat flattened dorsoventrally, slightly broader than high; total length 5–41 mm. Coxae not fused with pereonites. Telson short, triangular, not fused with double urosomite. Head with blunt to triangular rostrum, somewhat longer than pereonite 1. Eyes very small or absent. Antenna 1 somewhat shorter than head, inserted in lateral depression of head beneath rostrum; peduncle 3-segmented; flagellum with very large proximal segment and sometimes a few minute distal segments. Antenna 2 shorter than antenna 1, with large inflated proximal segment (containing opening of antennal gland) and minute distal segment. Mandible without palp or molar; lacinia mobilis broad. Maxilliped with large, rounded outer lobes; inner lobes small and completely separate. All pereopods with hooded dactyls; pereopods 3–7 with spoon-shaped propus. Uropods with free exopods and endopods. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

One genus.

13. *Chuneola* Woltereck, 1909

FIGURE 22

Type-species: Chuneola paradoxa Woltereck, 1909.

With the characters of the family.

References: Pirlot, 1930:3; Vinogradov, 1956:196; 1957:201; 1960b:251.

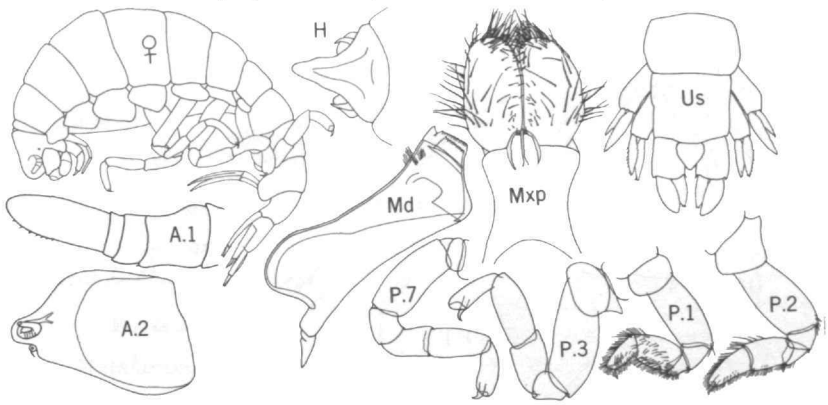

FIGURE 22.—*Chuneola*.

VII. Family LANCEOLIDAE Bovallius, 1887

Body greatly inflated in larva, only slightly so in adult, total length 6–70 mm. Eyes small, rudimentary, or absent. Coxae separate from pereonites. Antenna 1 with 1st flagellar segment large, robust, nearly straight or slightly curved; distal segments

Key to the Genera of Lanceolidae

(Modified from Vinogradov, 1957)

1. Pereopods 5 and 6 with spoon-shaped propus and hooded dactyl 2
   Only pereopods 6 and 7 with spoon-shaped propus and hooded dactyl. Pereopod 1 with propus widening distally ..... 18. ***Prolanceola***
2. Gills on pereonites 4–6. Maxilla 1 with palp shorter than outer lobe ..... 16. ***Metalanceola***
   Gills on pereonites 2–6. Maxilla 1 with palp longer than outer lobe 3
3. Pereopod 1 with propus produced into lobe above insertion of dactyl so that dactyl is inserted subterminally ..... 17. ***Paralanceola***
   Pereopod 1 with propus not produced anteriorly above insertion of dactyl; dactyl inserted terminally 4
4. Pereopod 1 with carpus subquadrate, only slightly wider at distal end than at proximal end. Left mandible, lacinia nearly as wide as incisor ..... 15. ***Megalanceola***
   Periopod 1 with carpus subtriangular, markedly wider at distal end than at proximal end. Left mandible with lacinia minute 5
5. Lateral surface of head with 2 concavities separated by an oblique ridge ..... 19. ***Scypholanceola***
   Lateral surface of head without concavities ..... 14. ***Lanceola***

small, few in number. Antenna 2 usually longer and more slender than antenna 1. Mandible with 3-segmented palp, without molar. Pereopod 1 with carpus usually more or less expanded distally. Pereopods 6 and 7 and usually pereopod 5 with spoon-shaped propus and hooded dactyl.

Six genera.

14. *Lanceola* Say, 1818

FIGURE 23

Type-species: *Lanceola pelagica* Say, 1818.

Head usually with well-developed rostrum; interantennal lobe rounded, rudimentary to well developed. Eyes small, round to oval. Mandible with 3rd segment of palp shorter than 2nd. Maxilla 1 with well-developed palp and broad inner lobe. Pereopod 1 with carpus expanded distally. Pereopods 5–7 with spoon-shaped propus and hooded dactyl.

References: Bovallius, 1887c:28; Stebbing, 1888: 1301; Stephensen, 1918:8; Woltereck, 1927:60; Barnard, 1932:254; Shoemaker, 1945:206; Vinogradov, 1957:189; 1960a:200; 1926:6; 1964:109.

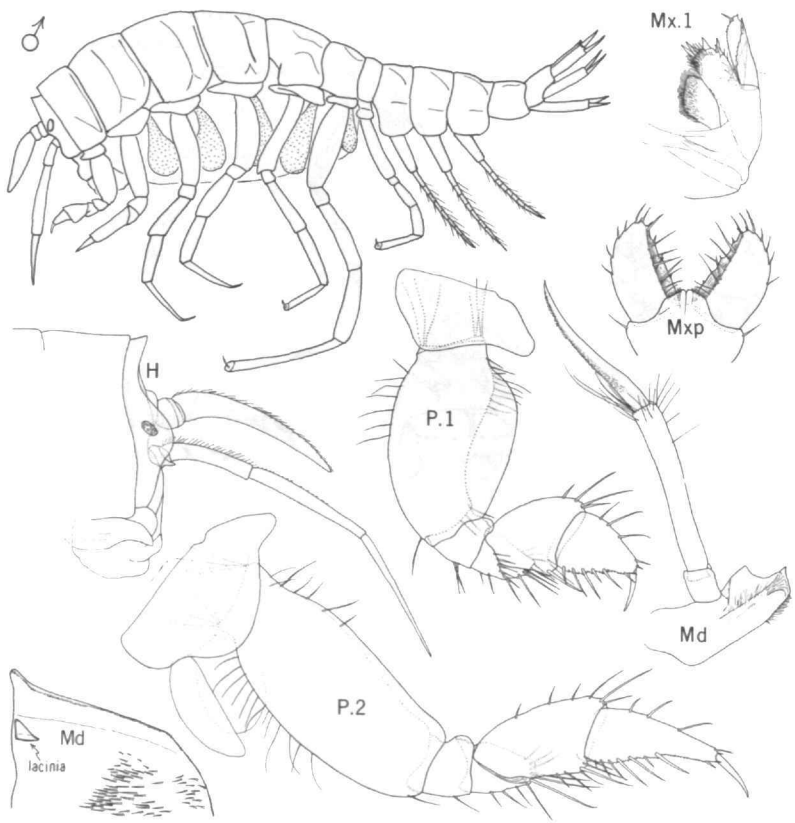

FIGURE 23.—*Lanceola*.

15. *Megalanceola* Pirlot, 1935

FIGURE 24

Type-species: *Lanceola stephenseni* Chevreux, 1920.

Large amphipods, up to 70 mm in length. Head short; rostrum very small; interantennal lobe rather narrow, with concave lateral surface, its distal margin flaring laterad to form a rim. Eyes oval, without pigment. Mandible with lacinia mobilis nearly as broad as incisor. Maxilla 1 with narrow inner lobe. Pereopod 1 with carpus only slightly

expanded distally. Pereopods 5–7 with spoon-shaped propus and hooded dactyl.

References: Pirlot, 1935:passim; 1939:8; Shoemaker, 1945:212; Vinogradov, 1964:114.

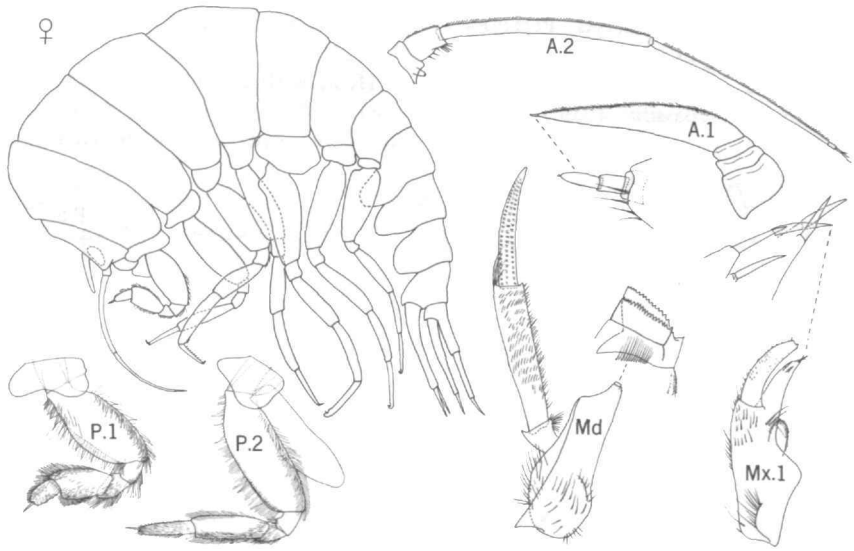

FIGURE 24.—*Megalanceola.*

16. *Metalanceola* Pirlot, 1931

FIGURE 25

Type-species: *Metalanceola chevreuxi* Pirlot, 1931.

Head with inconspicuous rostrum. Eyes absent. Antenna 1 with well-developed distal segments. Antenna 2 short, only slightly longer than peduncle of antenna 1. Mandible with 3rd segment of palp slightly longer and not much narrower than

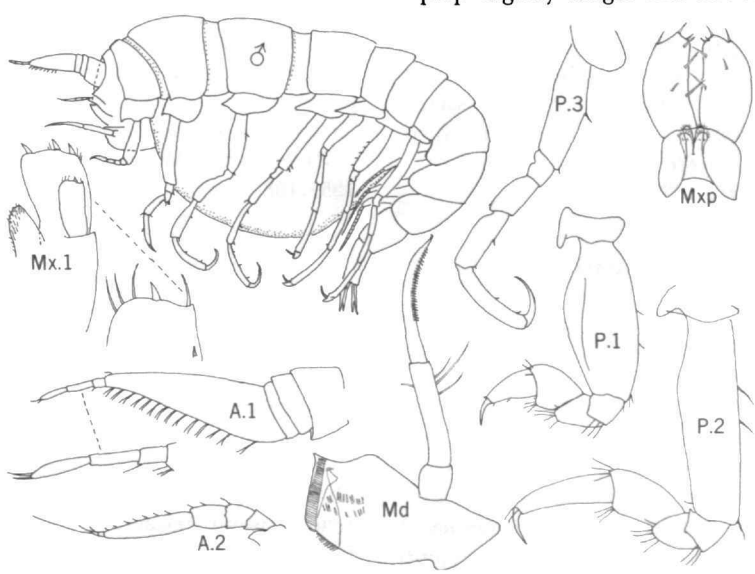

FIGURE 25.—*Metalanceola.*

2nd segment. Maxilla 1 with palp shorter than outer lobe. Maxilliped with very small inner lobes. Pereopod 1 with carpus not expanded. Pereopods 3 and 4 with strong, recurved dactyls. Pereopods 5–7 with spoon-shaped propus and hooded dactyls. Gills on pereonites 4–6.

References: Pirlot, 1931:passim; 1939:12; Vinogradov, 1960a:210.

17. *Paralanceola* Barnard, 1930

FIGURE 26

Type-species: *Paralanceola anomala* Barnard, 1930.

Head with inconspicuous rostrum. Eyes minute, composed of only 4 facets. Antenna 1 very short and stout. Antenna 2 with last segment of peduncle

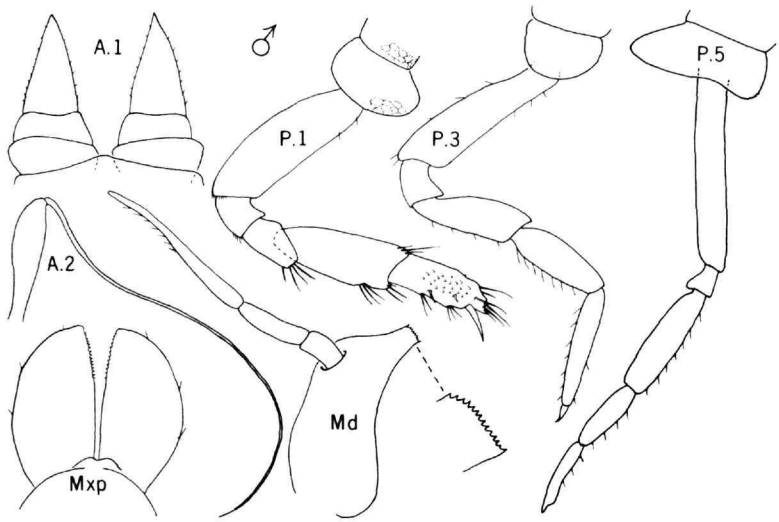

FIGURE 26.—*Paralanceola*.

elongate and slightly enlarged distally; flagellum very long, filiform, without visible sutures. Mandibular palp with long 3rd segment. Pereopod 1 with carpus not expanded; propus produced into lobe above insertion of dactyl so that dactyl is inserted subterminally. Pereopods 5–7 with spoon-shaped propus and hooded dactyl.

Reference: Barnard, 1930:398.

18. *Prolanceola* Woltereck, 1907

FIGURE 27

Type-species: *Prolanceola vibiliformis* Woltereck, 1907.

Body not tumid. Head only slightly shorter than pereonite 1, with short rostrum. A row of 4 eyespots extending dorsally from usual eye on side of head. Antenna 1 with 1st flagellar segment tapering and becoming very slender distally. Antenna 2 much longer than antenna 1; flagellum 6-segmented, longer than peduncle. Mandible with rather narrow incisor and well-developed lacinia mobilis; palp with long 3rd segment. Pereopod 1 subchelate, with triangular carpus; propus produced distally into lobes above and below insertion of dactyl. Pereopods 6 and 7, but not pereopod 5, with hooded dactyls and spoon-shaped propus.

References: Woltereck, 1909:157; Vinogradov, 1957:198.

19. *Scypholanceola* Woltereck, 1905

FIGURE 28

Type-species: *Scypholanceola vanhoeffeni* Woltereck, 1909.

Large amphipods, body length up to about 60 mm. Head with well-developed rostrum; lateral surface with 2 concavities separated by ridge running obliquely posteroventrad from interantennal lobe. Eyes without refracting elements or pigment, in form of band with ends lying in concavities and connected across ridge. Coxae 2–5 sharply pointed

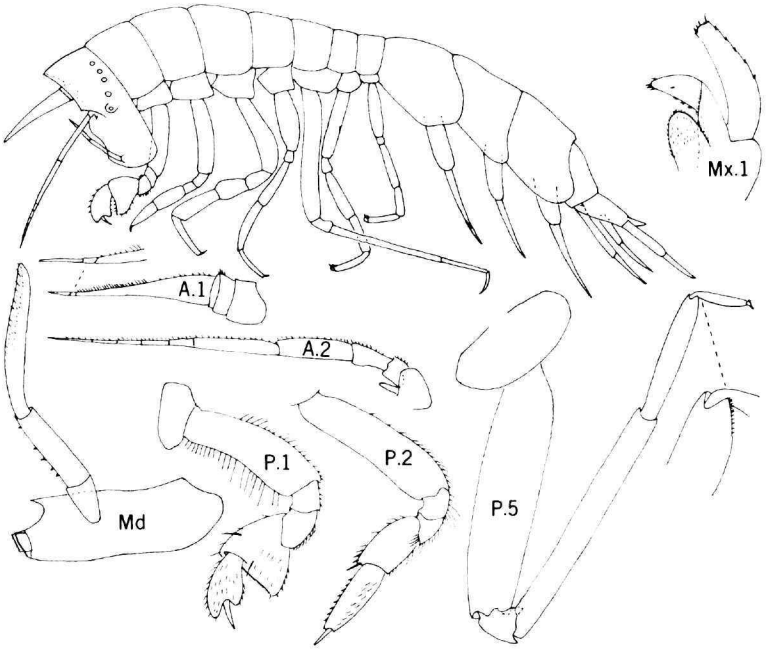

FIGURE 27.—*Prolanceola.*

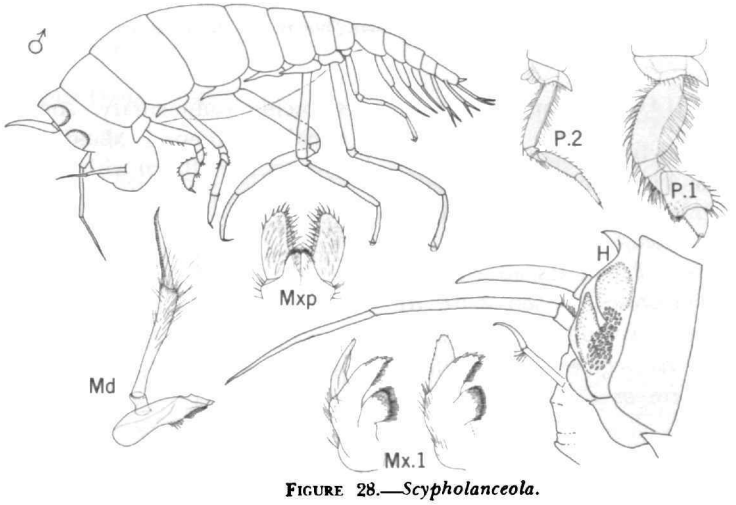

FIGURE 28.—*Scypholanceola.*

anteriorly. Mandible with 3rd segment of palp shorter than 2nd. Maxilla 1 with well-developed palp and broad inner lobe. Pereopod 1 with carpus expanded distally. Pereopods 5–7 with spoon-shaped propus and hooded dactyl.

References: Woltereck, 1909:161; 1927:65; Chevreux, 1920:7; Shoemaker, 1945:215; Vinogradov, 1956:197; 1960a:207.

Infraorder PHYSOCEPHALATA, new name

Head large, longer than pereonite 1. Eyes large (small to moderately large in *Vibilia*), occupying most of head surface (excluding rostrum in Oxycephalidae). Maxilla 1 without inner lobe. Maxilliped with inner lobes completely fused. Pereopods 1 and 2 usually chelate or subchelate, less commonly simple.

Four superfamilies.

Key to the Superfamilies of Physocephalata

1. Antenna 1 inserted on ventral surface of head; 1st segment of flagellum of male curved. Antenna 2 of male folded in zigzag ..... PLATYSCELOIDEA
   Antenna 1 inserted on anterior surface of head. Antenna 2 of male not folded 2
2. Antenna 1 of male with flagellum multisegmented ..... PHRONIMIMOIDEA
   Antenna 1 of male with flagellum composed of large first segment and sometimes a few rudimentary distal segments 3
3. Antenna 1 not inserted in groove of head; first segment of flagellum of male lanceolate or conical; distal segments inserted terminally or absent ..... VIBILIOIDEA
   Antenna 1 inserted in groove of head; first segment of flagellum of male conical, distal segments inserted subterminally ..... LYCAEOPSOIDEA

Superfamily VIBILIOIDEA, new name

Antenna 1 inserted on anterior surface of head; flagellum with large straight 1st segment and one or a few small or rudimentary additional segments inserted terminally. Antenna 2 inserted on anterior or ventral surface of head, short, composed of a few segments or rudimentary. Pereopod 5 never with large subchela.

Three families (Vibiliidae, Cystisomatidae, Paraphronimidae).

Key to the Families of Vibilioidea

1. Head very large, rounded dorsally; ventral surface flat with dentate border. Uropod 2 absent; uropods 1 and 3, endopod fused with protopod ..... IX. CYSTISOMATIDAE
   Head subquadrangular or rounded, without dentate border. Uropods all present, endopods not fused with protopods 2
2. Body not transparent. Mandible with palp. Pereopod 2 chelate ..... VIII. VIBILIIDAE
   Body transparent. Mandible with palp in male, not in female. Pereopod 2 simple ..... X. PARAPHRONIMIDAE

VIII. Family VIBILIIDAE Dana, 1852

Body compact, moderately slender; total length from about 5 to 20 mm. Head small to moderately large, subquadrangular or rounded. Eyes small to moderate-sized and separated, or large and occupying most of head surface. Pereonites all separate. Coxae separate from pereonites. Telson short, triangular or semicircular. Antenna 1 with short 3-segmented peduncle; 1st segment of flagellum large, straight, spatuliform or conical; remaining segments rudimentary. Antenna 2 filiform, subequal to antenna 1. Mandible with palp and molar process. Maxilliped with short rounded inner lobe; outer lobes rounded at apices, with straight medial margins and rounded lateral margins. Pereopod 1 simple; pereopod 2 chelate. Pereopods 5 and 6 the longest; pereopod 7 short, segments sometimes reduced in number, distal segment always digitiform. Uropods with free exopods and endopods. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

Two genera.

Key to the Genera of Vibiliidae

Eyes small to moderately large, but never occupying most of head surface. Antenna 1 with spatuliform flagellum. Antenna 2 inserted anteriorly ..... 20. ***Vibilia***
Eyes occupying most of head surface. Antenna 1 with conical flagellum. Antenna 2 inserted ventrally ..... 21. ***Cyllopus***

20. *Vibilia* H. Milne-Edwards, 1830

FIGURE 29

Type species: *Vibilia peronii* H. Milne-Edwards, 1830.

Head rather small, subquadrangular. Eyes small to moderately large but never occupying most of head surface. Antenna 1 with broad, laterally flattened flagellum. Antenna 2 inserted on anterior surface of head. Pereopod 7 usually with complete

number of segments, rarely with only 3 segments distal to basipod. Protopod of uropod 3 shorter than that of uropod 1.

References: Behning, 1913, 1925; Stephensen, 1918:33; Chevreux and Fage, 1925:382; Pirlot, 1929:91; Laval, 1963.

