Fig. 475. *Mesosignum usheri* (Menzies) (2 mm)

Range: Caribbean Sea off Cartagena, Columbia (2875 to 2941 m)

The species was found near to *M. kohleri*, but it differs from that species in that it has long posterolateral spines on the pleotelson. The lateral margins of the pleotelson are convex.

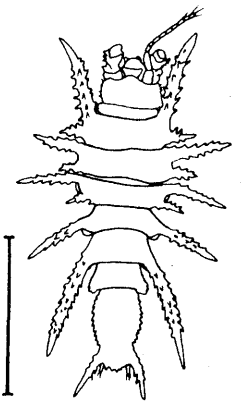


Figure 475. *Mesosignum usheri*.

DENDROTIONIDAE

The species in the family are similar to those in the family Munnidae. They, however, have spines on their bodies and many species have in addition long lateral lappets. Both species with eyes and blind ones are included in the family. The apical 2 articles on the maxillipedal palp of 5 articles are much narrower than the endite of the maxilliped itself (Fig. 370p). The peraeopods, except for the first one which is gnathal, are ambulatory and with a single dactyl claw. Only two species, each in a different genus, are found in North American waters.

KEY TO THE GENERA OF DENDROTIONIDAE

1a. **Lateral bulges (perhaps vestigal eyes) present on cephalon; cephalon longer than broad; uropods biramus, with rami extremely long (Fig. 42b); single produced lappet on all peraeonal segments either simple or serrated, but never multibranched** ..... *Acanthomunna*

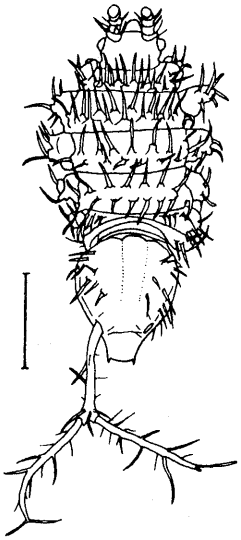


Figure 476. *Acanthomunna tannerensis.*

Fig. 476. *Acanthomunna tannerensis* (Schultz) (3.5 mm)

Range: Tanner Canyon on shelf off southern California (813 m)

The uropods on this specimen are the only ones to have ever survived the rough process of sorting to which isopods and other benthic animals taken from the deep sea are usually subjected. Whether they are representative of the uropods found on other species is not known.

1b. Eyes or lateral bulges absent; cephalon quadrangular or longer than broad; lateral spines on all peraeonal segments simple or serrated, but never multibranched ..... *Dendrotion*

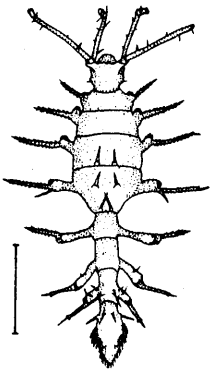


Figure 477. *Dendrotion hanseni.*

Fig. 477. *Dendrotion hanseni* (Menzies) (3.5 mm)

Range: Caribbean Sea, south of Jamaica (1244 m)

This species is easily distinguished from other asellotes by the very long pointed lateral lappets on the edges of the peraeonal segments. It is interesting to note that those coming from peraeonal segments I to IV come from the edge of the peraeonal segment itself, but those arising from segments V to VII are really from the coxal segments of the peraeopods, not from the segment edges.

ILYARACHNIDAE

There are about 36 species in the widely distributed genus *Ilyarachna,* but there are only 3 recorded from North American

waters. The species are characterized by long peraeopods, a wide cephalon and narrow pleotelson. Peraeopod I is gnathal, peraeopods II to IV are ambulatory and the last three are natatory. Occasionally the species are taken in plankton tows.

Fig. 478. *Ilyarachna acarina* (Menzies and Barnard) (4 mm)

Range: Southern California coastal slopes (73 to 507 m)

The species is common and abundant in the moderately deep water off southern California and northern Mexico.