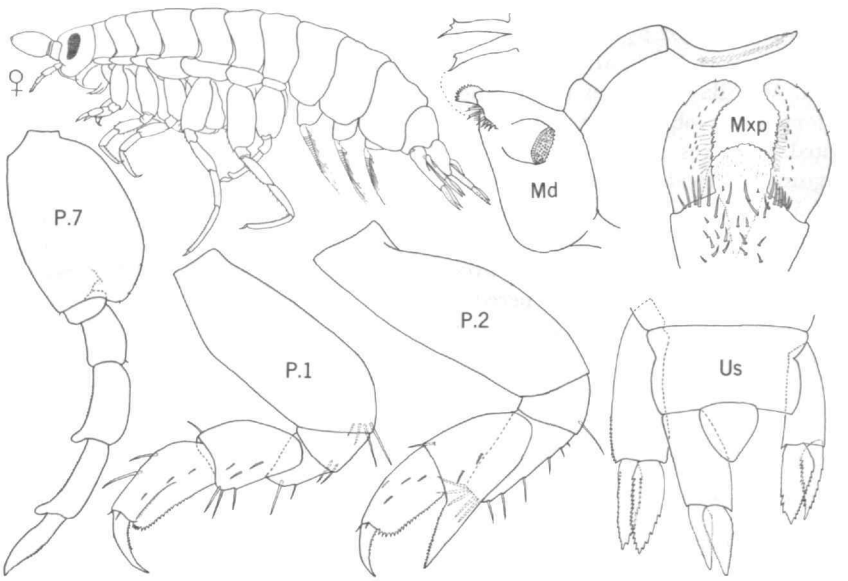

FIGURE 29.—*Vibilia*.

21. *Cyllopus* Dana, 1852

FIGURE 30

Type-species: *Cyllopus magellanicus* Dana, 1852.

Head large, almost globular. Eyes large, occupying most of head surface. Antenna 1 with slender conical flagellum. Antenna 2 inserted on ventral surface of head. Pereopod 7 with basipod longe than remaining segments combined, the latter com prising 5 or 3 segments. Protopod of uropod ! longer or shorter than that of uropod 1.

References: Barnard, 1930:405; Hurley, 1955 129.

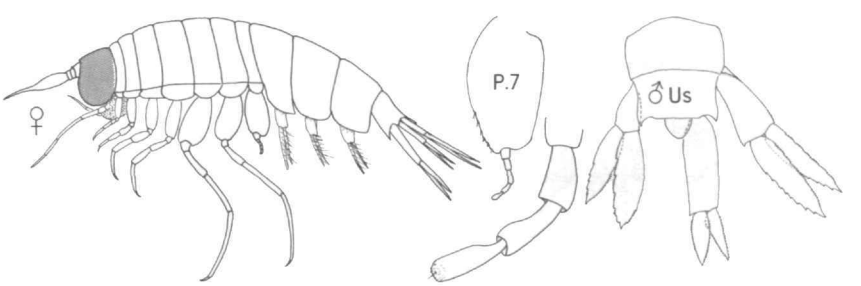

FIGURE 30.—*Cyllopus*.

IX. Family CYSTISOMATIDAE Willemoes-Suhm, 1875

Body large, cuticle thin, almost completely transparent; musculature very weak. Total length up to 120 mm. Head very large, rounded dorsally; ventra surface flat or slightly concave, with dentate borde Eyes comprising 2 oval areas on dorsal surface c head. Short middorsal spines often present o pereonites and pleonites. Pereonites 1 and 2 o

even 1–4 fused. Coxae fused with pereonites. Telson very small. Antenna 1 with 1 or 2 poorly defined peduncle segments; flagellum composed of a slender lanceolate proximal segment and a minute distal segment. Antenna 2 represented by a pair of small spines on ventral surface of head. Mandible with molar; palp absent. Maxilla 2 without inner lobe. Maxilliped with long inner lobe, widening distally; outer lobes pointed at apices. Pereopod segments with serrate margins. Pereopods 1 and 2 distinctly chelate. Pereopod 5 the longest. Pereopod 7 sometimes prehensile, with dactyl closing against distal end of propus. Uropod 2 absent. Endopod of uropods 1 and 3 fused with protopod. Gills on pereonites 2–6 or 4–6. Oostegites on pereonites 2–5, those on pereonites 4 and 5 rudimentary.

One genus.

22. *Cystisoma* Guérin-Méneville, 1842

FIGURES 31, 32

Type-species: *Cystisoma neptunus* Guérin-Méneville, 1842.

With the characters of the family.

References: Stephensen, 1918:56; Barnard, 1932: 268; Woltereck, 1903:passim; 1904:passim; Willemoes-Suhm, 1874:passim.

X. Family PARAPHRONIMIDAE Bovallius, 1887

Body rather slender, transparent; total length 6–15 mm. Head large, almost cubical. Eyes large, occupying most of head surface. Pereonites all separate. Coxae fused with pereonites. Telson very short. Antenna 1 shorter than head; peduncle 3-segmented; first segment of flagellum enlarged, the others rudimentary. Antenna 2 inserted on ventral margin of head, rudimentary in female, slightly

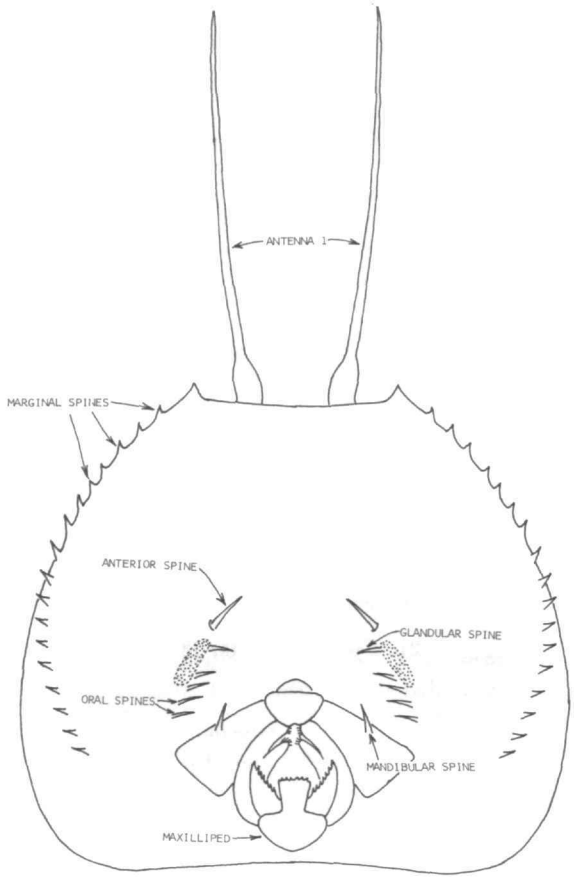

FIGURE 31.—*Cystisoma*: diagram of head, ventral.

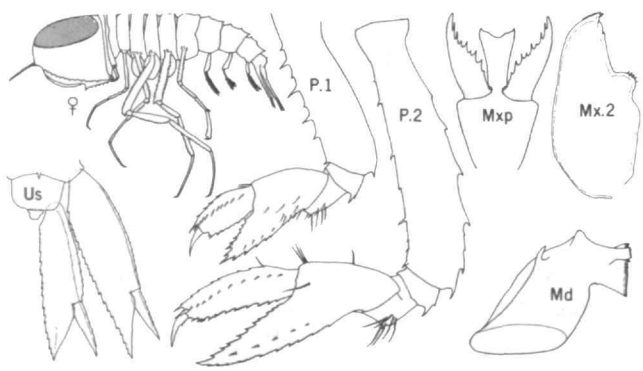

FIGURE 32.—*Cystisoma*.

longer than antenna 1 in male, composed of a few segments. Mandible without palp and without molar. Maxilliped with inner and outer lobes fused into a single broad plate. Pereopods 1 and 2 much shorter than following pereopods. Pereopod 1 weakly subchelate, merus produced into short spoon-shaped lobe beneath carpus. Pereopod 2 with propus produced into a thin hollowed process on either side of dactyl. Pereopods 3–6 slender, subequal; pereopod 7 shorter. Uropods with free exopods and endopods. Gills on pereonites 3–6. Oostegites on pereonites 2–5.

One genus.

23. *Paraphronima* Claus, 1879

FIGURE 33

Type-species: *Paraphronima gracilis* Claus, 1879a.

With the characters of the family.

References: Claus, 1879a:64; Bovallius, 1889:22; Stebbing, 1888:1335; Vosseler, 1901:94.

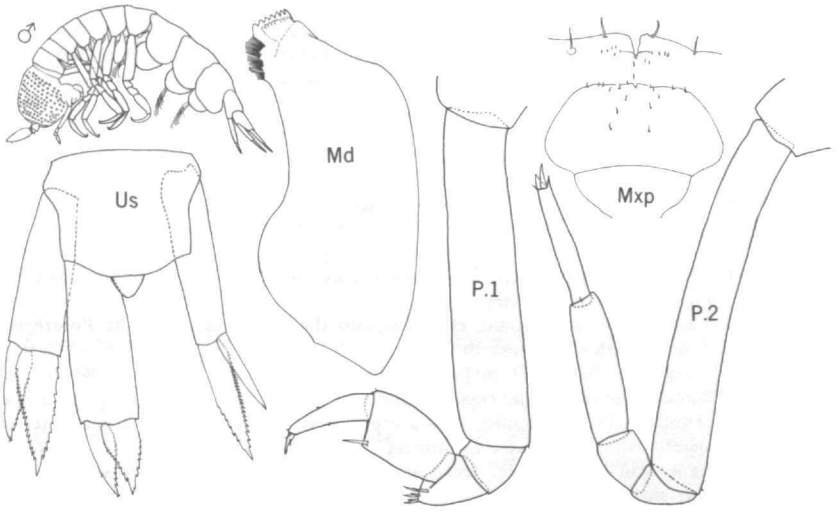

FIGURE 33.—*Paraphronima*.

Superfamily PHRONIMOIDEA, new name

Antenna 1 inserted on anterior surface of head; flagellum of male with long straight 1st segment and shorter, terminally inserted distal segments; flagellum of female 1-segmented. Antenna 2 inserted on anterior surface of head; flagellum of male long, multisegmented; flagellum of female short, composed of a few segments, sometimes rudimentary or absent. Pereopod 5 sometimes with large subchela.

Four families (Hyperiidae, Dairellidae, Phronimidae, Phrosinidae).

Key to the Families of Phronimoidea

1. Pereopod 5 without large subchela 2
   Pereopod 5 with large subchela 3
2. Pereopod 2 chelate ..... XI. HYPERIIDAE
   Pereopod 2 simple ..... XII. DAIRELLIDAE
3. Uropods with free exopods and endopods. Head subconical, narrowing and prolonged ventrally ..... XIII. PHRONIMIDAE
   Uropods composed each of a single leaflike segment only. Head globular ..... XIV. PHROSINIDAE

XI. Family HYPERIIDAE Dana, 1852

Body compact, form rather variable, most often subglobular in female, more slender in male; total length, 2–30 mm. Head usually large, globular. Eyes usually large and occupying most of head surface. Pereonites all separate, or up to 5 anterior pereon-

ites fused. Coxae separate or fused with pereonites. Telson small to moderate-sized, rounded or triangular. Antenna 1 with long filiform flagellum in male, with short 1-segmented flagellum in female. Antenna 2 similar to antenna 1, but often more reduced in female. Mandible with molar; palp present in both sexes or absent in female. Maxilliped quite variable; outer lobes usually well developed, sometimes fused medially; inner lobe well developed, reduced, or even absent. Pereopod 1 simple, subchelate, or chelate. Pereopod 2 chelate. Pereopods 3–7 varying in relative lengths, but pereopod 7 not reduced. Uropods with free exopods and endopods. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

Thirteen genera.

Key to the Genera of Hyperiidae

1. Pereonites all separate. Coxae separated from pereonites by sutures 2
   At least pereonites 1 and 2 fused. Coxae fused with pereonites (except in *Bougisia*) 7
2. Eyes without facets. Head produced anteriorly into acute process between antenna 1 and antenna 2 ..... 34. ***Pegohyperia***
   Eyes normal, with facets. Head not produced between antenna 1 and antenna 2 3
3. Anterior pereonites raised into transverse folds. Body covered with fine pubescence ..... 31. ***Iulopis***
   Pereonites not raised into folds. Body not covered with fine pubescence 4
4. Pereopods 1 and 2 with carpal process laterally compressed, knife-shaped, without spines ..... 30. ***Hyperoche***
   Pereopods 1 and 2 with carpal process spoon-shaped, with somewhat concave center and raised margins armed with spines 5
5. Pereopods 3 and 4 prehensile; propus closing against the dilated carpus ..... 33. ***Parathemisto***
   Pereopods 3 and 4 with carpus not dilated 6
6. Pereopod 5 or pereopods 5 and 6 longer than pereopods 3 and 4 ..... 26. ***Hyperiella***
   Pereopods 3 and 4 longer than pereopods 5 and 6 ..... 24. ***Hyperia***
7. Eyes small. Head produced anteriorly into acute process between antenna 1 and antenna 2. Coxae separated from pereonites by sutures ..... 25. ***Bougisia***
   Eyes covering most of head surface. Head not produced between antenna 1 and antenna 2. Coxae fused with pereonites 8
8. First 2 pereonites fused in adult male and female 11
   First 3, 4, or 5 pereonites fused in adult female; first 2, 3, or 4 pereonites fused in adult male 9
9. Pereopods 5–7 subequal in length; pereopod 6 only slightly longer than pereopods 5 and 7. Telson of moderate size ..... 32. ***Lestrigonus***
   Pereopod 5 much shorter or distinctly longer than pereopods 6 and 7. Telson very short 10
10. Pereonites 1–3 fused. Pereopod 5 much shorter than pereopods 6 and 7 ..... 29. ***Hyperionyx***
    Pereopods 1–5 fused. Pereopod 5 much longer than pereopods 6 and 7 ..... 36. ***Themistella***
11. Pereopod 2 chelate; dactyl closing against process of robust propus. Pereopods 3–7 prehensile ..... 35. ***Phronimopsis***
    Pereopod 2 chelate; propus closing against carpal process. Pereopods 3–7 not prehensile 12
12. Antenna 2 of female moderately long; shape sinuous in profile. Mandible incisor with serrate apex. Maxilliped with well-developed inner lobe. Exopods of uropods with notched lateral margins ..... 28. ***Hyperioides***
    Antenna 2 of female rudimentary. Mandible incisor with smooth apex. Maxilliped with rudimentary inner lobe. Exopods of uropods without notches ..... 27. ***Hyperietta***

24. *Hyperia* Latreille, in Desmarest, 1823

FIGURE 34

Type-species: *Cancer medusarum* O. F. Müller, 1776.

Large species, 10–30 mm in length. Head deeper than long. Pereon more or less dilated in female; all pereonites free. Coxae not fused with pereonites. Antenna 1 with 3-segmented peduncle. Mandible with serrate incisor; palp present in both sexes. Maxilla 1 with outer lobe having 5 apical spines; palp with robust spine at mediodistal corner. Maxilliped with inner lobe well developed, usually with 2 terminal spines. Pereopod 1 subchelate or barely

chelate; carpal process only slightly developed. Pereopod 2 chelate; carpal process spoon-shaped, bearing spines along edge of spoon. Pereopods 1 and 2, carpus, and propus with many spines. Pereopods 5–7 shorter than pereopods 3 and 4. Uropod 3 of male with broad endopod.

References: Bovallius, 1889:129; Sars, 1890:6; Bowman, 1972:5.

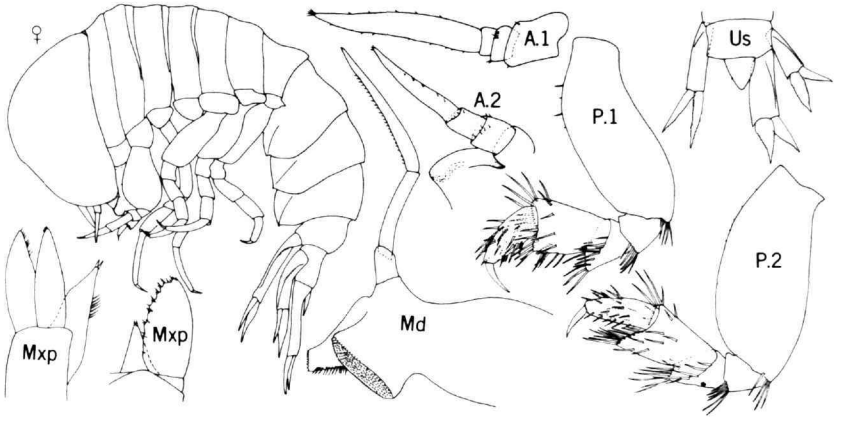

FIGURE 34.—*Hyperia*.

25. *Bougisia* Laval, 1966

FIGURE 35

Type-species: Bougisia ornata Laval, 1966.

Head with well-developed rostrum and acute lateral lobes. Eyes small, lateral. Pereonites 1 and 2 fused. Coxal plates separate from pereonites. Antenna 2 of female composed of a single segment. Mandible with palp in both sexes. Maxilla 1 with rather broad palp. Maxilliped with very short inner lobe. Pereopod 1 subchelate; pereopod 2 chelate, with short spoon-shaped carpal process. Pereopods 3–7 subequal; dactyl of pereopod 5 prehensile, closing against expanded distal margin of propus.

Reference: Laval, 1966.

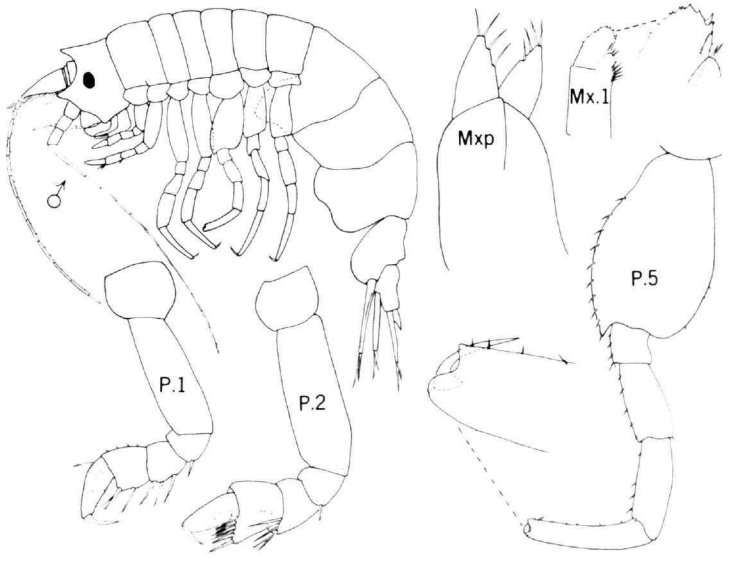

FIGURE 35.—*Bougisia*.

26. *Hyperiella* Bovallius, 1887

FIGURE 36

Type-species: *Hyperiella antarctica* Bovallius, 1887b.

Body small to moderate-sized; pereon rather plump; pereonites all separate. Antenna 1 and antenna 2 of female 4-segmented. Mandible with palp in both sexes; incisor with serrate margin. Maxilla 1 with inner lobe having 5 terminal spines. Maxilla 2 with 1 terminal spine on inner lobe, 2 or 3 on outer lobe. Maxilliped with inner lobe well developed, with 2 terminal spines; outer lobes separate. Pereopod 1 subchelate; pereopod 2 chelate; posterior margin of propus serrate in pereopods 1 and 2. Pereopods 3 and 4 with posterior margins of carpus and propus serrulate; posterior margins of carpus bearing a few slender spines. Pereopod 5 (or pereopods 5 and 6) much longer than pereopods 3 and 4; pereopod 7 (or pereopods 6 and 7) subequal to pereopods 3 and 4. Dactyls of pereopods 3–5 very long. Uropod 3 elongate, except in *H. macronyx*.

References: Bovallius, 1889:242; Stebbing, 1888: 1403; Walker, 1907:7; Bowman, 1973:26.

FIGURE 36.—*Hyperiella*.

27. *Hyperietta* Bowman, 1973

FIGURE 37

Type-species: *Hyperia luzoni* Stebbing, 1888.

Small species, with body rather compressed laterally. Head rather short anteroposteriorly; eyes occupying most of its surface. Pereonites 1 and 2 fused in both sexes. Coxae fused with pereonites. Telson inserted distinctly anterior to insertion of protopod of uropod 3. Female telson at least half as long as

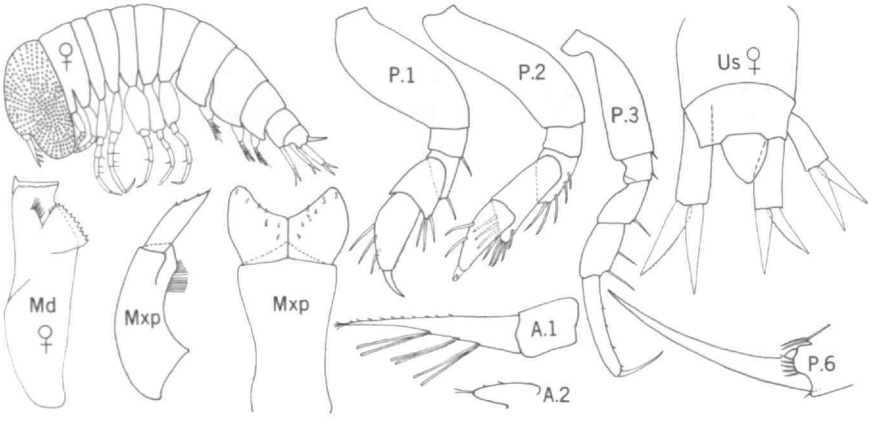

FIGURE 37.—*Hyperietta*.

protopod of uropod 3. Epistome small, inconspicuous. Antenna 1 of female 2-segmented. Antenna 2 of female 1-segmented, rudimentary; gland cones rather inconspicuous, in anterior view converging medially. Mandible with smooth incisor and dentate lacinia; molar narrow; with palp in male, without in female. Maxilla 1 with outer lobe having 3 terminal spines. Maxilliped with outer lobes fused medially; inner lobe rudimentary. Pereopod 1 simple, weakly subchelate or barely chelate. Pereopod 2 chelate, with spoon-shaped carpal process bearing marginal spines. Pereopods 3 and 4 of female with 1 conspicuous spine on posterior margin of merus, 2 spines on posterior margin of carpus; pereopods 3 and 4 of male with shorter spines in same positions. Distal margin of propus of pereopods 6 and 7 and sometimes of pereopod 5 produced into spinose lobe medial to base of dactyl; dactyl unarmed. Uropods slender, margins of exopods and endopods smooth or with extremely fine serrations.

References: Stebbing, 1888:1382; Vosseler, 1901: 64; Stephensen, 1924:83; Yang, 1960:33; Bowman, 1973:55.

28. *Hyperioides* Chevreux, 1900

FIGURE 38

Type-species: *Hyperioides longipes* Chevreux, 1900.

Small species with body rather compressed laterally. Head globular, produced anteriorly above insertion of antenna 1; eyes occupying most of its surface or limited entirely to dorsal surface. Pereonites 1 and 2 fused in both sexes. Coxae fused with pereonites. Posterior elevation of pleonite 1 of male pronounced. Telson rather short. Antenna 1 of female 2- or 3-segmented. Antenna 2 of female 1-segmented, moderately long, with characteristic sinuous shape in lateral view; gland cone distally rounded. Mandible with dentate incisor; with palp in male, without in female. Maxilla 1 with outer lobe having 3 large terminal spines and a smaller subterminal spine. Maxilla 2 with outer lobe having 1 terminal and 1 subterminal spine; inner lobe with 1 terminal spine. Maxilliped having inner lobe well developed, with 2 terminal spines. Pereopods 1 and 2 chelate, with spoon-shaped carpal process bearing marginal spines. Pereopods 5 and 6 dis-

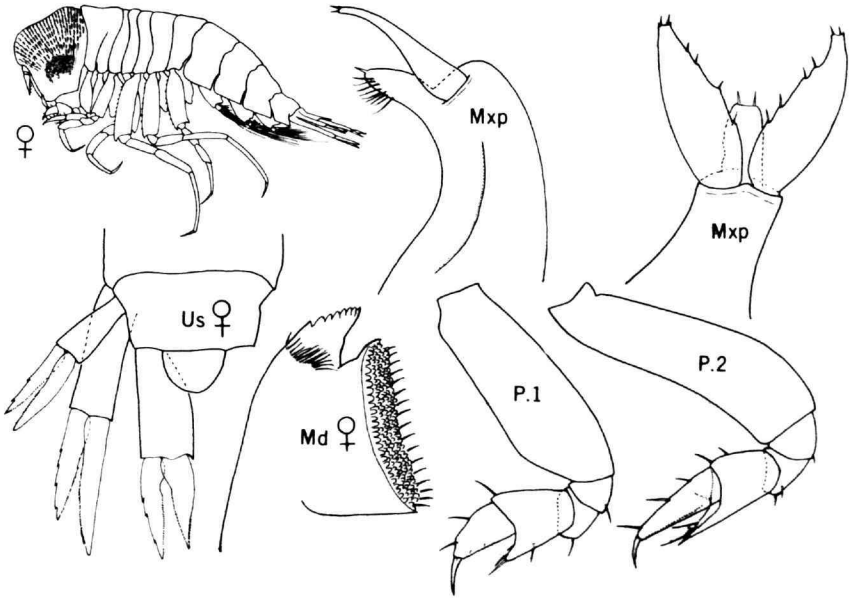

FIGURE 38.—*Hyperioides*.

tinctly longer than pereopods 3 and 4 and pereopod 7; dactyls of pereopods 5–7 long, with comb of fine setules on proximal 3rd of anterior margin. Uropods, exopods notched on lateral margins.

References: Chevreux, 1900:143; Stebbing, 1888: 1379; Vosseler, 1901:60; Bowman, 1973:30.

29. *Hyperionyx* Bowman, 1973

FIGURE 39

Type-species: *Hyperia macrodactyla* Stephensen, 1924.

Small species. Head globular, eyes occupying most of its surface. Pereonites 1–3 fused in both sexes. Coxae fused with pereonites. Telson very short. Antenna 1 of female 2-segmented. Antenna 2 of female 1-segmented, slender, moderately long; gland cone small, triangular. Mandible reduced [?]; with palp in male, without palp in female. Maxilla 1 with outer lobe having 1 terminal spine; palp with very few marginal setae. Maxilla 2 with few setae; outer lobe with 2 terminal spines; inner lobe very short. Maxilliped with very few setae; inner lobe slender; outer lobes obovate. Pereopod 1 subchelate. Pereopod 2 chelate, with spinose, spoon-shaped carpal process. Pereopods 3–7 with strong, curved, unarmed dactyls. Pereopods 3 and 4 and pereopod 6 subequal; pereopod 5 much shorter; pereopod 7 somewhat longer.

References: Stephensen, 1924:90; Yang, 1960:35; Bowman, 1973:71.

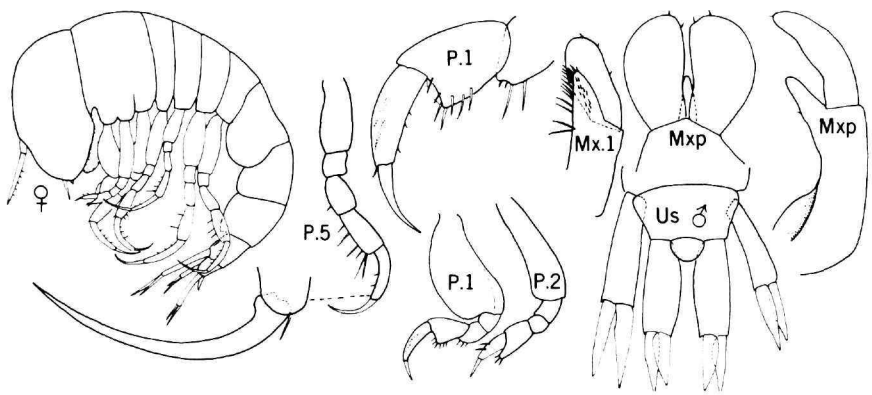

FIGURE 39.—*Hyperionyx*.

30. *Hyperoche* Bovallius, 1887

FIGURE 40

Type-species: *Metoecus medusarum* Krøyer, 1838.

Pereonites all separate. Coxae separate from pereonites. Antenna 1 with 3-segmented peduncle. Mandible with palp in both sexes; molar laminate, triangular, nearly smooth. Maxilla 1 with broad palp. Maxilliped with inner lobe well developed; outer lobes separate. Pereopods 1 and 2 distinctly chelate; carpal process laterally compressed, knife-shaped. Pereopods 3–7 subequal; pereopods 3 and

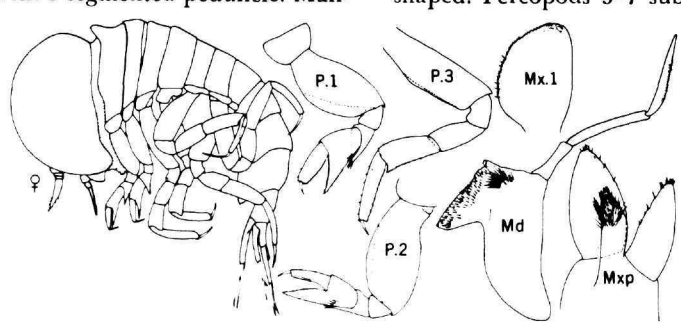

FIGURE 40.—*Hyperoche*.

4 with posterior margin of carpus produced into thin ridge which may end distally in a tooth.

References: Bovallius, 1889:83; Senna, 1906:154; Steuer, 1911:674.

31. *Iulopis* Bovallius, 1887

FIGURE 41

Type-species: Iulopis loveni Bovallius, 1887b (by present designation).

Body and pereopods covered with fine setae, giving the species a furry appearance. Pereonites all free. Pereonites 2–7 raised into transverse rounded folds. Coxae not fused with pereonites. Antenna 2 much reduced in female. Mandible with palp in male, without palp in female. Maxilliped with obsolete inner lobe and sparsely spinose outer lobes. Pereopod 1 subchelate; pereopod 2 chelate; carpal process narrowly hollowed in both. Pereopods 3–7 subequal; pereopods 3 and 4 may be slightly shorter or slightly longer than pereopods 5–7.

References: Bovallius, 1889:116; Spandl, 1927:159; Shoemaker, 1945:238.

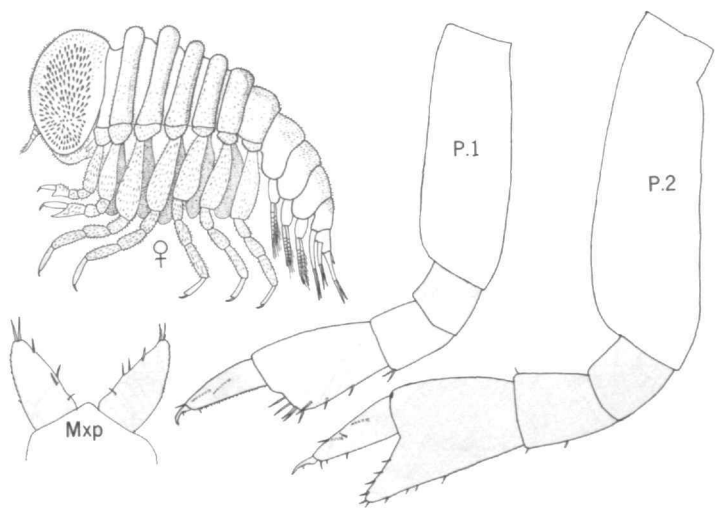

FIGURE 41.—*Iulopis.*

32. *Lestrigonus* Milne Edwards, 1830

FIGURE 42

Type-species: *Lestrigonus fabrei* Milne Edwards, 1830.

Small species with rather plump pereon. Head globular; eyes occupying most of its surface. Some of anterior pereonites fused, first 2 to first 5 in female, first 2 to first 4 in male, always more in female. Coxae fused with pereonites. Telson of moderate size. Antenna 1 of female 2-segmented. Antenna 2 of female 1-segmented, usually very small; gland cone conspicuous, with rounded or pointed apex. Epistome prominent, strongly convex anteriorly. Mandible with dentate incisor, with palp in male, without palp in female. Maxilla 1 with outer lobe having 3 large terminal spines and usually a smaller subterminal spine. Maxilliped with outer lobes separate, tapering distally; inner lobe well developed. Pereopod 1 subchelate or barely chelate. Pereopod 2 distinctly chelate; carpal process spoon-shaped with spines along margin of spoon. Pereopods 5–7 usually longer than pereopods 3 and 4; pereopods 5 and 7 subequal, slightly shorter than pereopod 6.

References: Vosseler, 1901:66; Yang, 1960:15; Laval, 1968a:passim; Bowman, 1973:33.

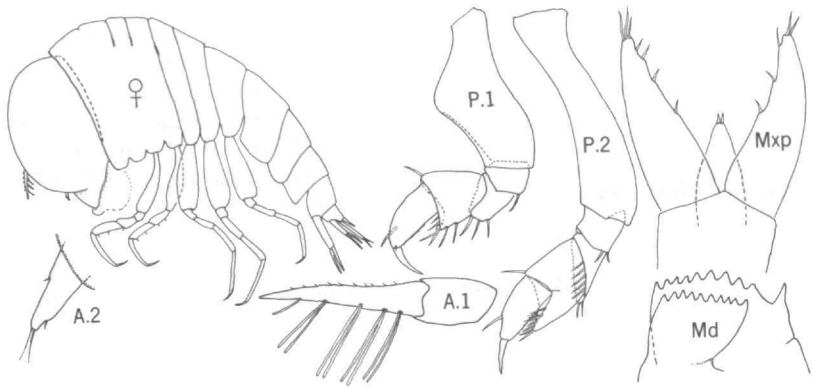

FIGURE 42.—*Lestrigonus*.

33. *Parathemisto* Boeck, 1870

FIGURE 43

Type-species: *Parathemisto abyssorum* Boeck, 1870.

Body rather compressed laterally. Pereonites all free. Coxae not fused with pereonites. Antenna 1 with 3-segmented peduncle. Mandible with palp in both sexes. Pereopod 1 simple. Pereopod 2 chelate, with spoon-shaped carpal process. Pereopods 3 and 4 with dilated carpus, forming prehensile organ with propus. Pereopods 5–7 longer than pereopods 3 and 4.

References: Stephensen, 1924:94; Barnard, 1930: 419; Hurley, 1955:151; Bowman, 1960:passim; Kane, 1966:passim.

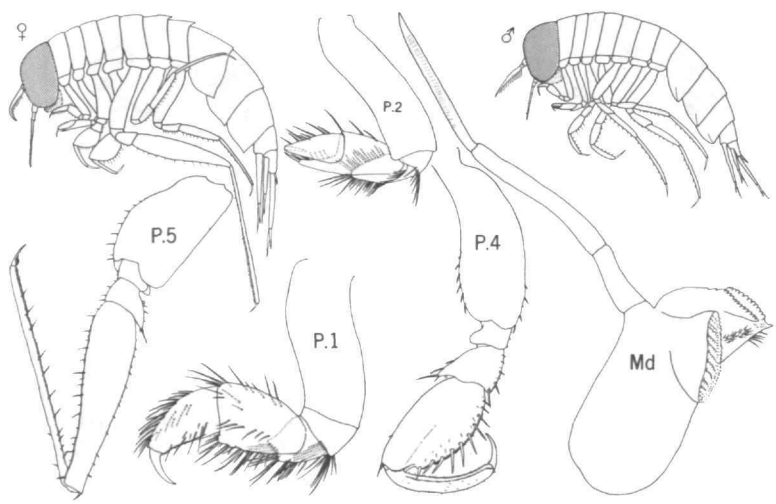

FIGURE 43.—*Parathemisto*.

34. *Pegohyperia* Barnard, 1932

FIGURE 44

Type-species: *Pegohyperia princeps* Barnard, 1932.

Body rather elongate. Head short; eyes without facets. Pereonites all free, with rounded transverse folds. Coxae not fused with pereonites; coxae 3–5 much deeper than others. Telson nearly as long as protopod of uropod 3. Antenna 1 of female with large laminate flagellum. Mandible with palp in both sexes; molar laminate, triangular. Pereopods

1 and 2 distinctly chelate; carpal process laterally compressed, knife-shaped. Pereopods 5 and 6 somewhat longer than pereopods 3, 4, and 7. Protopods of uropods broad.

References: Barnard, 1932:277; Hurley, 1960:112.

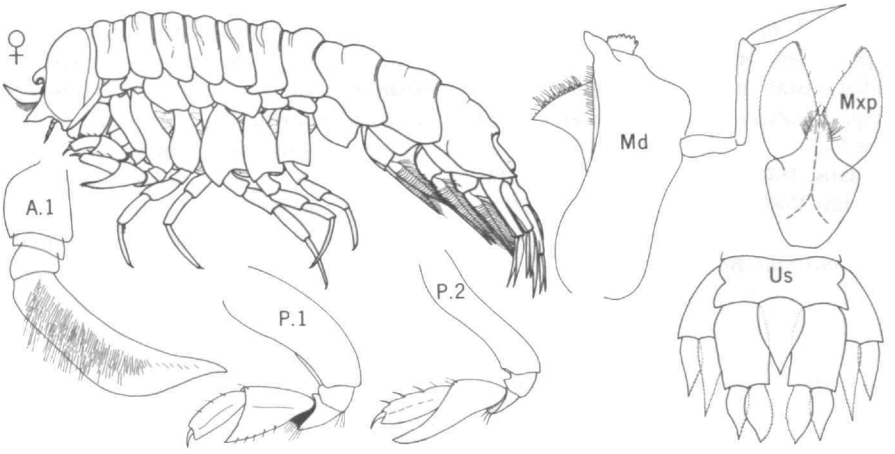

FIGURE 44.—*Pegohyperia.*

35. *Phronimopsis* Claus, 1879

FIGURE 45

Type-species: *Phronimopsis spinifera* Claus, 1879a.

Body slender in male; pereon somewhat inflated in female. Head higher than long. Pereonites 1 and 2 fused. Coxae fused with pereonites. Telson very short. Antenna 1 of female with 1-segmented pe-

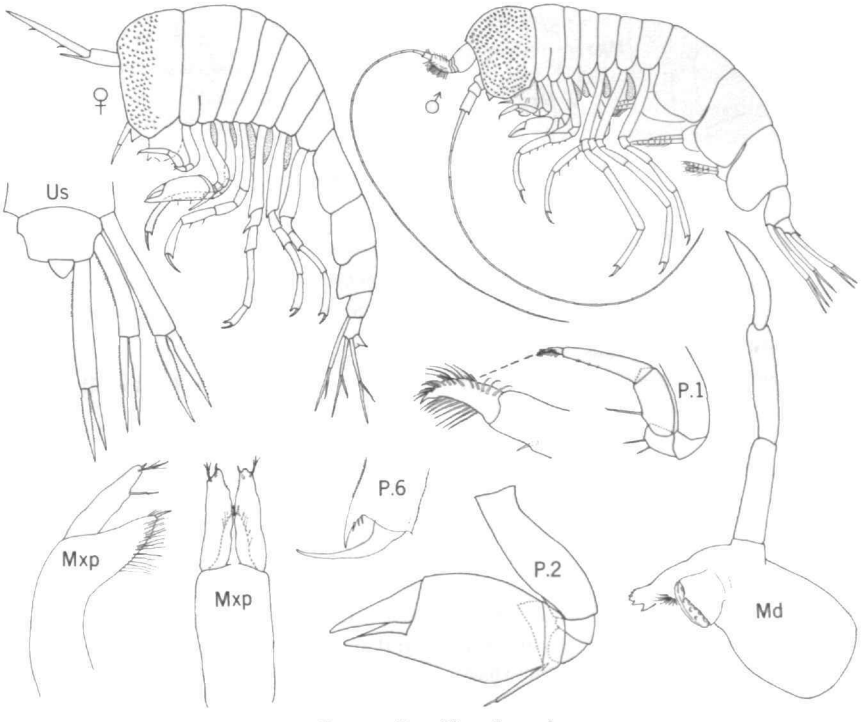

FIGURE 45.—*Phronimopsis.*

duncle produced into long spine beneath flagellum. Mandible with palp in male, without palp in female. Pereopod 1 simple; dactyl covered with short setae. Pereopod 2 chelate; dactyl closing against anteroventral process of strongly swollen propus. Pereopods 3–7 prehensile; dactyl closing against expanded distal margin of propus. Pereopods 5–7 subequal, longer than pereopods 3 and 4. Uropods slender.

References: Claus, 1879a:63; Bovallius, 1889:318; Vester, 1900:passim; Vosseler, 1901:51.

36. *Themistella* Bovallius, 1887

FIGURE 46

Type-species: *Themistella steenstrupi* Bovallius, 1887b.

Small species with rather broad pereon. Head rather broad; eyes occupying most of its surface. Pereonites 1–5 fused in both sexes. Coxae fused with pereonites. Telson very short. Antenna 1 of female 2-segmented, rather long. Antenna 2 of female 1-segmented, rudimentary; gland cone small. Mandible with serrate incisor; with palp in male, without palp in female. Maxilliped, outer lobes narrow, tapering distally; inner lobe almost completely absent, apparently represented by slight unarmed bulge on basal segment. Pereopods with rather broad segments. Pereopods 1 and 2 chelate; carpal process gauge-shaped, with marginal spines. Pereopod 5 much longer than pereopods 6 and 7. Dactyls of pereopods 6 and 7 with flexure slightly distal to midlength.

References: Bovallius, 1889:312; Bowman, 1973: 63.

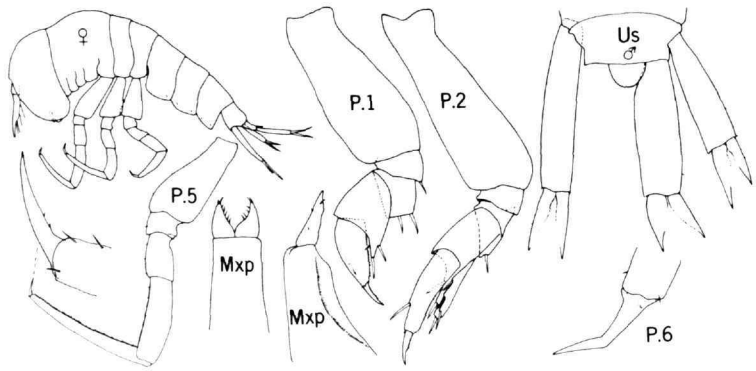

FIGURE 46.—*Themistella*.

XII. Family DAIRELLIDAE Bovallius, 1887

Body moderately slender, but pereon of female somewhat expanded, transparent; total length 6–10 mm. Head large, globular in female, somewhat smaller in male. Eyes large, occupying most of head surface. Pereonites 1 and 2 fused dorsally. Coxae fused with pereonites. Telson rounded, very short. Antenna 1 with short 3-segmented peduncle; flagellum of male long, filiform, multisegmented; flagellum of female composed of a single cylindrical segment. Antenna 2 of male long, multisegmented; absent in female. Mandible without palp, with molar. Maxilliped with inner and outer lobes fused into a single subquadrate plate. Pereopods 1 and 2 slender, simple, only slightly shorter than pereopods 3–7, which are subequal. Uropods with free exopods and endopods. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

One genus.

37. *Dairella* Bovallius, 1887

FIGURE 47

Type-species: *Paraphronima californica* Bovallius, 1885.

With the characters of the family.

The mouthparts of *Dairella* have been described by Stebbing (1888) and Bovallius (1889). The small size makes dissection of these mouthparts difficult, and it is not surprising that both authors misinterpreted maxilla 2 and maxilliped. The maxilliped is a single subquadrate plate with a slightly concave

distal margin bearing a few spines at the disto-lateral corners. Stebbing considered this plate to be the base only of the maxilliped. The pyriform maxilla 2 lies directly in front of and close to the maxilliped. Both Bovallius and Stebbing believed it to be the outer lobe of the maxilliped, but careful dissection showed it to be completely separate from the latter throughout its entire length. The reason for Stebbing's failure to find maxilla 2 is now obvious, but the nature of the structure that Bovallius described as maxilla 2 is not clear.

References: Stebbing, 1888:1342; Bovallius, 1889: 332.