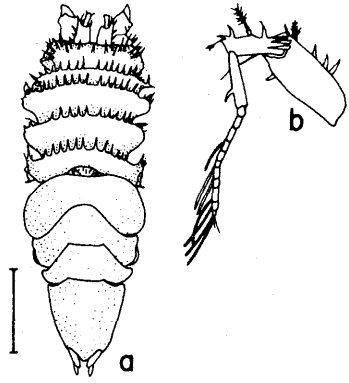


Figure 478. a. *Ilyarachna acarina*. b. Antenna one.

Fig. 479. *Ilyarachna profunda* (Schultz) (3 mm)

Range: La Jolla Canyon on shelf off southern California (461 to 1298 m)

The species lacks the conspicuous spines on the anterior borders of the peraeonal segments that are found in *I. acarina*. It also was taken in much deeper water than that species.

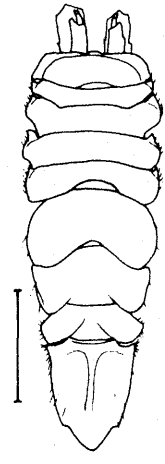


Figure 479. *Ilarachna profunda*.

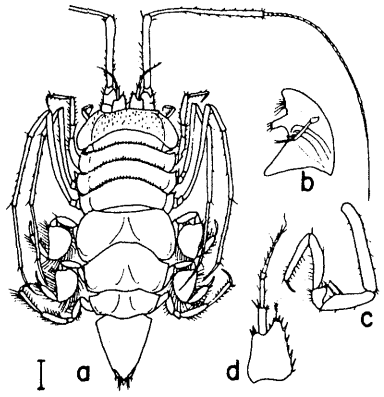


Figure 480. a. *Ilyarachna hirticeps*. b. Mandible. c. Peraeopod I. d. Antenna one.

Fig. 480. *Ilyarachna hirticeps* (Sars) (7.5 mm)

Range: Greenland (20 to 435 m)

The species has very small spines on the anterior margins of the anterior peraeonal segments.

EURYCOPIDAE

The many species of this family are divided into 12 genera which are placed in four subfamilies. Species of three genera, in three of the subfamilies, have been recorded from North American waters. The peraeopods of the specimens are long and of two types. Peraeopods I to IV are ambulatory (peraeopod I can be gnathal) and peraeopods V to VII are natatory. A dactylus is present on the natatory peraeopods (it is absent on natatory peraeopods in members of Munnopsidae, a closely related family). The small body and very large peraeopods of the isopods enable the species to swim well and they are caught, sometimes in very large numbers, in plankton tows. Species of the family are blind and frequently have peraeonal segments fused with each other or with the pleon. The cephalon is usually separated from the peraeon. Both uniramus and biramus uropods are present among the species. The maxillipedal palp of five articles has the two distal narrower than the other three. The wider of the three basal articles has a particular pattern of lobes and/or setae on the medial border.

KEY TO THE GENERA AND SPECIES OF EURYCOPIDAE

1a. Uropods uniramus; pleotelson suboval with two pairs of lateral and one terminal spine; peraeopods I to IV of subequal length; peraeopods V to VII with narrow carpus and propodus (natatory setae present) ..... *Acanthocope*

Fig. 481. *Acanthocope spinosissima* (Menzies) (8 mm)

Range: Caribbean Sea, south of Jamaica (1224 m)

The food of this species, as stomach content analysis has revealed, consists of what are probabably bacteria, protozoa and forminifera (a particular kind of abundant calcareous protozoan). Also polychaeta (a sea bottom worm related to the earthworm) and sponge spicules (the calcareous or silicate frame work of sponges) have been found. The isopod then apparently eats either live or dead animal and bacterial material that is present in its habitat in the deep sea.

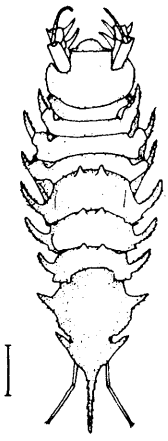


Figure 481. *Acanthocope spinosissima.*

1b. Uropods biramus; pleotelson rarely with two pairs of lateral spines; peraeopod I much shorter than III and IV; peraeopods V and VII generally with carpus and propodus moderately or greatly expanded 2

2a. Maxilliped with articles four and five or palp abruptly narrower than article three and with medial margins never produced; articles three with fringe of setae or crenulations or both on medial border (Fig. 370e) ..... *Syneurycope*

Fig. 482. *Syneurycope parallela* (Hansen) (3.7 mm)

Range: North Atlantic to past Cape Farewell (3474 m)

This species has coupling hooks on the medial edge of the maxilliped; *S. hanseni*, mentioned below, has none.

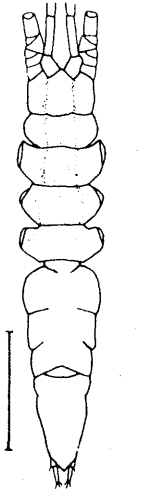


Figure 482. *Syneurycope parallela.*

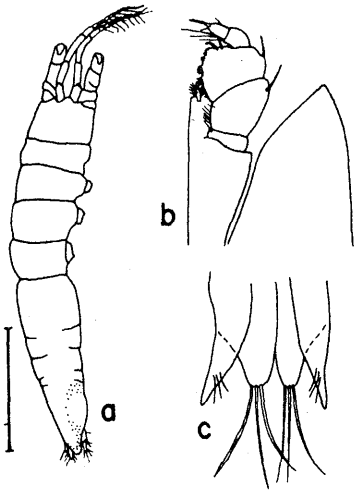


Figure 483. a. *Syneurycope hanseni*. b. Maxilliped. c. Apex pleopod 1, male.

Fig. 483. *Syneurycope hanseni* (Menzies) (3.8 mm)

Range: North of Puerto Rico (5104 to 5122 m)

The lateral margins of the body in this species are convex when compared to the parallel body margin in *S. parallela.*

2b. Maxilliped never as described above (in 2a) 3
3a. Pleon not fused to peraeon; no dorsal spines present; long lappets on peraeons never present; basal segment of antenna one flattened and much wider than other segments ....*Eurycope*

GENUS EURYCOPE

This large genus of about 36 species contains most non-spined members of the family. The body is generally oval and there are long peraeopods. Only the four following species have been recorded from North American waters until now.

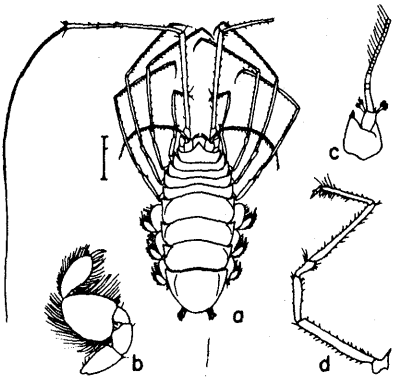


Figure 484. a. *Eurycope cornuta*. b. Peraeopod V. c. Antenna one. d. Peraeopod I.

Fig. 484. *Eurycope cornuta* (Sars) (4 mm)

Range: Greenland, Gulf of St. Lawrence and Atlantic coast of North America (91 to 732 m)

This species has a pointed rostrum or medial cephalic projection.

Fig. 485. *Eurycope complanata* (Bonnier) (5 mm)

Range: Davis Strait and southeast of Bermuda (2258 to 5779 m)

This species has a bifid medial cephalic projection.

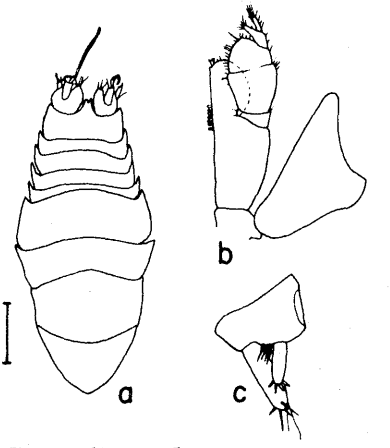


Figure 485. a. *Eurycope complanata*. b. Maxilliped. c. Uropod.