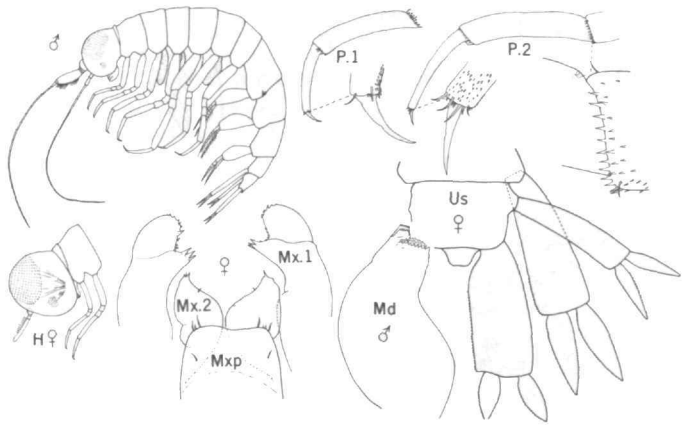

FIGURE 47.—*Dairella*.

XIII. Family PHRONIMIDAE Dana, 1853

Body slender, elongate; total length 5–40 mm. Head subconical, widest dorsally, narrowing and prolonged ventrally. Eyes composed of a larger dorsal part and a smaller bulging ventrolateral part. Pereonites all separate or pereonites 1 and 2 fused. Coxae fused with pereonites. Telson very small. Antenna 1 in male long, multisegmented, first segment of flagellum distinctly enlarged; antenna 1 of female very short, 2-segmented. Antenna 2 of male long, multisegmented, sometimes absent; antenna 2 of female reduced to a tubercle. Mandible without palp in both sexes. Maxilliped with slender outer lobes and short inner lobe. Pereopods 1 and 2 simple, subchelate, or chelate depending on development of carpal process; propus produced into thin triangular process on either side of dactyl. Pereopods 3, 4, 6, and 7 simple, slender; pereopod 7 not reduced. Pereopod 5 ending in subchelate claw. Uropods slender, with free exopods and endopods. Gills on pereonites 4–6. Oostegites on pereonites 2–5.

Two genera.

Key to the Genera of Phronimidae

Pereonites 1 and 2 not fused. Carpus of pereopod 5 with smooth anterior margin and pointed process at anterodistal angle ..... 38. ***Phronima***

Pereonites 1 and 2 fused. Carpus of pereopod 5 with dentate anterior margin, without clearly defined anterodistal angle ..... 39. ***Phronimella***

38. *Phronima* Latreille, 1802

FIGURE 48

Type-species: Cancer sedentarius Forskål, 1775. Body moderately slender. Pereonites all free. Pereopod 5 with carpus markedly widened distally; anterodistal angle forming strong pointed process; anterior margin smooth. Uropod 2 present in both sexes; endopod sometimes reduced but never missing.

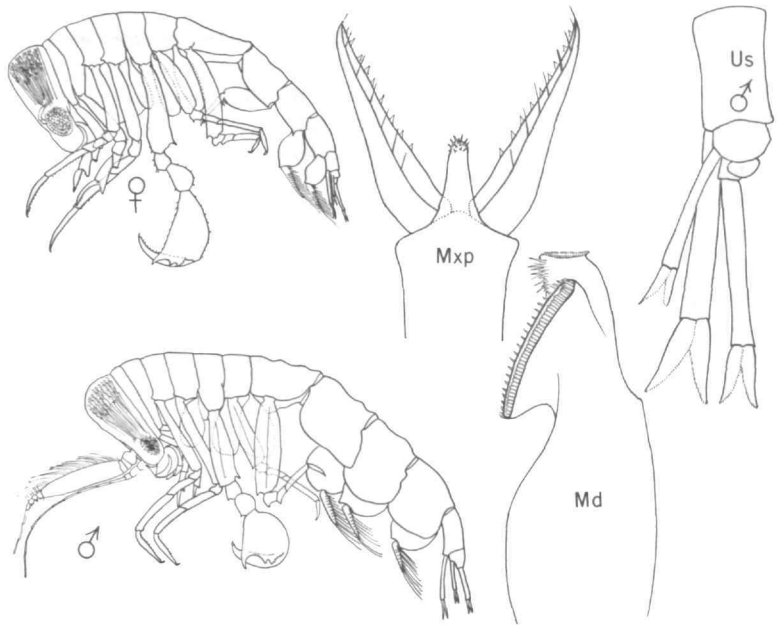

FIGURE 48.—*Phronima.*

References: Claus, 1879a:passim; Vosseler, 1901: 1; Stephensen, 1924:112; Shih and Dunbar, 1963: passim; Shih, 1969:passim.

39. *Phronimella* Claus, 1871

FIGURE 49

Type-species: *Phronima elongata* Claus, 1862.

Body and pereopods extremely slender. Pereonites 1 and 2 fused. Pereopod 5 with carpus elongate, only slightly widened distally, without clearly defined anterodistal angle; anterior margin dentate. Uropod 2 absent in female, rudimentary in male, sometimes with small exopod.

References: Same as for *Phronima*.

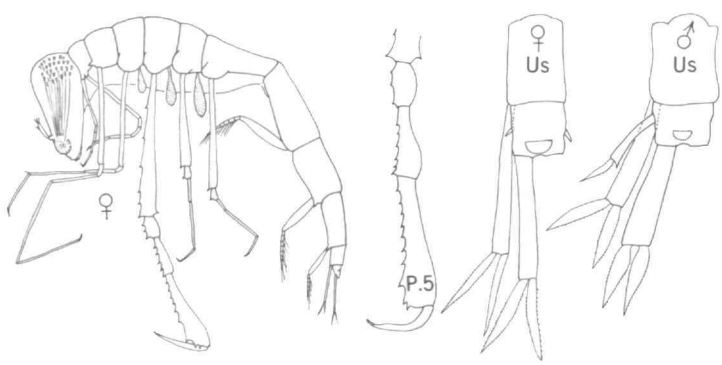

FIGURE 49.—*Phronimella.*

XIV. Family PHROSINIDAE Dana, 1853

Body rather compact; total length 4–30 mm. Head large, globular; eyes occupying most of head surface. Pereonites all separate or pereonites 1 and 2 fused. Coxae separate from pereonites. Telson well developed, oval or triangular. Antenna 1 with

long filiform flagellum in male; with 1-segmented flagellum in female, sometimes reduced. Antenna 2 similar to antenna 1 in male, rudimentary in female. Mandible with palp in male, without palp in female. Maxilliped with slender outer lobes and well-developed inner lobe.

Pereopods 1 and 2 simple; one or more of following pereopods prehensile, subchelate; pereopod 5 always the longest, with large subchela; pereopod 7 reduced in length or number of segments. Uropods composed each of a single leaflike segment only. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

Three genera.

Key to the Genera of Phrosinidae

1. Pereonites 1 and 2 separate. Pereopods 3 and 4 simple ..... 42. ***Primno***
   Pereonites 1 and 2 fused. Pereopods 3 and 4 subchelate 2
2. Head produced into 2 rostral points. Pereopod 7 composed of broad basis and sometimes a rudimentary second segment. ..... 40. ***Phrosina***
   Head rounded, without rostral points. Pereopod 7 with all segments present ... 41. ***Anchylomera***

40. *Phrosina* Risso, 1822

FIGURE 50

Type-species: *Phrosina semilunata* Risso, 1822.

Head produced into 2 rostral points. Pereonites 1 and 2 fused. Telson round-triangular, nearly as wide as urosome. Antenna 1 of female very short. Antenna 2 absent in female. Pereopods 3 and 4 subchelate, with sharp carpal process; distal margin of carpus dentate, with larger teeth in pereopod 4. Pereopods 5 and 6 subchelate; carpus relatively short and broad, with dentate distal margin; propus much longer than carpus. Pereopod 7 composed of broad basis and sometimes a rudimentary second segment. Uropods rounded, with smooth margins. Gills without folds.

References: Stebbing, 1888:1424; Vosseler, 1901: 89.

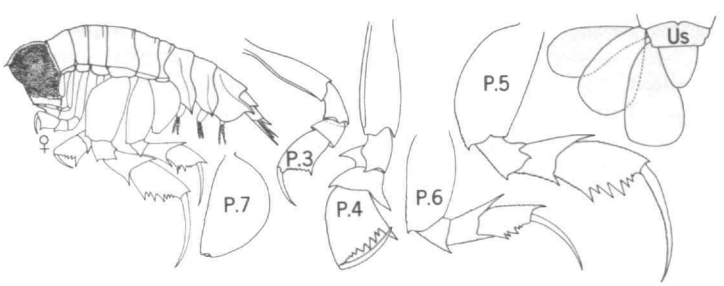

FIGURE 50.—*Phrosina*.

41. *Anchylomera* H. Milne-Edwards, 1830

FIGURE 51

Type-species: *Anchylomera blossevillii* H. Milne-Edwards, 1830.

Head globular, without rostrum. Pereonites 1 and 2 fused. Telson round-triangular, nearly as wide as urosome. Antenna 1 of female very short. Antenna 2 of female reduced to a tubercle. Pereopods 3 and 4 subchelate, with sharp carpal process; distal margin of carpus smooth. Pereopod 5 with broad basis, having greatest width proximally; carpus with broad distal margin with rounded teeth. Pereopod 6 prehensile, with swollen and rounded carpus. Pereopod 7 with all segments present; dactyl digitiform. Uropods rounded, with smooth margins. Gills with folds.

References: Bovallius, 1889:408; Vosseler, 1901: 88.

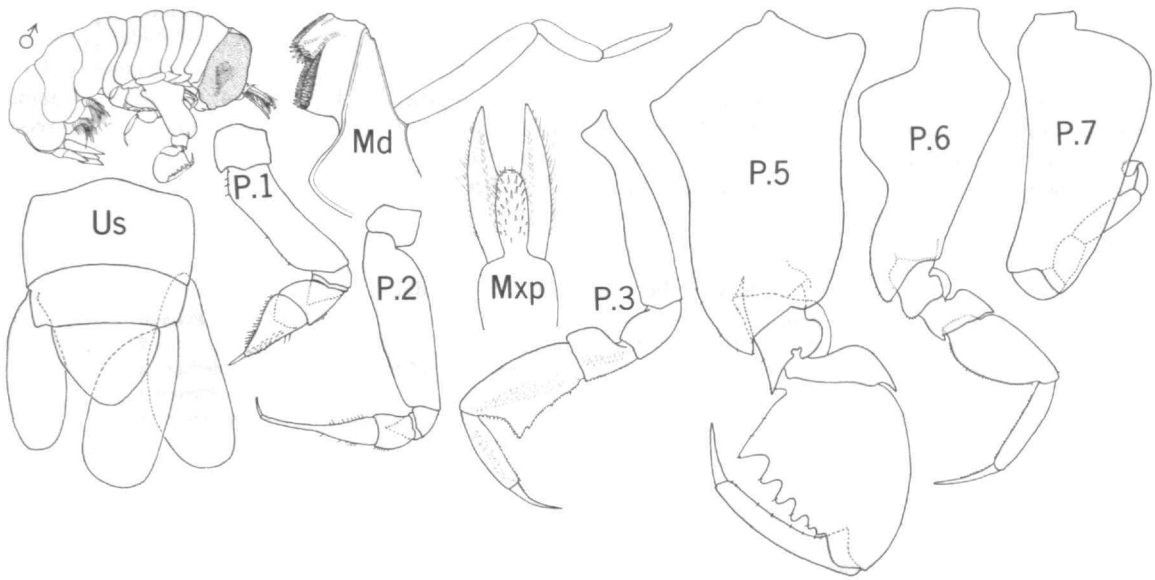

FIGURE 51.—*Anchylomera.*

42. *Primno* Guérin-Méneville, 1836

FIGURE 52

Type-species: *Primno macropa* Guérin-Méneville, 1836.

Head produced into single, very short rostrum. Pereonites 1 and 2 separate. Telson much narrower than urosome. Antenna 1 of female longer than head. Antenna 2 of female reduced to a tubercle. Pereopods 3, 4, and 6 simple, with some teeth on margin of carpus. Pereopod 5 prehensile, entire anterior margin of carpus dentate; propus shorter than carpus. Pereopod 7 with all segments present, dactyl digitiform. Uropods pointed; uropods 2 and 3 with teeth on outer margins. Gills without folds.

References: Stebbing, 1888:1440; Bovallius, 1889: 397; Vosseler, 1901:87.

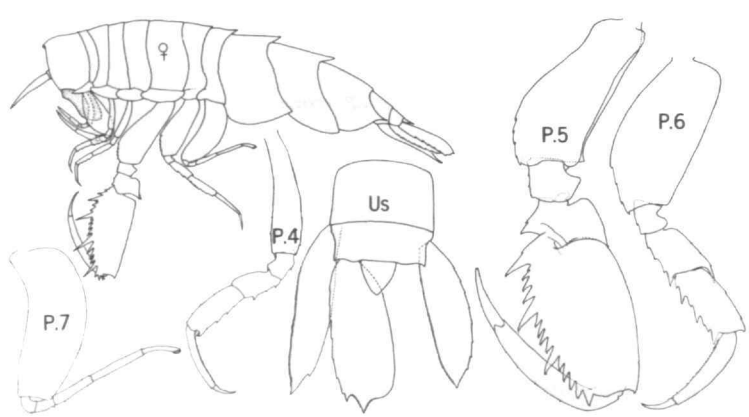

FIGURE 52.—*Primno.*

LYCAEOPSOIDEA, new superfamily

Antenna 1 inserted on anterior surface of head; flagellum of male with large triangular 1st segment and a few small distal segments inserted subterminally; flagellum of female short, composed of a few segments. Antenna 2 absent in female; in male inserted on ventral surface of head, very short, curved, composed of a few segments. Pereopod 5 never with large subchela. Pereopod 7 reduced in size, but all segments present.

One family (Lycaeopsidae).

XV. Family LYCAEOPSIDAE Chevreux, 1913

Body slender, somewhat compressed laterally; total length 3–6 mm. Head globular, higher than long; eyes large, occupying most of head surface. Coxae not fused with pereonites. Telson usually rather narrow, not fused with double urosomite. Mandible with palp in male, without palp in female. Maxilliped with outer lobes pointed, only slightly longer than inner lobe.

Pereopods 1 and 2 simple. Pereopod 5 long and very slender in male, normal in female and young male. Pereopod 6 long, with broad segments, especially in male. Uropods 1–3 having exopods and endopods not fused with protopods. Uropod 3 with endopod modified in male. Gills on pereonites 5 and 6, without folds. Oostegites on pereonites 2–5.

One genus.

43. *Lycaeopsis* Claus, 1879

FIGURE 53

Type-species: *Lycaeopsis themistoides* Claus, 1879b.

With the characters of the family.

References: Pirlot, 1930:27; 1939;42; Spandl, 1927:213.

Superfamily PLATYSCELOIDEA, new name

Antenna 1 inserted on ventral surface of head; flagellum of male with large curved 1st segment and a few small distal segments inserted terminally, or more commonly subterminally, on 1st segment; flagellum of female usually curved, composed of a few segments. Antenna 2 inserted on ventral surface of head; in male composed of 5 usually long segments (3 peduncular, 2 flagellar) that fold on one another in zigzag fashion; in female short, composed of a few segments, or absent. Pereopod 5 never with large subchela. Pereopod 7 reduced in size and sometimes in number of segments.

Six families (Pronoidae, Anapronoidae, Lycaeidae, Oxycephalidae, Platyscelidae, Parascelidae).

References: Claus, 1887; Spandl, 1927.

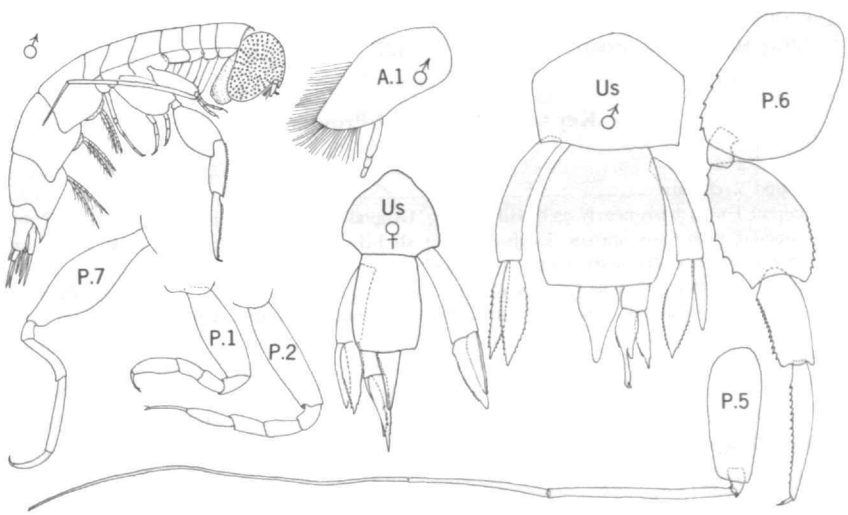

FIGURE 53.—*Lycaeopsis*.

Key to the Families of Platysceloidea

1. Body not conglobate. Pereopods 5 and 6 with basis somewhat broadened, but never operculate. Pereopod 6 with distal segments inserted on margin of basis or on medial surface a short distance back from margin 2
   Body conglobate. Pereopods 5 and 6 with basis transformed into broad operculum. Pereopod 6 with distal segments inserted on medial surface far back from margin 6
2. Body elongate; head produced into distinct rostrum anterior to eyes ..... XIX. OXYCEPHALIDAE (except *Simorhynchotus*)
   Body rather compact; head globular 3
3. Pereopod 7 consisting only of basis and 1 or 2 rudimentary segments. Mandible with palp in both sexes ..... XVI. PRONOIDAE
   Pereopod 7 having all segments present. Mandible without palp in female 4
4. Antenna 2 of female short, composed of a few segments. Mandible without palp in male ..... XVII. ANAPRONOIDAE
   Antenna 2 of female rudimentary or absent. Mandible with palp in male 5
5. Maxillae 1 and 2 absent. Uropod 2 with endopod fused with protopod ..... XVIII. LYCAEIDAE
   Maxillae 1 and 2 reduced but present. Uropod 2 with endopod not fused with protopod ..... XIX. OXYCEPHALIDAE (*Simorhynchotus*)
6. Mouthparts in form of a broad short cylinder. Pereopod 7 consisting only of basis and sometimes 1 or 2 rudimentary additional segments ..... XX. PLATYSCELIDAE
   Mouthparts pointed, in form of a cone. Pereopod 7 with all segments present ..... XXI. PARASCELIDAE

XVI. Family PRONOIDAE Claus, 1879

Body compact, more or less laterally compressed; total length 3–16 mm. Head globular; eyes large, occupying most of head surface. Coxae not fused with pereonites. Telson triangular, separate from or very rarely fused with double urosomite. Antenna 2 of female short, with few segments. Mandible with palp in both sexes. Maxillae 1 and 2 well developed. Pereopod 1 simple, sometimes subchelate. Pereopod 2 simple or chelate. Pereopod 5 longer than pereopod 6; basis somewhat broadened. Pereopod 6 having basis much broader than that of pereopod 5, but not operculate; distal segments inserted subterminally. Pereopod 7 with well-developed basis followed by 1 or 2 rudimentary segments; all segments may be present in juveniles. Uropods usually with free rami; endopods of uropods 2 and 3 rarely fused with protopods. Gills on pereonites 2–6, with or without folds. Oostegites on pereonites 2–5.

Five genera.

References: Claus, 1887:47–55; Spandl, 1927:216–227.

Key to the Genera of Pronoidae

1. Pereopod 2 simple 2
   Pereopod 2 chelate 3
2. Pereopod 1 with basis nearly as broad as long. Uropod 3 much longer than telson 44. ***Pronoe***
   Pereopod 1 with basis narrow. Uropod 3 only slightly longer than telson ..... 46. ***Paralycaea***
3. Double urosomite distinctly longer than wide 4
   Double urosomite about as long as wide ..... 45. ***Eupronoe***
4. Pereopod 2 with carpal process pointed, nearly as long as propus. Uropod 3 slightly longer than telson ..... 47. ***Parapronoe***
   Pereopod 2 with carpal process rounded, about half as long as propus. Uropod 3 much longer than telson ..... 48. ***Sympronoe***

44. *Pronoe* Guérin-Méneville, 1836

FIGURE 54

Type-species: Pronoe capito Guérin-Méneville, 1836.

Body rather slender; double urosomite about as wide as long. Telson very short, not fused with double urosomite. Antenna 2 of male short, folded only once or twice. Pereopod 1 simple; basis oval,

almost as broad as long. Pereopod 2 simple. Pereopod 5 distinctly longer than pereopod 6. Pereopod 7 composed of basis and very small second segment. Uropod 1 with exopod and endopod pointed. Uropod 2 with exopod pointed, endopod rounded. Uropod 3 much longer than telson. Gills without folds.

References: Claus, 1887:48; Stebbing, 1888:1507.

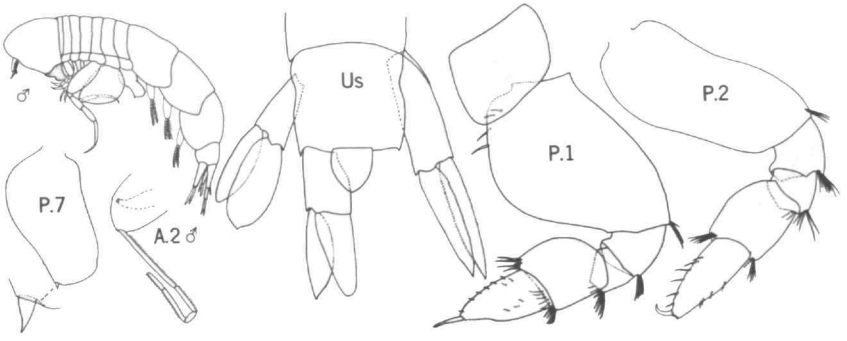

FIGURE 54.—*Pronoe*.

45. *Eupronoe* Claus, 1879

FIGURE 55

Type-species: *Eupronoe maculata* Claus, 1879b.

Body rather stout; anterior pereonites short, appearing as though compressed together longitudinally; double urosomite about as wide as long. Telson moderately long, not fused with double urosomite. Antenna 2 of male long, with very short terminal segment. Pereopod 1 simple or subchelate; basis twisted in male. Pereopod 2 chelate; carpal process pointed or rounded. Pereopod 5 distinctly longer than pereopod 6. Pereopod 7 with pear-shaped basis and small elliptical second segment. Uropod 1 with exopod and endopod pointed. Uropods 2 and 3 with exopod and endopods rounded, very delicate; uropod 3 much longer than telson. Gills with folds.

References: Claus, 1887:50; Spandl, 1927:222; Hurley, 1955:175.

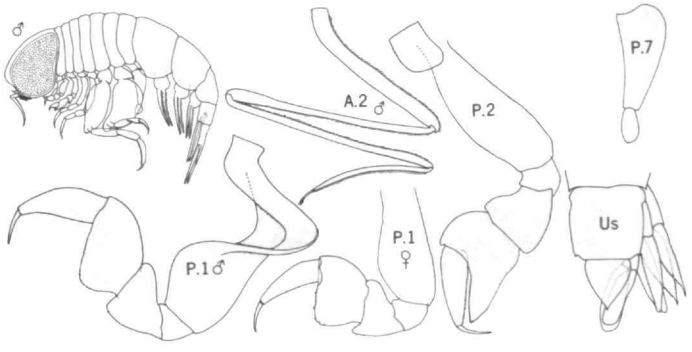

FIGURE 55.—*Eupronoe*.

46. *Paralycaea* Claus, 1879

FIGURE 56

Type-species: *Paralycaea gracilis* Claus, 1879b.

Body rather stout; double urosomite somewhat broader than long; telson long, fused with or separate from double urosomite. Antenna 2 of male with long terminal segment. Pereopods 1 and 2 simple. Pereopod 5 distinctly longer than pereopod 6. Pereopod 7 with narrow basis; distal segments

sometimes separate, usually fused into short recurved segment. Uropod 2 having endopod fused with or separate from protopod. Uropod 3 having endopod fused with protopod. Uropods 1 and 2 having exopods and endopods pointed. Uropod 3 slightly longer than telson; exopod pointed; endopod obtusely rounded. Gills without folds.

References: Claus, 1887:63; Pirlot, 1930:30.

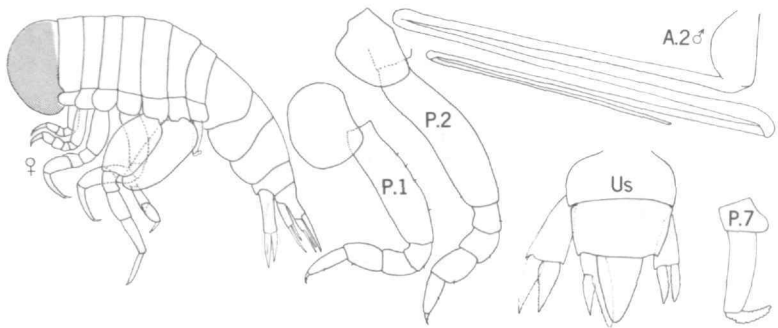

FIGURE 56.—*Paralycaea*.

47. *Parapronoe* Claus, 1879

FIGURE 57

Type-species: Parapronoe crustulum Claus, 1879b.

Body rather slender; double urosomite distinctly longer than wide; telson long, not fused with double urosomite. Antenna 2 of male moderately long, with very short terminal segment. Pereopod 1 simple. Pereopod 2 chelate; carpal process pointed, about as long as propus. Pereopod 5 much longer than pereopod 6; basis of pereopod 6 with concave distal margin. Pereopod 7 with broad basis and very small additional segments. Uropods with pointed endopods and exopods; uropod 3 only slightly longer than telson. Gills with folds.

References: Claus, 1887:53; Stebbing, 1888:1521; Barnard, 1930:427; Pirlot, 1939:52.

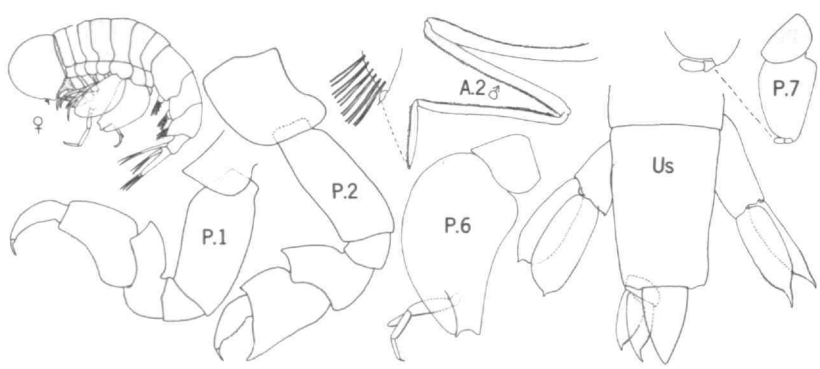

FIGURE 57.—*Parapronoe*.

48. *Sympronoe* Stebbing, 1888

FIGURE 58

Type-species: *Parapronoe parva* Claus, 1879b.

Body rather slender; double urosomite about twice as long as wide; telson very short, not fused with double urosomite. Antenna 2 of male long, with very short terminal segment. Pereopod 1 simple. Pereopod 2 chelate; carpal process rounded, about half as long as propus. Pereopod 5 much longer than pereopod 6; basis of pereopod 6 with rather narrow distal margin produced into broadly rounded anterior lobe and narrow, pointed posterior process. Pereopod 7 with pear-shaped basis and

2 very small additional segments. Uropods 1 and 2 wtih pointed endopods and exopods; uropod 3 much longer than telson, endopod rounded, exopod bluntly pointed. Gills with folds.

References: Stebbing, 1888:1533; Spandl, 1927: 225.

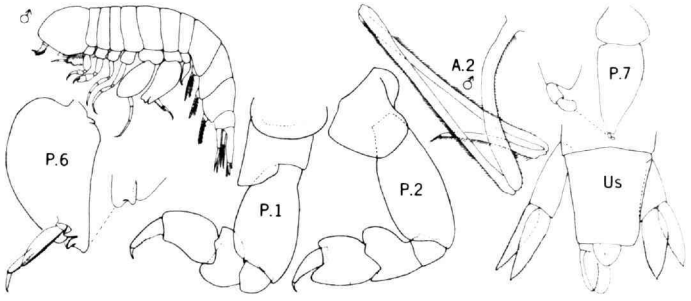

FIGURE 58.—*Sympronoe*.

XVII. ANAPRONOIDAE, new family

Body rather plump, not laterally compressed. Head globular; eyes large, occupying most of head surface. Double urosomite shorter than wide. Telson triangular, not fused with double urosomite. Antenna 2 of female short, with few segments. Mandible without palp in both sexes. Maxillae 1 and 2 moderately well developed. Pereopod 1 subchelate; pereopod 2 chelate. Pereopod 5 longer than pereopod 6; basis of both broad, but not operculate. Pereopod 6 with distal segments inserted on medial surface of basis proximal to its distal end, their combined length subequal to that of basis. Pereopod 7 with all segments present.

One genus.

49. *Anapronoe* Stephensen, 1925

FIGURE 59

Type-species: *Anapronoe reinhardti* Stephensen, 1925.

With the characters of the family.

References: Stephensen, 1925:163; Spandl, 1927: 217.

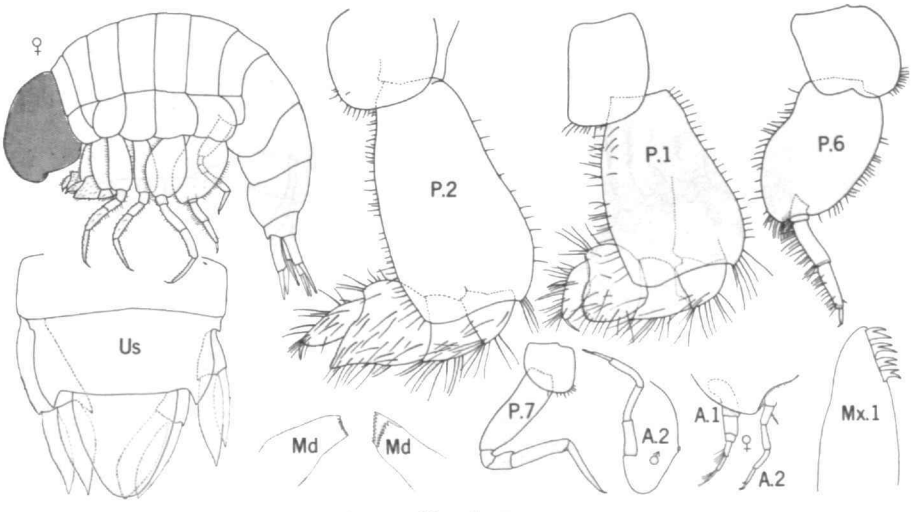

FIGURE 59.—*Anapronoe*.

XVIII. Family LYCAEIDAE Claus, 1879

Body rather compact, laterally compressed or somewhat flattened dorsoventrally; total length 3–22 mm. Head globular or somewhat flattened dorsoventrally; eyes large, occupying most of head surface. Coxae not fused with pereonites. Telson triangular, separate from or fused with double urosomite. Antenna 2 rudimentary or absent in female. Mandible with palp in male, without palp in female (except 2-segmented palp in female *Tryphana*). Maxillae 1 and 2 reduced but present. Pereopods 1 and 2 simple or subchelate. Pereopod 5 slightly or distinctly longer than pereopod 6; basis of both somewhat broadened but not operculate. Pereopod 6 with distal segments inserted on margin of basis or on medial surface proximal to margin. Pereopod 7 with all segments present. Uropod 3 having endopod sometimes fused with protopod. Gills on pereonites 2–6, with folds. Oostegites on pereonites 2–5.

Five genera.

References: Claus, 1887:55–65; Chevreux and Fage, 1925:426.

Key to the Genera of Lycaeidae

1. Pereopods 1 and 2 simple 2
   Pereopods 1 and 2 subchelate 3
2. Pereopod 1 with basis nearly as broad as long. Uropod 3 much longer than telson; endopod not fused with protopod ..... 54. ***Tryphana***
   Pereopod 1 with basis about half as broad as long. Uropod 3 slightly longer than telson; endopod fused with protopod ..... 52. ***Pseudolycaea***
3. Pereopods 1 and 2 with margins of carpus and propus smooth or finely serrulate. Uropod 1 with protopod much longer than endopod ..... 50. ***Lycaea***
   Pereopods 1 and 2 with margins of carpus and propus dentate. Uropod 1 with protopod and endopod subequal in length 4
4. Body somewhat flattened dorsoventrally. Distal segments of pereopods covered with numerous setae ..... 53. ***Thamneus***
   Body laterally compressed. Distal segments of pereopods without setae ..... 51. ***Brachyscelus***

50. *Lycaea* Dana, 1852

FIGURE 60

Type-species: *Lycaea ochracea* Dana, 1853.

Body rather plump, especially in female. Telson fused with double urosomite. Antenna 2 of male with very short terminal segment. Pereopods 1 and 2 subchelate, margins of carpus and propus smooth or finely serrulate; basis of pereopod 1 not markedly broadened. Pereopod 5 distinctly longer than pereopod 6. Uropod 1 with protopod much longer than endopod. Uropod 3 slightly longer than telson; endopod not fused with protopod.

References: Claus, 1887:61; Barnard, 1930:428; Shoemaker, 1945:243.

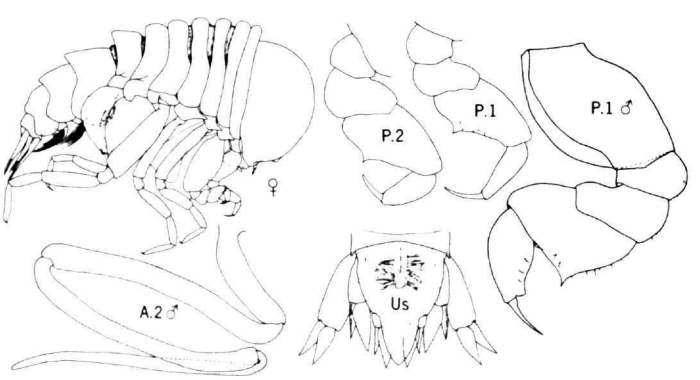

FIGURE 60.—*Lycaea*.

51. *Brachyscelus* Bate, 1861

FIGURE 61

Type-species: *Brachyscelus crusculum* Bate, 1861.

Body compact, moderately slender. Telson not fused with double urosomite. Antenna 2 of male with short terminal segment. Pereopods 1 and 2 subchelate, margins of carpus and propus dentate; basis of pereopod 1 not markedly broadened. Pereopod 5 slightly longer than pereopod 6. Uropod 1 with protopod and endopod subequal in length. Uropod 3 slightly longer than telson; endopod not fused with protopod.

References: Claus, 1887:56; Stephensen, 1925:172.

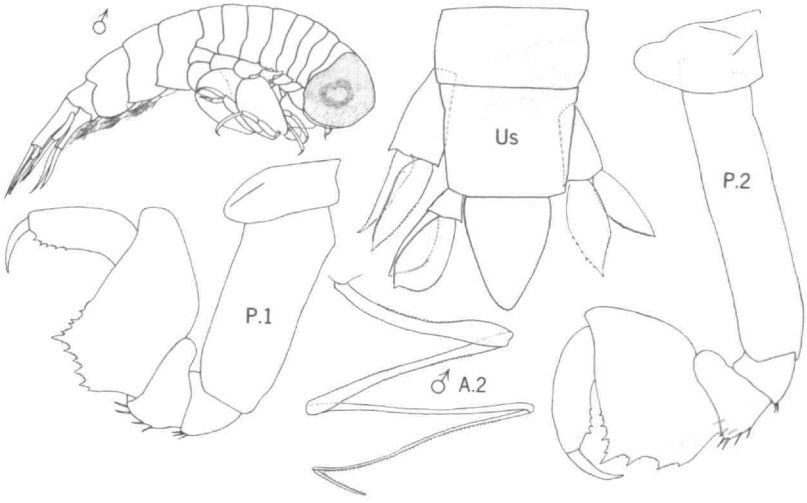

FIGURE 61.—*Brachyscelus*.

52. *Pseudolycaea* Claus, 1879

FIGURE 62

Type-species: *Pseudolycaea pachypoda* Claus, 1879b.

Body moderately plump. Telson fused with double urosomite. Antenna 2 of male with very short terminal segment. Pereopods 1 and 2 simple; basis of pereopod 1 not markedly broadened. Pereopods 5 and 6 subequal in length. Uropod 1 with protopod much longer than endopod. Uropod 3 slightly longer than telson; endopod fused with protopod.

References: Claus, 1887:64; Chevreux and Fage, 1925:430; Spandl, 1927:215.

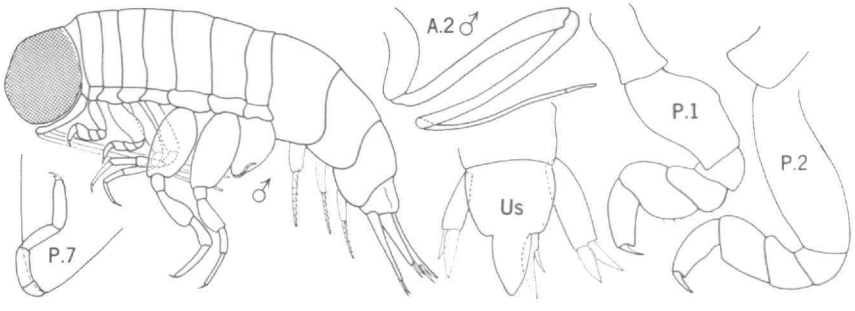

FIGURE 62.—*Pseudolycaea*.

53. *Thamneus* Bovallius, 1887

FIGURE 63

Type-species: *Thamneus rostratus* Bovallius, 1887b.

Body moderately plump, flattened dorsoventrally. Head somewhat flattened, with short, broad, upturned rostrum in male. Telson not fused with double urosomite. Antenna 2 of male much shorter than head, 4-segmented. Pereopods 1–6 covered with numerous setae on distal segments. Pereopods 1 and 2 subchelate, margins of carpus and propus dentate; basis of pereopod 1 not markedly broadened. Pereopods 5 and 6 subequal in length. Uropod 1 with protopod and endopod subequal in length. Uropod 3 distinctly longer than telson; endopod not fused with protopod.

Reference: Stebbing, 1888:1558.

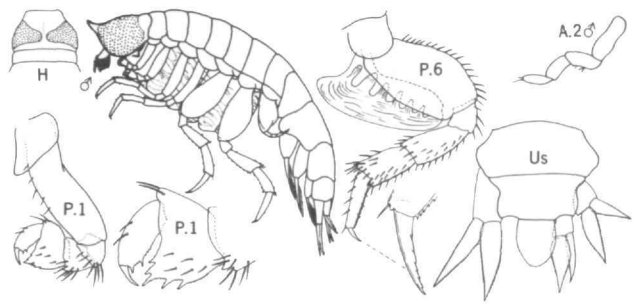

FIGURE 63.—*Thamneus*.

54. *Tryphana* Boeck, 1870

FIGURE 64

Type-species: *Tryphana malmi* Boeck, 1870.

Body robust. Telson not fused with double urosomite. Antenna 2 of male with long terminal segment. Mandible of female with 2-segmented palp. Pereopods 1 and 2 simple; basis of pereopod 1 oval, nearly as broad as long; pereopod 2 with slender distal segments, propus and dactyl covered with short setae. Pereopods 3–6 stout, with prominent glands in carpus, distally prehensile with dactyl closing against produced distal margin of propus. Pereopod 5 distinctly longer than pereopod 6. Uropod 1 with protopod and endopod subequal in length. Uropod 3 much longer than telson; endopod not fused with protopod.

Reference: Sars, 1890:16.

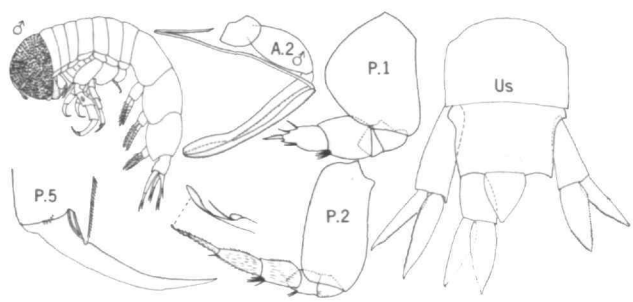

FIGURE 64.—*Tryphana*.

XIX. Family OXYCEPHALIDAE Bate, 1861

Body form variable, sometimes compact, usually elongate, sometimes extremely long and slender; total length 3–120 mm. Head sometimes globular, usually produced anteriorly into long rostrum, sometimes with distinct neck; eyes large, occupying

most of head surface except rostrum and neck. Coxae usually separate from pereonites, sometimes fused. Telson fused with or separate from double urosomite. Antenna 2 absent in female. Mandible with palp in male, without palp in female. Maxillae 1 and 2 absent. Pereopod 1 rarely simple, usually subchelate or chelate. Pereopod 2 subchelate or chelate. Pereopod 5 subequal to or distinctly longer than pereopod 6; basis of both rarely slender, usually broadened but not operculate. Pereopod 6 with distal segments inserted terminally or rarely subterminally on basis, their combined length greater than that of basis. Pereopod 7 usually with all segments present; distal segments sometimes reduced in number or absent. Uropods 2 and 3 having endopods sometimes fused with protopods. Gills on pereonites 2–6, sometimes rudimentary or absent on one or more of pereonites 2–4. Oostegites on pereonites 2–5, sometimes on pereonites 3–5, sometimes reduced in size.

Nine genera.

References: Bovallius, 1890; Fage, 1960; Pillai, 1966a.

Key to the Genera of Oxycephalidae

1. Double urosomite 3 or more times as long as wide 2
   Double urosomite less than 3 times as long as wide 4
2. Body extremely slender. Pereopod 7 reduced to basis and sometimes one or more additional rudimentary segments ..... 60. ***Rabdosoma***
   Body only moderately slender. Pereopod 7 with all segments present 3
3. Rostrum with broad lateral flanges. Uropods 1 and 3 with well-developed exopods and endopods ..... 56. ***Calamorhynchus***
   Rostrum without lateral flanges. Uropod 1 with endopod very small; uropod 3 with exopod very small ..... 59. ***Leptocotis***
4. Rostrum rounded or absent 5
   Rostrum pointed 6
5. Body very slender. Pereopods 1 and 2 chelate; pereopods 5 and 6 paddle-like ..... 58. ***Glossocephalus***
   Body compact. Pereopod 1 simple; pereopod 2 subchelate; pereopods 5 and 6 not paddle-like ..... 61. ***Simorhynchotus***
6. Uropods 2 and 3 having endopods not fused with protopods 7
   Uropods 2 and 3 or uropod 3 having endopods fused with protopod 8
7. Pereonite 5 produced into backward-pointed processes on either side. Pereopods 5–7 having basis with row of 3 or 4 pitlike glands ..... 57. ***Cranocephalus***
   Pereonite 5 without processes. Pereopods 5–7 having basis without pitlike glands 62. ***Streetsia***
8. Pereopods 1 and 2 subchelate. Pereopod 6 with distal posterior corner of basis produced into triangular process. Endopod fused with protopod in uropod 3, not fused in uropods 1 and 2 ..... 63. ***Tullbergella***
   Pereopods 1 and 2 chelate. Pereopod 6 having basis without process. Endopod fused with protopod in uropods 2 and 3 ..... 55. ***Oxycephalus***

55. *Oxycephalus* H. Milne-Edwards, 1830

FIGURE 65

Type-species: *Oxycephalus piscatoris* H. Milne-Edwards, 1830.

Body elongate. Head somewhat shorter than pereon, produced into long, pointed rostrum. Coxae fused with pereonites. Double urosomite longer than wide, sometimes twice as long, fused with telson. Pereopods 1 and 2 chelate. Pereopod 7 with all segments present. Uropods 2 and 3 having endopods fused with protopods. Uropod 3 slightly shorter, equal to, or slightly longer than telson.

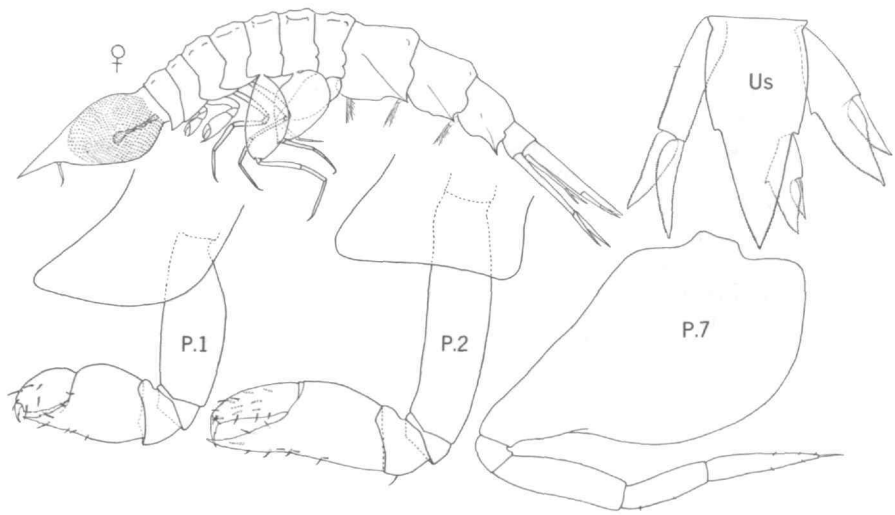

FIGURE 65.—*Oxycephalus.*

56. *Calamorhynchus* Streets, 1878

FIGURE 66

Type-species: *Calamorhynchus pellucidus* Streets, 1878.

Body elongate. Head longer than pereon, produced into long, pointed rostrum expanded into broad lateral flanges. Coxae fused with pereonites. Double urosomite more than 3 times as long as wide, fused with telson. Pereopods 1 and 2 chelate. Pereopod 7 with all segments present. Uropod 3 shorter than telson; endopod fused with protopod.

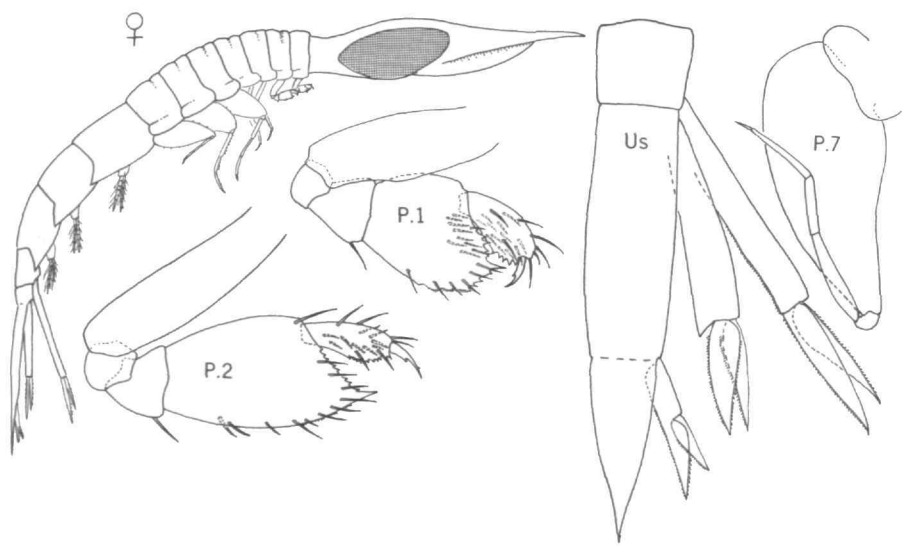

FIGURE 66.—*Calamorhynchus.*

57. *Cranocephalus* Bovallius, 1890

FIGURE 67

Type-species: Cranocephalus goesi Bovallius, 1890.

Body rather compact, only moderately elongate. Head somewhat shorter than pereon, produced into pointed rostrum. Coxae fused with pereonites but demarcated by indentations. Pereonite 5 produced into backward-pointed processes on either side. Double urosomite somewhat longer than wide, fused with telson. Pereopods 1 and 2 subchelate; pereopod 2 sometimes almost chelate. Pereopods 5–7 having broad basis, with row of 3 or 4 pitlike glands. Pereopod 7 with all segments present. Uropod 3 subequal to or shorter than telson.

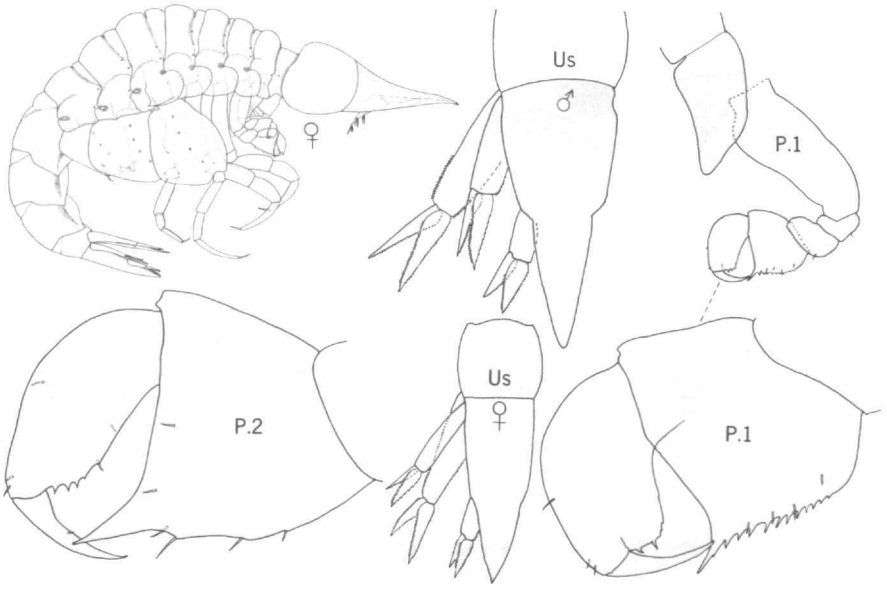

FIGURE 67.—*Cranocephalus.*

58. *Glossocephalus* Bovallius, 1887

FIGURE 68

Type-species: *Glossocephalus milne-edwardsi* Bovallius, 1887b.

Body very slender, elongate. Head much shorter than pereon, produced into short rounded rostrum. Coxae separate on pereonites 1–6, fused with pereonite 7. Double urosomite about as long as wide, fused with telson. Pereopods 1 and 2 chelate. Pere-

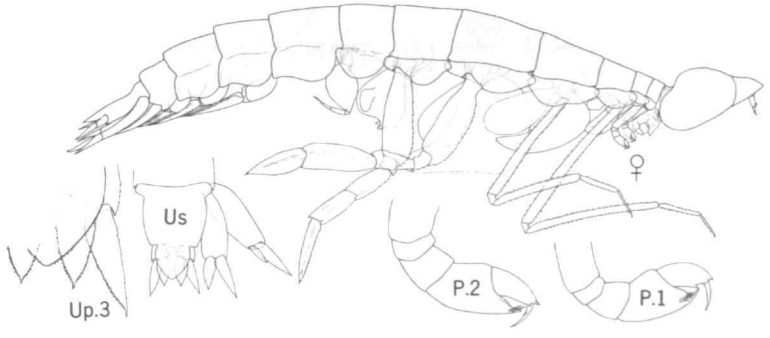

FIGURE 68.—*Glossocephalus.*

opods 3 and 4 very slender. Pereopods 5 and 6 paddle-like, with broad segments; dactyl very small. Pereopod 7 with all segments present. Uropod 3 somewhat longer than telson. Gills on pereonite 2 absent in male, rudimentary in female; on pereonite 3 rudimentary in both sexes. Oostegites on pereonites 3–5.

59. *Leptocotis* Streets, 1877

FIGURE 69

Type-species: *Leptocotis spinifera* Streets, 1877.

Body elongate. Head longer than pereon, produced into long, pointed rostrum. Coxae not fused with pereonites. Double urosomite more than 3 times as long as wide, fused with telson. Pereopods 1 and 2 chelate. Pereopod 7 with all segments present. Uropod 1 having endopod very small. Uropod 2 having endopod fused with protopod in female, separate in male. Uropod 3 shorter than telson; endopod fused with protopod; exopod very small.

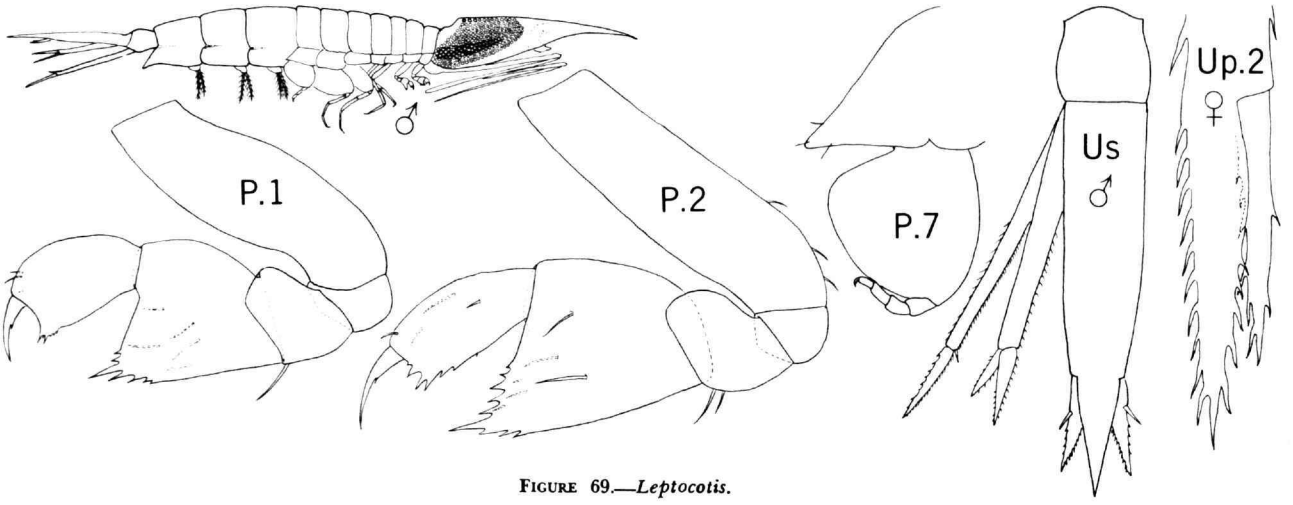

FIGURE 69.—*Leptocotis*.

60. *Rhabdosoma* White, 1847

FIGURE 70

Type-species: *Oxycephalus armatus* H. Milne-Edwards, 1840.

Body extremely slender and elongate. Head much longer than pereon, with long neck and very long, needle-shaped rostrum. Coxae fused with pereonites. Double urosomite more than 3 times as long as wide, not fused with telson. Pereopods 1 and 2 very short, chelate. Pereopods 3–6 very slender. Pereopod 7 very small, usually consisting only of basis,

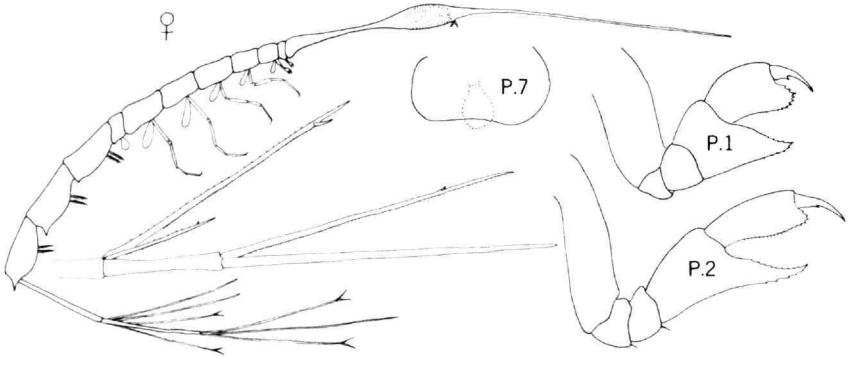

FIGURE 70.—*Rhabdosoma*.

sometimes with one or more additional rudimentary segments. Uropods very slender; uropods 2 and 3 having endopod fused with protopod, exopod very short. Gills on pereonites 2–6 or 5 and 6 in female, on pereonites 4–6 or 5 and 6 in male. Oostegites reduced in size, on pereonites 2–6.

61. *Simorhynchotus* Stebbing, 1888

FIGURE 71

Type-species: *Simorhynchus antennarius* Claus, 1871.

Body compact. Head much shorter than pereon, globular, with short, rounded rostrum in male. Coxae separate. Double urosomite slightly shorter than wide, fused with telson. Pereopod 1 simple. Pereopod 2 subchelate. Pereopod 7 with all segments present. Uropods 2 and 3 having endopod fused with protopod. Uropod 3 slightly longer than telson.

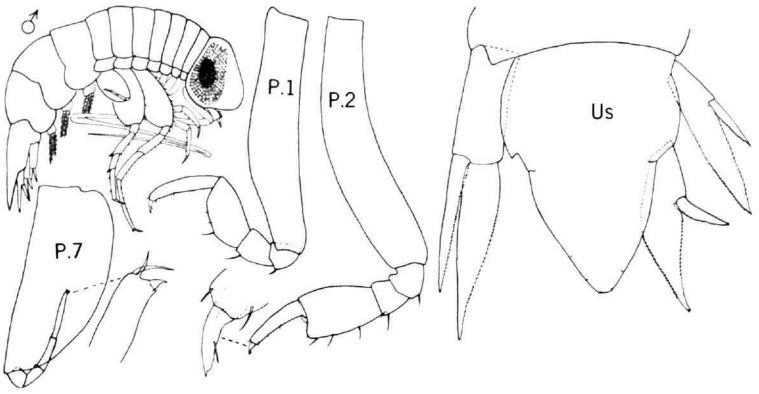

FIGURE 71.—*Simorhynchotus*.

62. *Streetsia* Stebbing, 1888

FIGURE 72

Type-species: *Streetsia challengeri* Stebbing, 1888.

Body elongate. Head variable in length, from somewhat shorter to distinctly longer than pereon, produced into pointed rostrum. Coxae not fused with pereonites. Double urosomite from slightly longer to 2.5 times as long as wide, fused with telson. Pereopod 1 subchelate; pereopod 2 subchelate or chelate. Pereopod 7 with all segments present. Uropod 3 shorter than telson.

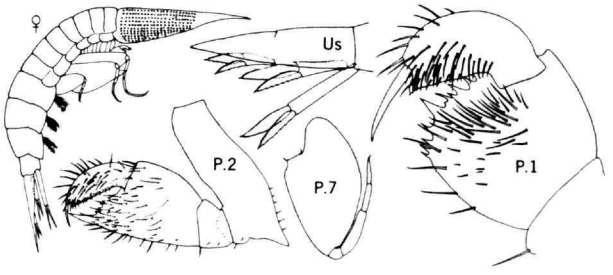

FIGURE 72.—*Streetsia*.

63. *Tullbergella* Bovallius, 1887

FIGURE 73

Type-species: *Tullbergella cuspidata* Bovallius, 1887b.

Body rather compact, only moderately elongate. Head much shorter than pereon, produced into short, pointed rostrum. Coxae not fused with pereonites. Pleonite 3 produced into long, backward-pointing spines on either side. Double urosomite

slightly shorter than wide, fused with telson. Pereopods 1 and 2 subchelate. Pereopod 6 with distal posterior corner of basis produced into triangular process. Pereopod 7 composed of basis and 3 small distal segments. Uropod 3 as long as telson; endopod fused with protopod.

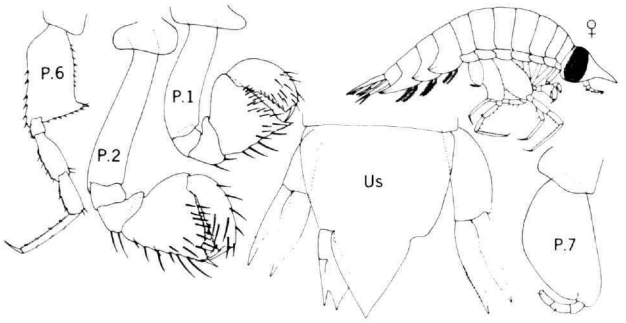

FIGURE 73.—*Tullbergella.*

XX. Family PLATYSCELIDAE Bate, 1862

FIGURE 74

Body wide, stout, conglobate, usually somewhat depressed dorsoventrally. Pleon distinctly narrower than pereon and capable of folding under pereon. Total length 2–24 mm. Head short, wider than pereon, ventral margin (viewed from front) produced into median round-triangular process. Eyes large, occupying most of head surface. Coxae not fused with pereonites. Telson broadly triangular, fused with double urosomite. Antenna 2 of female short, of few segments. Mouthparts in the form of a broad, short cylinder. Mandible short, with broad incisor; with palp in male, wtihout palp in female. Maxillae 1 and 2 with large broad lobes.

Pereopods 1 and 2 simple, subchelate, or chelate. Pereopods 5 and 6 with bases transformed into broad opercula, always longer in pereopod 6; distal segments inserted subterminally in basis of pereopod 5, much farther proximally in pereopod 6; posterior margin of basis of pereopod 6 with longitudinal groove (telsonic groove) into which telson and uropods fit during conglobation; outer surface of basis of pereopod 6 often with fissure. Pereopod 7 with narrow, curved basis and sometimes one or more rudimentary additional segments. Uropods 2 and 3 having endopods sometimes fused with protopods. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

Five genera.

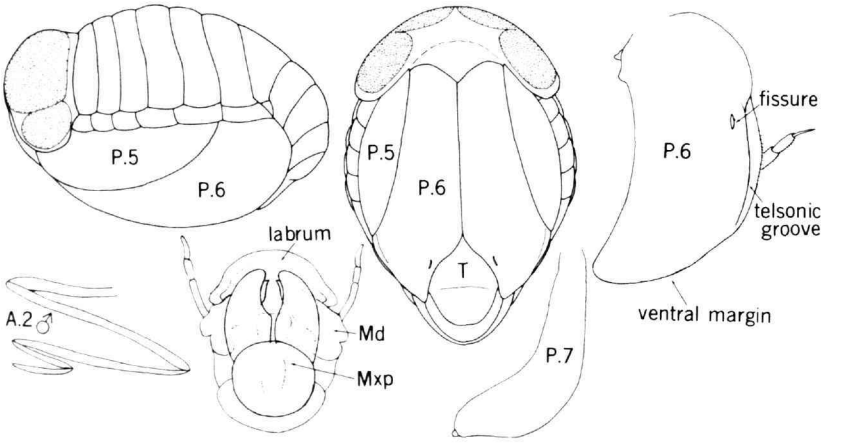

FIGURE 74.—*Platyscelidae.*

Key to the Genera of Platyscelidae

1. Pereopods 1 and 2 having dactyl forming subchela with concave distal margin of propus ... 2
   Pereopods 1 and 2 without subchela between dactyl and propus ... 3
2. Pereopods 1 and 2 with pointed carpal process. Pereopod 6 having basis with semicircular fissure ... 65. ***Amphithyrus***
   Pereopods 1 and 2 without carpal process. Pereopod 6 having basis without fissure ... 67. ***Tetrathyrus***
3. Pereopod 1 simple. Pereopod 2 with short carpal process ... 68. ***Paratyphis***
   Pereopods 1 and 2 chelate. Pereopod 2 with carpal process about as long as propus ... 4
4. Antenna 2 of male with two distal segments much shorter than half the length of preceding segment ... 64. ***Platyscelus***
   Antenna 2 of male with two distal segments more than half the length of preceding segment ... 66. ***Hemityphis***

64. *Platyscelus* Bate, 1862

FIGURE 75

Type-species: *Typhis ovoides* Risso, 1816.

Antenna 2 of male having 2 distal segments much shorter than half the length of preceding segment (third segment from end). Pereopods 1 and 2 chelate, with pointed carpal process. Pereopod 6 having basis with nearly straight fissure.

References: Claus, 1887:31; Stebbing, 1888:1480; Spandl, 1927:240; Shoemaker, 1945:255.

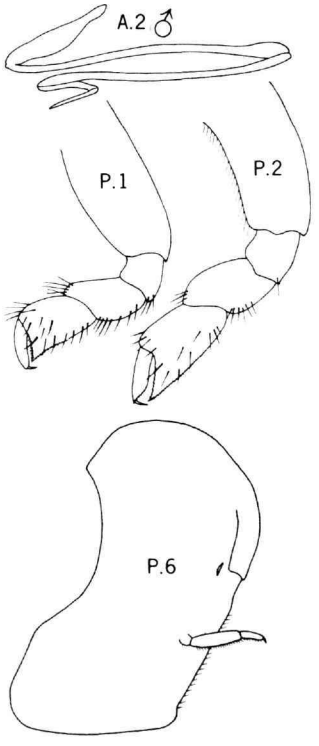

FIGURE 75.—*Platyscelus*.

65. *Amphithyrus* Claus, 1879

FIGURE 76

Type-species: *Amphithyrus bispinosus* Claus, 1879b (by present designation).

Cuticle with polygonal pattern of surface sculpturing. Antenna 2 of male with two distal segments subequal in length to preceding segment. Pereopods 1 and 2 complexly chelate; carpus with pointed process forming chela; propus with concave distal margin forming subchela. Pereopod 6 having basis relatively short and wide, with semicircular fissure.

References: Claus, 1887:41; Pirlot, 1930:43; Spandl, 1927:246.

66. *Hemityphis* Claus, 1879

FIGURE 77

Type-species: *Hemityphis tenuimanus* Claus, 1879b.

Antenna 2 of male having two distal segments more than half the length of preceding segment. Pereopods 1 and 2 chelate, with pointed carpal process. Pereopod 6 having basis with short, curved fissure.

References: Claus, 1887:38; Stebbing, 1888:1471; Spandl, 1927:233; Pirlot, 1930:37; Shoemaker, 1945:259.

67. *Paratyphis* Claus, 1879

FIGURE 78

Type-species: *Paratyphis maculatus* Claus, 1879b.

Antenna 2 of male having 2 distal segments slightly less than half or somewhat more than half

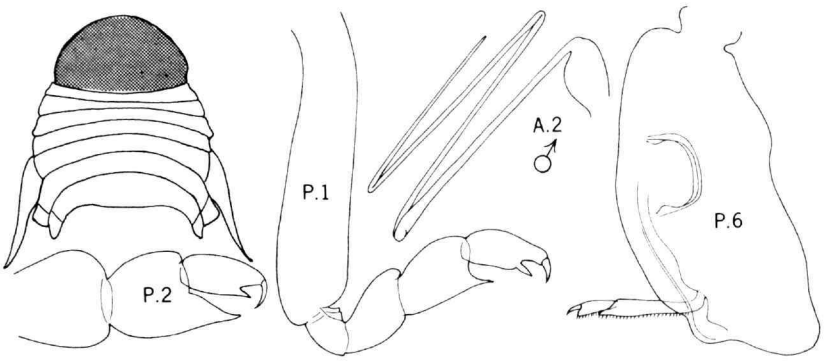

FIGURE 76.—*Amphithyrus.*

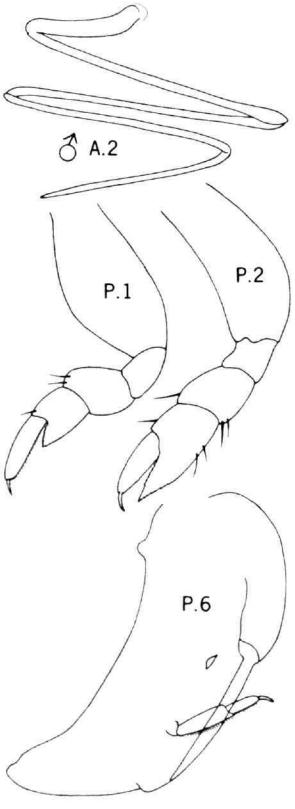

FIGURE 77.—*Hemityphis.*

the length of preceding segment. Pereopod 1 simple. Pereopod 2 weakly chelate, with short carpal process. Pereopod 6 having basis with nearly straight fissure.

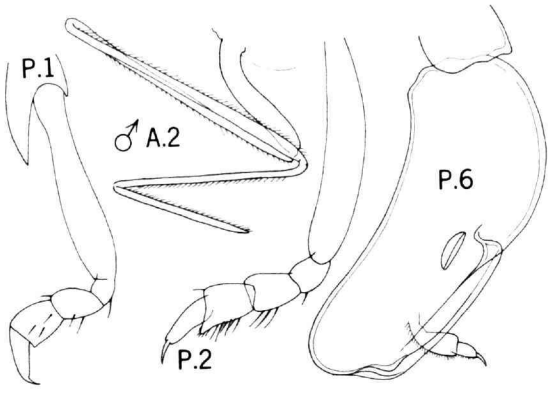

FIGURE 78.—*Paratyphis.*

References: Claus, 1887:39; Stebbing, 1888:1476; Spandl, 1927:243; Pirlot, 1930:39.

68. *Tetrathyrus* Claus, 1879

FIGURE 79

Type-species: *Tetrathyrus forcipatus* Claus, 1879b.

Antenna 2 of male with two distal segments more than half the length of preceding segment. Pereopods 1 and 2 subchelate; dactyl closing against concave distal margin of propus. Pereopod 6 having basis with long ventral margin, without fissure.

References: Claus, 1887:40; Stebbing, 1888:1480; Spandl, 1927:240; Barnard, 1930:439.

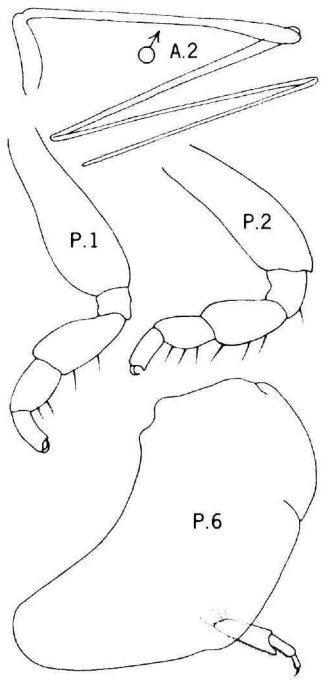

FIGURE 79.—*Tetrathyrus.*

XXI. Family PARASCELIDAE Bovallius, 1887

Body wide, stout, conglobate, usually somewhat depressed dorsoventrally. Pleon distinctly narrower than pereon and capable of folding under pereon. Total length 2.5–7 mm. Head short, wider than pereon, ventral margin (viewed from front) broadly rounded. Eyes large, occupying most of head surface. Coxae not fused with pereonites. Telson broadly triangular, fused with double urosomite. Antenna 2 of female short, of few segments. Mouthparts pointed, in the form of a cone. Mandible elongate, with narrow incisor; with palp in male, without palp in female. Pereopods 1 and 2 simple or chelate. Pereopods 5 and 6 with basis transformed into broad operculum, always longer in pereopod 6; distal segments inserted subterminally on basis of pereopod 5, much farther proximally in pereopod 6; posterior margin of pereopod 6 with longitudinal groove (telsonic groove) into which telson and uropods fit during conglobation; outer surface of pereopod 6 with or without fissure. Pereopod 7 with all segments present. Uropods 2 and 3 having endopods sometimes fused with protopods; exopods much shorter than endopods. Gills on pereonites 2–6. Oostegites on pereonites 2–5.

Three genera.

References: Claus, 1887:42; Stebbing, 1888:1491; Spandl, 1927:250.

Key to the Genera of Parascelidae

1. Pereopods 1 and 2 simple ..... 69. ***Thyropus***
   Pereopod 2 chelate 2
2. Pereopod 1 simple. Pereopod 6, basis with long fissure ..... 71. ***Schizoscelus***
   Pereopod 1 chelate. Pereopod 6, basis without fissure ..... 70. ***Euscelus***

69. *Thyropus* Dana, 1852

FIGURE 80

Synonym: Parascelus Claus, 1879.

Type-species: *Thyropus diaphanus* Dana, 1852.

Pereopods 1 and 2 simple. Pereopod 6 having basis very long, narrowed in distal half, with or without short fissure. Uropods 1–3 having exopods and endopods not fused with protopod.

References: Claus, 1887:45; Stebbing, 1888:1492; Stephensen, 1925:208; Spandl, 1927:258; Shoemaker, 1945:260.

70. *Euscelus* Claus, 1879

FIGURE 81

Type-species: *Euscelus robustus* Claus, 1879b.

Pereopods 1 and 2 chelate; carpal process narrow, curved, with truncate and dentate distal margin. Pereopod 6 having basis without fissure. Uropods 1–3 with exopods oval, much shorter than endopods; exopods and endopods not fused with protopods.

References: Claus, 1887:43; Spandl, 1927:251.

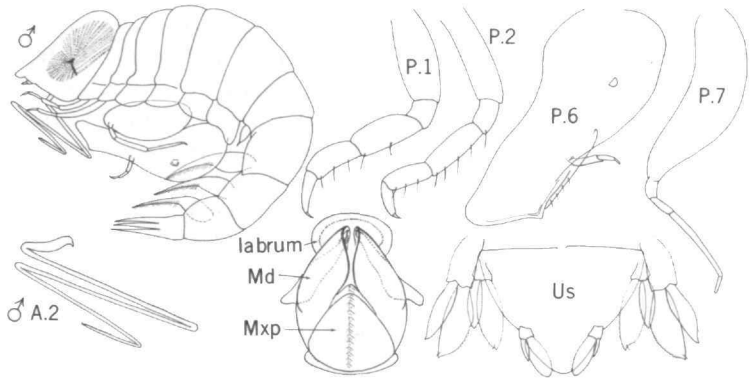

FIGURE 80.—*Thyropus.*

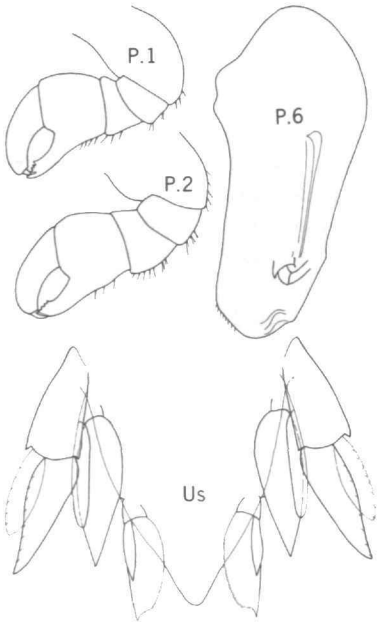

FIGURE 81.—*Euscelus.*

71. *Schizoscelus* Claus, 1879

FIGURE 82

Type-species: Schizoscelus ornatus Claus, 1879b.

Pereopod 1 simple. Pereopod 2 chelate, with pointed carpal process. Pereopod 6 having basis subrectangular, with long, slightly curved fissure. Uropods 2 and 3 having endopods fused with protopods.

References: Claus, 1887:43; Stebbing, 1888:1503; Spandl, 1927:225.

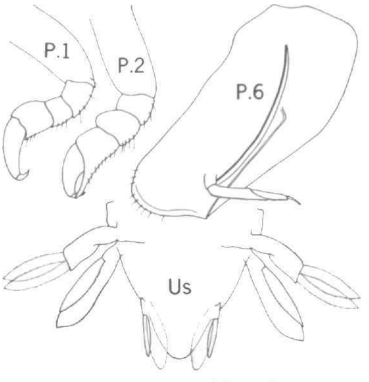

FIGURE 82.—*Schizoscelus.*

Sources of Illustrations

Figure 1: Original.
Figure 2: Original.
Figure 3: Md, original. Md′, Pirlot, 1930, fig. 3. Mx.1, Mx.2, original. Mxp, Stephensen and Pirlot, 1931, fig. 17. Mxp′, original.
Figure 4: Original.
Figure 5: Original.
Figure 6: Original.
Figure 7: Original.
Figure 8: Shoemaker, 1945, fig. 22J.
Figure 9: A, original. B, Fage, 1960, fig. 8.
Figure 10: ♂, Woltereck, 1909, pl. 5, fig. 13; ♀, fig. 12. A.1, A.2, Md, P.1, P.2, Vinogradov, 1956, fig. 2. Us, Stephensen and Pirlot, 1931, fig. 13.
Figure 11: ♂, Woltereck, 1909, pl. 3, fig. 8. ♀, Stephensen and Pirlot, 1931, fig. 7; Md, Mxp, fig. 8; P.1, P.2, P.7, Us, fig. 9.
Figure 12: Whole animal, Vinogradov, 1960a, fig. 12; Md, P.7, fig. 13.
Figure 13: A.1, Vinogradov, 1956, fig. 4. A.2, Md, P.1, P.2, Stephensen and Pirlot, 1931, fig. 17; Us, fig. 18.
Figure 14: ♀, Pirlot, 1933, fig. 1. A.1, A.2, Vinogradov, 1960a, fig. 14. Md, Mxp, Pirlot, 1933, fig. 2. P.1, P.2, P.7, Vinogradov, 1960a, fig. 14. Us, Pirlot, 1933, fig. 3.

Figure 15: ♂, Chevreux and Fage, 1925, fig. 387. A.2, P.1, P.5, *Scina borealis,* off California, original. Md, Mxp, *Scina curvidactyla,* off Washington, original. Us, *Scina tullbergi,* off California, original.

Figure 16: ♀, Vosseler, 1901, pl. 10, fig. 1. A.1, Wagler, 1926, fig. 51b; Mxp, fig. 52d; P.1, P.5, fig. 52a.

Figure 17: ♀, Wagler, 1926, fig. 53; H (ventral), fig. 54; Mxp, fig. 56d; P.1, P.5, fig. 56a. P.5 (dactyl, enlarged), original.

Figure 18: ♀, Mxp, Vinogradov, 1957, fig. 18. P.1, P.5, Chevreux, 1914, fig. 4.

Figure 19: Whole animal, Woltereck, 1909, pl. 4, fig. 11. A.1, A.2, P.1, P.3, P.5, P.6, Us, Stephensen and Pirlot, 1931, fig. 16.

Figure 20: Whole animal, Vinogradov, 1960a, fig. 9; A.1, A.2, Md, Mxp, Us, fig. 10; P.1, P.3, P.5, P.6, fig. 11.

Figure 21: Whole animal, Woltereck, 1909, fig. 10. Head, P.1, P.2, Shoemaker, 1945, fig. 29; P.5, P.7 (left), fig. 30. P.5, P.7 (right), Vinogradov, 1964, fig. 10.

Figure 22: ♀, Pirlot, 1930, fig. 1; A.1, A.2, Md, Mxp, fig. 3; P.1, P.2, P.3, P.7, fig. 4; Us, fig. 5. H (dorsal), Vinogradov, 1960b, fig. 2.

Figure 23: ♂, Stephensen, 1918, fig. 4. H, Md, Mxp, Shoemaker, 1945, fig. 15; Mx.1, fig. 20; P.1, P.2, fig. 19. Md incisor and lacinia, *Lanceola sayana,* off New Jersey, original.

Figure 24: ♀, original. A.1, A.2, Pirlot, 1935, fig. 3; Md, Mx.1, fig. 1. P.1, P.2, Shoemaker, 1945, fig. 21.

Figure 25: ♂, Pirlot, 1931, fig. 1; Md, Mxp, P.3, fig. 2. A.1, A.2, Mx.1, P.1, P.2, Vinogradov, 1960a, fig. 6.

Figure 26: Barnard, 1930, fig. 52.

Figure 27: Whole animal, Woltereck, 1909, fig. 14. A.1, A.2, Md, Mx.1, Vinogradov, 1957, fig. 7; P.1, P.2, P.5, fig. 8.

Figure 28: ♂, Woltereck, 1909, fig. 21. H, original. Md, Mx.1, Mxp, P.1, P.2, Shoemaker, 1945, fig. 22.

Figure 29: ♀, Vosseler, 1901, pl. 11, fig. 6. Md, Mxp, Us, *Vibilia viatrix,* off California, original. P.7, *V. cultripes,* off California, original.

Figure 30: ♀, Hurley, 1955, fig. 23. P.7, Us, *Cyllopus magellanicus,* off New Zealand, original.

Figure 31: Original.

Figure 32: ♀, Spandl, 1927, fig. 8. Md, Mxp, P.1, P.2, original. Us, Stephensen, 1918, fig. 21.

Figure 33: ♂, Vosseler, 1901, pl. 8, fig. 22. Md, Mxp, P.1, P.2, Us, *Paraphronima gracilis,* off California, original.

Figure 34: ♀, A.1, A.2, Bowman, 1973, fig. 18a–c; Md, Us, fig. 2h,o; Mxp, fig. 15e,f; P.1, P.2, fig. 4a,b.

Figure 35: Laval, 1966.

Figure 36: ♂, Bowman, 1973, fig. 22a; Mxp, fig. 20i; P.1, P.2, fig. 23a,b; Us, fig. 21a.

Figure 37: ♀, Vosseler, 1901 pl. 5, fig. 16. A.1, A.2, Mxp, P.3, Bowman, 1973, fig. 46d,e,i,j,m; Md, P.1, P.2, fig. 43d,i,j; P.6, fig. 41o; Us, fig. 41q.

Figure 38: ♀, Vosseler, 1901, pl. 7, fig. 6. Md, original. Mxp, Bowman, 1973, fig. 24j and original. P.1, P.2, Bowman, 1973, fig. 24k,l. Us, original.

Figure 39: ♀, P.1, P.2, P.5, Yang, 1960, fig. 9. Mx.1, Mxp, P.5 dactyl, Bowman, 1973, fig. 52b,d–f. Us, Stephensen, 1924, fig. 35.

Figure 40: ♀, Md, *Hyperoche martinizii,* Gulf of Guinea, original. Mx.1, Mxp, *H. medusarum,* Antarctic, original. P.1, P.2, P.3, *H medusarum,* off California, original.

Figure 41: ♀, Bovallius, 1889, pl. 8, fig. 1. Mxp, P.1, P.2, *Iulopis mirabilis,* off California, original.

Figure 42. ♀, P.1, P.2, Bowman, 1973, fig. 32a,o,p; A.2, fig. 37j; Md, Mxp, fig. 36c,f. A.1, original.

Figure 43: ♀, ♂, Chevreux and Fage, 1925, figs. 407, 408. Md, Bowman, 1960, fig. 1; P.1, P.4, P.5, fig. 16; P.2, fig. 2.

Figure 44: ♀, original. A.1, P.1, P.2, Barnard, 1932, fig. 162b,d,e; Md, Mxp, fig. 163a,f; Us, fig. 164c.

Figure 45: ♀, Chevreux and Fage, 1925, fig. 406. ♂, Us, Bovallius, 1889, pl. 14. Md, Mxp, P.1, P.2, P.6, original.

Figure 46: Bowman, 1973, fig. 51a,e,f,g,j,k,p,r,s.

Figure 47: ♂, H♀, Bovallius, 1889, pl. 15. Md, Mx.1, Mx.2, Mxp, P.1, P.2, Us, original.

Figure 48: ♀, ♂, Vosseler, 1901, pl. 2. Md, Mxp, Us, *Phronima sedentaria,* original.

Figure 49: ♀, P.5, Shih and Dunbar, 1963, fig. 9. Us♂, Us♀, original.

Figure 50: ♀, Bovallius, 1889, pl. 18, fig. 3; P.3, fig. 6; P.4, fig. 7; P.5, fig. 8; P.6, fig. 9; P.7, fig. 10 (distal segment added); Us, fig. 11.

Figure 51: ♂, Stebbing, 1888, pl. 177. Md, Mxp. P.1, P.2, P.3, P.5, P.6, P.7, Us, original.

Figure 52: Original.

Figure 53: ♂, Stebbing, 1888, pl. 181. A.1, P.1, P.2, P.5, P.6, P.7, Us♀, Pirlot, 1930, fig. 9; Us♂, fig. 9 (but Up.3 added from Stebbing, 1888, pl. 180).

Figure 54: ♂, A.2, Stebbing, 1888, pl. 186. P.1, P.2, P.7, Us, original.

Figure 55: ♂, Claus, 1887, pl. 13, fig. 7. A.2, P.1♂, P.1♀, P.2, P.7, original. Us, Stebbing, 1888, pl. 187.

Figure 56: ♀, P.1, P.2, P.7, Us, original. A.2♂, Claus, 1887, pl. 20, fig. 2.

Figure 57: ♀, Stebbing, 1888, pl. 191. A.2♂, P.1, P.2, P.6, P.7, Us, original.

Figure 58: ♂, Stebbing, 1888, pl. 192. A.2, P.1, P.2, P.6, P.7, Us, original.

Figure 59: ♀, P.1, P.2, P.6, P.7, *Anapronoe* sp., off California, original. A.1♀, A.2♀, A.2♂, Md, Mx.1, Us, *A. reinhardti,* Gulf of Guinea, original.

Figure 60: ♀, Us, Shoemaker, 1945, fig. 38; P.1, P.2, fig. 39. A.2♂, P.1♂, original.

Figure 61: ♂, Stebbing, 1888, pl. 195. A.2, P.1, P.2, Us, original.

Figure 62: ♂, P.1, P.2, Chevreux and Fage, 1925, fig. 420. P.7, Us, Stephensen, 1925, fig. 64. A.2♂, original.

Figure 63: ♂, ♂H, dorsal, A.2♂, original. P.1, P.6, Pillai, 1966b, fig. 16. Us, Stebbing, 1888, pl. 198.

Figure 64: ♂, A.2♂, Stebbing, 1888, pl. 194. P.1, P.2, P.5, Us, original.

Figure 65: ♀, Fage, 1960, fig. 5a. P.1, P.2, P.7, Us, original.

Figure 66: ♀, Pillai, 1966a, pl. 1; P.1, P.2, P.7, fig. 8. Us, Fage, 1960, fig. 19.

Figure 67: ♀, Shoemaker, 1945, fig. 44A. Us♂, Us♀, Fage, 1960, fig. 51. P.1, P.2, original.

Figure 68: ♀, P.1, P.2, Up.3, Us, Shoemaker, 1945, fig. 45.

Figure 69: ♂, Pillai, 1966a, pl. 1; P.7, fig. 7. Up.2♀, Fage, 1960, fig. 22; Us♂, fig. 21. P.1, P.2, original.

Figure 70: ♀, Bovallius, 1890, pl. 7, fig. 20. P.1, P.2, Pillai, 1966a, fig. 15; P.7, fig. 16. Us, Fage, 1960, fig. 63.
Figure 71: ♂, Pillai, 1966a, pl. 1. P.1, P.2, P.7, Us, original.
Figure 72: ♀, Pillai, 1966a, pl. 1; Us, fig. 12. P.1, P.2, P.7, original.
Figure 73: ♀, Pillai, 1966a, pl. 1; P.1, P.2, P.6, P.7, fig. 6. Us, original.
Figure 74: *Platyscelus ovoides*, original.
Figure 75: A.2 ♂, Claus, 1887, pl. 2, fig. 6. P.1, P.2, P.6, Spandl, 1927, fig. 45.
Figure 76: *Amphithyrus bispinosus*. Head and pereon, dorsal, original. A.2, P.1, P.2, P.6, Claus, 1887, pl. 6.
Figure 77: A.2 ♂, Claus, 1887, pl. 4. P.1, P.2, P.6, Spandl, 1927, fig. 47.
Figure 78: A.2 ♂, Claus, 1887, pl. 5; P.1, P.2, P.6, pl. 7.
Figure 79: A.2 ♂, Claus, 1887, pl. 5. P.1, P.2, P.6, Spandl, 1927, fig. 48.
Figure 80: ♂, A.2 ♂, P.7, Claus, 1887, pl. 8. P.1, P.2, P.6, Us, Spandl, 1927, fig. 53. Mouth cone (labrum, Md, Mxp), original.
Figure 81: Spandl, 1927, fig. 51.
Figure 82. Spandl, 1927, fig. 52.

Literature Cited

Barnard, K. H.
1930. Crustacea. Part IX. Amphipoda. *British Antarctic (Terra Nova) Expedition, 1910, Natural History Report, Zoology*, 8 (4) :307–454.
1932. Amphipoda. *Discovery Reports*, 5:1–326, plate 1.

Bate, C. Spence
1861. On the Morphology of Some Amphipoda of the Division Hyperina. *Annals and Magazine of Natural History*, (3) 8 (43) :1–16, plates 1, 2.
1862. *Catalogue of the Specimens of Amphipodous Crustacea in the Collection of the British Museum*. iv + 399 pages, plates 1, 1a, 2–58. London.

Behning, Arvid L.
1913. Die Systematische Zusammensetzung und Geographische Verbreitung der Familie Vibiliidae. *Zoologica* (Stuttgart), 26 (8) :211–226, 6 charts.
1925. Amphipoda der Deutschen Tiefsee-Expedition. I. Hyperiidea Fam. Vibiliidae Claus 1872. In *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898-1899*, 19 (9) :479–500, figures 1–79.

Bigelow, Henry B.
1926. Plankton of the Offshore Waters of the Gulf of Maine. *Bulletin of the United States Bureau of Fisheries*, 40 (2) :1–509.

Boeck, Axel
1870. Crustacea Amphipoda Borealia et Arctica. *Forhandlinger i Videnskabs-Selskabet i Christiania*, Aar 1870:81–280 (1–200) + I–VIII.

Bovallius, Carl
1885. On Some Forgotten Genera among the Amphipodous Crustacea. *Bihang till Kungliga Svenska Vetenskapsakademiens Handlingar*, 10 (14) :1–17, 1 plate.
1887a. Arctic and Antarctic Hyperids. *"Vega"—Expeditionens Vetenskapliga Iakttagelser*, 4:543–582, plates 40–47.
1887b. Systematical List of the Amphipoda Hyperiidea. *Bihang till Kungliga Vetenskapsakademiens Handlingar*, 11 (16) :1–50.
1887c. Contributions to a Monograph of the Amphipoda Hyperiidea, Part I: 1. The Families Tyronidae, Lanceolidae and Vibilidae. *Kongliga Svenska Vetenskapsakademiens Handlingar*, 22 (7) :1:72, plates 1–10.
1889. Contributions to a Monograph of the Amphipoda Hyperiidea, Part I: 2. The Families Cyllopodidae, Paraphronimidae, Thaumatopsidae, Mimonectidae, Hyperiidae, Phronimidae and Anchylomeridae. *Kongliga Svenska Vetenskapsakademiens Handlingar*, 22 (7) :1–434, plates 1–18.
1890. The Oxycephalids. *Nova Acta Regiae Societatis Scientiarum Upsaliensis*, series 3, 14:1–141, plates 1–7.

Bowman, Thomas E.
1960. The Pelagic Amphipod Genus *Parathemisto* (Hyperiidea: Hyperiidae) in the North Pacific and Adjacent Arctic Ocean. *Proceedings of the United States National Museum*, 112 (3439) :343–392.
1973. Pelagic Amphipods of the Genus *Hyperia* and Closely Related Genera (Hyperiidea: Hyperiidae). *Smithsonian Contributions to Zoology*, 136:1–76, 52 figures.

Bowman, Thomas E., Caldwell D. Meyers, and Steacy D. Hicks
1963. Notes on Associations between Hyperiid Amphipods and Medusae in Chesapeake and Narragansett Bays and the Niantic River. *Chesapeake Science*, 4 (3) :141–146.

Chevreux, Édouard
1900. Amphipodes provenant des campagnes de *l'Hirondelle*. *Résultats des campagnes scientifiques accomplies sur son yacht, par Albert Ier, Prince Souverain de Monaco*, fascicule 16:i–iv + 1–195, plates 1–18.
1905. Description d'un Amphipode pélagique nouveau comme genre et comme espèce. *Bulletin du Musée Océanographique de Monaco*, 49:1–5.
1913. Sur Quelques Intéressantes Espèces d'Amphipodes provenant des parages de Monaco et des pêches pélagiques de la *Princess-Alice* et de *l'Hirondelle II* en Méditerranée. *Bulletin de l'Institut Océanographique, Monaco*, 262:1–26.
1914. Sur quelques Amphipodes pélagiques nouveaux ou peu connus provenant des campagnes de S.A.S.

le Prince de Monaco. I. Scinidae. *Bulletin de l'Institut Océanographique, Monaco,* 291:1–10.

1920. Révision des Lanceolidae provenant des campagnes de S.A.S. le Prince de Monaco. *Bulletin de l'Institut Océanographique, Monaco,* 363:1–12.

Chevreux, Édouard, and Louis Fage

1925. Amphipodes. *Faune de France,* 9:1–488.

Claus, C.

1862. Bemerkungen über *Phronima sedentaria* Forskaal und *elongata* n. sp. *Zeitschrift für Wissenschaftliche Zoologie,* 12 (2) :189–196, plate 19.

1871. Untersuchungen über den Bau und die Verwandtschaft der Hyperiden. *Nachrichten von der Königliche Gesellschaft der Wissenschaften und der Georg-Augusts-Universität zu Göttingen,* Jahre 1871:149–157.

1879a. Der Organismus der Phronimiden. *Arbeiten aus dem Zoologischen Institut der Universität zu Wien,* 2:59–146, plates 1–8.

1879b. Die Gattungen und Arten der Platysceliden in Systematischer Übersicht. *Arbeiten aus dem Zoologischen Institut der Universität zu Wien,* 2: 147–198.

1887. *Die Platysceliden.* 77 pages, 25 plates. Wien: Alfred Hölder.

Dahl, Erik

1959a. The Hyperiid Amphipod, *Hyperia galba,* a True Ecto-Parasite on Jelly-Fish. *Universitet i Bergen, Årbok 1959, Naturvidenskapelig Rekke,* 9:1–8.

1959b. The Amphipod, *Hyperia galba,* an Ecto-Parasite of the Jelly-Fish, *Cyanea capillata. Nature,* 183 (4677) :1749.

Dana, James D.

1852. On the Classification of the Crustacea Choristopoda or Tetradecapoda. *American Journal of Science and Arts,* series 2, 14 (41) :297–316.

1853. Crustacea, Part II. *United States Exploring Expedition,* 14:689–1618. [Plates (1–96) published in 1855.]

Desmarest, Anselme-Gaetan

1823. Malacostracés. In *Dictionnaire des Sciences Naturelles,* 28:138–425. Paris and Strasbourg.

Dunbar, Maxwell J.

1946. On *Themisto libellula* in Baffin Land Coastal Waters. *Journal of the Fisheries Research Board of Canada,* 6 (6) :419–434.

Fage, Louis

1960. Oxycephalidae. Amphipodes Pélagiques. *Dana-Report,* 9 (52) :1–145.

Forskål, Pehr

1775. *Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, Vermium; quae in Itinere Orientali Observavit Petrus Forskål. Prof. Haun. Post Mortem Auctoris Ed. Carsten Neibuhr. Adjuncta est Materia Medica Kahirina atque Tabula Maris Rubri Geographica.* Hauniae.

Guérin-Méneville, F.-E.

1836. Description de quelques genres nouveaux appartenant à la famille des Hypérines. *Magasin de Zoologie,* Année 6, Classe 7, pages 1–10, plates 17, 18.

1842. Description d'un Crustacé amphipode formant un genre nouveau dans la famille des Hypérines. *Revue Zoologique, par la Société Cuvierienne,* Juillet, 1842:214–216.

Haan, W. de

1833–1850. Crustacea. In P. F. de Siebold, *Fauna Japonica sive descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis superiorum, qui summum in India Batava Imperium tenent, suscepto, annis 1823–1830 collegit, notis, observationibus et adumbrationibus illustravit.* Pages i–xvii, i–xxxi, ix–xvi, 1–243, plates A–J, L–Q, 1–55, circul. tab. 2. [Pages 1–24, plates A, B, circul. tab. 2 published in 1833.]

Hollowday, Eric D.

1947. On the Commensal Relationship between the Amphipod *Hyperia galba* (Mont.) and the Scyphomedusa *Rhizostoma pulmo* Agassiz, var. *octopus* Oken. *Journal of the Quekett Microscopical Club,* series 4, 2 (4) :187–190, plate 25.

Hurley, Desmond E.

1955. Pelagic Amphipods of the Sub-Order Hyperiidea in New Zealand Waters. I. Systematics. *Transactions of the Royal Society of New Zealand,* 83 (1) : 119–194.

1956. Bathypelagic and Other Hyperiidea from Californian Waters. *Allan Hancock Foundation Publications, Occasional Paper,* 18:1–25.

1960. Amphipoda Hyperiidea. *B.A.N.Z. Antarctic Research Expedition 1929–1931 Reports,* series B (Zoology and Botany), 8 (5) :107–113.

1969. Amphipoda Hyperiidea. Pages 32–34, sheets 1, 2 in *Antarctic Map Folio Series, Folio 11, Distribution of Selected Groups of Marine Invertebrates in Waters South of 35°S Latitude.* American Geographical Society.

International Commission on Zoological Nomenclature

1957. Direction 78. Validation under the Plenary Powers of the generic name *Daira* de Haan, [1833] (Class Crustacea, Order Decapoda) (Validation of an entry on the *Official List of Generic Names in Zoology* made by the Ruling given in *Opinion* 73. *Opinions and Declarations Rendered by the International Commission on Zoological Nomenclature,* volume 1, section E, part E.16:292–304.

Kane, Jasmine

1966. The Distribution of *Parathemisto gaudichaudii* (Guér.), with Observations on Its Life-History in the 0° to 20° E Sector of the Southern Ocean. *Discovery Reports,* 34:163–198.

Krøyer, Henrik Nikol

1838. Grönlands Amfipoder beskriven af Henrik Kröyer. *Videnskabs-Selskabs Naturvidensk. og Mathemat. Afhandlinger,* 7:229–326, plates 1–4.

Latreille, P. A.

1802. *Histoire naturelle, générale et particulière des Crustacés et des Insectes.* 4 volumes. Paris.

Laval, Philippe

1963. Sur la Biologie et les larves de *Vibilia armata* Bov. et de *V. propinqua* Stebb., Amphipodes Hypérides. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Paris,* 236 (6) :1389–1392.

1966. *Bougisia ornata,* genre et espèce nouveaux de la famille des Hyperiidae (Amphipoda, Hyperiidea). *Crustaceana,* 10 (2) :210–218.

1968a. Développement en élevage et systématique d'*Hyperia schizogeneios* Stebb. (Amphipode Hypéride). *Archives de Zoologie Expérimentale et Générale,* 109 (1) :25–67.

1968b. Observations sur la biologie de *Phronima curvipes* Voss. (Amphipode Hypéride) et description du mâle adulte. *Cahiers de Biologie Marine,* 9:347–362.

1972. Comportement, parasitisme et écologie d'*Hyperia schizogeneios* Stebb. (Amphipode Hypéride) dans le plancton de Villefranche-sur-Mer. *Annales de l'Institut Océanographique, Paris,* 48 (1) :49–74.

Milne Edwards, Henri

1830. Extrait de recherches pour servir à l'histoire naturelle des Crustacés Amphipodes. *Annales des Sciences Naturelles,* 20:353–399, plates 10, 11.

1840. *Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie, et la classification de ces animaux,* 3:1–638, plates 1–42.

Müller, Otto Friedrich

1776. *Zoologiae Danicae Prodromus seu Animalium Daniae et Norvegiae Indigenarum Characteres, Nomina, et Synonyma Imprimis Popularium.* 282 pages. Copenhagen.

Pillai, N. Krishna

1966a. Pelagic Amphipods in the Collections of the Central Marine Fisheries Research Institute, India, Part I. Family Oxycephalidae. *Proceedings of the Symposium on Crustacea Held at Ernakulam from January 12–15, 1965,* part I:169–204.

1966b. Pelagic Amphipods in the Collections of the Central Marine Fisheries Research Institute, India, Part II. Excluding Oxycephalidae. *Proceedings of the Symposium on Crustacea Held at Ernakulam from January 12–15, 1965,* part 1:205–232.

Pirlot, Jean-M.

1929. Résultats zoologiques de la croisière atlantique de l'*Armauer Hansen* (Mai–Juin 1922). I. Les Amphipodes Hypérides. *Mémoires de la Société Royale des Sciences de Liége* (3) 15 (2):1–196.

1930. Les Amphipodes de l'expédition du *Siboga.* Première Partie, Les Amphipodes Hypérides (à l'exception des Thaumatopsidae et des Oxycephalidae). *Siboga-Expeditie,* Monograph 33a:1–55.

1931. *Metalanceola Chevreuxi,* genre et espèce nouveaux d'Amphipodes Hypérides. *Bulletin de l'Institut Océanographique, Monaco,* 572:1–14.

1932. Introduction à l'étude des Amphipodes Hypérides. *Annales de l'Institut Océanographique,* new series, 12 (1) :1–36.

1933. Les Proscinidae, nouvelle famille d'Amphipodes Hypérides. *Bulletin de l'Institut Océanographique, Monaco,* 631:1–11.

1935. Un Grand Amphipode Hypéride, nouveau comme genre et comme espèce. *Bulletin de l'Institut Océanographique, Monaco,* 681:1–8.

1939. Sur des Amphipodes Hypérides provenant des croisières du Prince Albert 1[er] de Monaco. *Résultats des Campagnes Scientifiques Accomplies sur son Yacht par Albert 1[er], Prince Souverain de Monaco,* fascicule 102:1–63, plates 1, 2.

Prestandrea, Nicolò

1833. Su di alcuni nuovi crostacei dei mari di Messina. *Effemeridi Scientifiche e Letterarie per la Sicilia,* 6:3–14. Palermo.

Risso, A.

1816. *Histoire naturelle des Crustacés des environs de Nice.* 175 pages, 3 plates. Paris: Librairie Grecque-Latine-Allemande.

1822. Mémoire sur quelques nouveaux Crustacés observés dans la mer de Nice. *Journal de Physique, de Chimie et d'Histoire Naturelle,* 95:241–248.

Sars, George O.

1890–1895. Amphipoda. In *An Account of the Crustacea of Norway with Short Descriptions and Figures of All the Species,* 1:viii + 711 pages, 240 plates, 8 supplementary plates. [Hyperiidea, pages 1–20, plates 1–8, published in 1890.]

Say, Thomas

1818. An Account of the Crustacea of the United States, by Thomas Say [Part 6]. *Journal of the Academy of Natural Sciences of Philadelphia,* 1 (2) :313–319.

Senna, A.

1966. Su alcuni Anfipodi Iperini del Plancton di Messina. *Bullettino della Società Entomologica Italiano (Firenze),* Anno 38 (3, 4) :153–175, plate 1.

Shih, Chang-tai

1969. The Systematics and Biology of the Family Phronimidae (Crustacea: Amphipoda). *Dana-Report,* 14 (74) :1–100.

Shih, Chang-tai, and Maxwell J. Dunbar

1963. Amphipoda. Sub-Order: Hyperiidea. Family: Phronimidae. *Fiches d'Identification du Zooplankton,* 104:1–6. Charlottenlund-Slot: Conseil Permanent International pour l'Exploration de la Mer.

Shoemaker, Clarence R.

1945. The Amphipoda of the Bermuda Oceanographic Expeditions, 1929–1931. *Zoologica, Scientific Contributions of the New York Zoological Society,* 30 (4) :185–266.

Spandl, Hermann

1927. Die Hyperiiden (exkl. Hyperidea Gammaroidea und Phronimidae) der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar-Expedition 1901–1903,* 19, Zoologie 11:145–287, plate 10.

Stebbing, T. R. R.

1888. Report on the Amphipoda Collected by H.M.S. *Challenger* during the Years 1873–76. *Report on the Scientific Results of the Voyage of H.M.S. Chal-*

lenger during the Years 1873–76. Zoology, 29:i–xxiv + 1–1713, plates 1–210 [in 3 volumes].

1895. Descriptions of Nine New Species of Amphipodous Crustaceans from the Tropical Atlantic. *Transactions of the Zoological Society of London,* 13 (10): 349–371, plates 51–55.

1904. Biscayan Plankton Collected during a Cruise of H.M.S. *Research,* 1900, Part II. The Amphipoda and Cladocera, with Notes on a Larval Thyrostracan. *Transactions of the Linnaean Society of London,* series 2, Zoology, 10 (2) :13–45, plates 2, 3.

Stephensen, K.

1918. Hyperiidea-Amphipoda (Lanceolidae, Scinidae, Vibiliidae, Thaumatopsidae). *Report on the Danish Oceanographical Expeditions 1908–10 to the Mediterranean and Adjacent Seas,* 2 (D.2) :1–70.

1924. Hyperiidea-Amphipoda (Part 2: Paraphronimidae, Hyperiidae, Dairellidae, Phronimidae, Anchylomeridae). *Report on the Danish Oceanographical Expeditions 1908–10 to the Mediterranean and Adjacent Seas,* 2 (D.4) :71–149.

1925. Hyperiidea-Amphipoda (Part 3: Lycaeopsidae, Pronoidae, Lycaeidae, Brachyscelidae, Oxycephalidae, Parascelidae, Platyscelidae). *Report on the Danish Oceanographical Expeditions 1908–10 to the Mediterranean and Adjacent Seas,* 2 (D.5) :151–252.

Stephensen, K., and Jean-M. Pirlot

1931. Les Amphipodes Hypérides du genre *Mimonectes* et de quelques genres voisins. *Archives de Zoologie Expérimentale et Générale,* 71 (4) :501–553.

Steuer, Adolf

1911. Adriatische Planktonamphipoden. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Klasse,* 120 (6) :671–688, plates 1–3. Wien.

Streets, Thomas Hale

1877. Contributions to the Natural History of the Hawaiian and Fanning Islands and Lower California. *Bulletin of the United States National Museum,* 7:1–172.

1878. Pelagic Amphipoda. *Proceedings of the Academy of Natural Sciences of Philadelphia,* 1878:276–290, plate 2.

Vester, H.

1900. Beiträge zur Kenntnis der Gattung *Phronimopsis.* Inaugural dissertation, Leipzig, 33 pages, 2 plates.

Vinogradov, M. E.

1956. Hyperiids (Amphipoda-Hyperiidea) of the Western Bering Sea. *Zoologicheskii Zhurnal,* 35 (2) :194–218. [In Russian.]

1957. Hyperiids (Amphipoda) of the Northwest Pacific Ocean. *Trudy Instituta Okeanologii Akademiya Nauk SSSR,* 20:186–227. [In Russian. English translation by American Institute of Biological Sciences published in 1959.]

1960a. Hyperiidea Physosomata of the Tropical Pacific Ocean. *Trudy Instituta Okeanologii Akademiya Nauk SSSR,* 41:198–247. [In Russian.]

1960b. A New Species of Chuneolidae (Amphipoda, Crustacea) from the Northwestern Part of the Pacific Ocean. *Trudy Instituta Okeanologii Akademiya Nauk SSSR.* 41:248–253. [In Russian.]

1962. Hyperiids (Amphipoda, Hyperiidea), Collected by the Soviet Antarctic Expedition on M/V *Ob* South of 40° S. *Studies of Marine Fauna* I (IX), *Biological Results of the Soviet Antarctic Expedition (1955–1958),* 1:5–35. Zoologial Institute, Akademiya Nauk SSSR. [In Russian. English translation by Israel Program for Scientific Translations published in 1966.]

1964. Hyperiidea Physosomata from the Northern Part of the Indian Ocean. *Trudy Instituta Okeanologii Akademiya Nauk SSSR,* 65:107–151. [In Russian.]

Vosseler, J.

1901. Die Amphipoden der Plankton-Expedition. I. Theil. Hyperiidea 1. *Ergebnisse der Plankton-Expedition der Humboldt Stiftung,* 2 (G,e) :i–viii +1–129 pages, plates 1–13.

Wagler, Erich

1926. Amphipoda 2: Scinidae der Deutschen Tiefsee-Expedition. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898–1899,* 20 (6) :317–446.

1927. Die Sciniden der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar-Expedition 1901–1903,* 19 (Zoologie 11) :85–111.

Walker, Alfred O.

1907. Crustacea, III: Amphipoda. *National Antarctic Expedition, British Museum (Natural History),* 3:1–39, plates 1–13.

White, Adam

1847. *List of the Specimens of Crustacea in the Collections of the British Museum.* viii + 143 pages. London.

Willemöes-Suhm, Rudolph von

1874. On a New Genus of Amphipod Crustaceans. *Philosophical Transactions of the Royal Society of London,* 163 (2) :629–638, plates 49, 50.

1875. On Some Atlantic Crustacea from the *Challenger* Expedition. *Transactions of the Linnaean Society of London,* series 2, Zoology, 1 (1) :23–59, plates 6–13.

Woltereck, Richard

1903. Bemerkungen zu den Amphipoda Hyperiidea der Deutschen Tiefsee-Expedition. I. Thaumatopsidae. *Zoologischer Anzeiger,* 26 (700) :447–459.

1904. Zweite Mitteilung über die Hyperiden der Deutschen Tiefsee-Expedition. *"Physosoma,"* ein neuer pelagischer Larventypus; nebst Bemerkungen zur Biologie von *Thaumatops* und *Phronima. Zoologischer Anzeiger,* 27 (18) :553–563.

1905. Mitteilungen über Hyperiden der *Valdivia-* (Nr. 4), der *Gauss-* (Nr. 2) und der Schwedischen Südpolarexpedition. a. *Scypholanceola,* eine neue Hyperidengattung mit Reflektororganen. b. Die *Physosoma*-Larve der Lanceoliden. *Zoologischer Anzeiger,* 29: (13) :413–417.

1906. Fünfte Mitteilung über die Hyperiden der *Valdivia*-Expedition: *Microminonectes* n. gen. *Zoologischer Anzeiger,* 30 (7) :187–194.

1907. Siebente Mitteilung über die *Valdivia* Hyperiden: *Prolanceola vibiliformis* nov. gen. nov. sp. *Zoologischer Anzeiger,* 31 (5/6) :129–132.

1909. Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in Charge of Alexander Agassiz, by the U. S. Fish Commission Steamer *Albatross* from October, 1904, to March, 1905, Lieutenant-Commander L. M. Garrett, U. S. N., Commanding. XVIII. Amphipoda. Die Hyperiidea Gammaroidea. 1. Teil: Tribus "Primitiva" dieser Unterordnung. *Bulletin of the Museum of Comparative Zoölogy at Harvard College,* 52 (9) :145–168, plates 1–8.

1927. Die Lanceoliden und Mimonectiden der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar-Expedition 1901–1903,* 19 (Zoologie 11) :57–84.

Yang, Won Tak

1960. A Study of the Subgenus *Parahyperia* from the Florida Current (Genus *Hyperia;* Amphipoda: Hyperiidea). *Bulletin of Marine Science of the Gulf and Caribbean,* 10 (1) :11–39.

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