Fig. 486. *Eurycope mutica* (Sars) (1.5 mm)

Range: Bay of Fundy to Norway (9 to 27m)

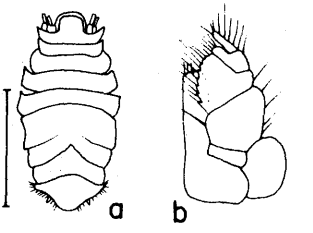


Figure 486. a. *Eurycope mutica*. b. Maxilliped.

Fig. 487. *Eurycope californiensis* (Schultz) (3.5 mm)

Range: Newport Canyon on shelf off southern California (478 m)

The species has a produced, rounded medial cephalic projection.

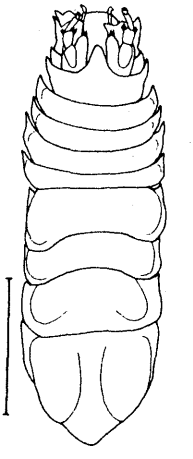


Figure 487. *Eurycope californiensis*.

3b. Peraeonal segments V to VII immovably fused together and sometimes pleon fused to peraeon; dorsal spines almost always present; pleotelson with at least two pairs of lateral spines, apex never rounded ..... *Storthyngura*

GENUS STORTHYNGURA

The members of this genus were considered to be members of the genus *Eurycope* by the people who first describe them. Now there are about 32 species in the genus. Several species listed here are probably the same species only one is the adult and the other the juvenile.

KEY TO SPECIES OF STORTHYNGURA

4a. Medial dorsal spines present on peraeons **5**

4b. Medial dorsal spines absent on peraeons ..... *S. truncata*

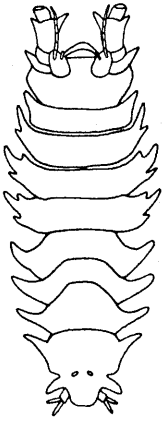


Figure 488. *Storthyngura truncata.*

Fig. 488. *Storthyngura truncata* (Richardson) (3.8 mm)

Range: Georges Bank and near Martha's Vineyard (2788 to 3225 m)

This species based on female specimens might prove to be the young or female of *S. magnispinis* mentioned below (p. 308), but more specimens must be collected before it can be definitely established.

5a. Posterior margin of pleotelson pointed, truncate or concave; dorsal spines on peraeonal segments V, VI and VII **6**

5b. Posterior margin of pleotelson broadly rounded; no dorsal spines on peraeonal segments V, VI and VII ..... *S. snanoi*

Fig. 489. *Storthyngura snanoi* (Menzies) (3.2 mm)

Range: Caribbean Sea, north of Columbia (4071 m)

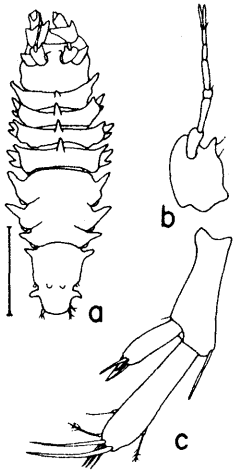


Figure 489. a. *Storthyngura snanoi*. b. Antenna one. c. Uropod.

6a. Posterior margin of pleotelson truncate or concave **7**

6b. Posterior margin of pleotelson pointed ..... ***S. caribbea***

Fig. 490. *Storthyngura caribbea* (Benedict) (12 mm)

Range: Windward Islands, West Indies (1256 m)

The species has been considered as a subspecies; i.e., *S. pulchra caribbea.*

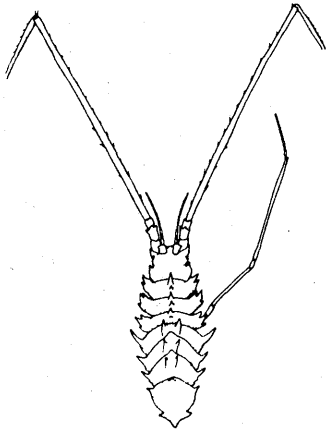


Figure 490. *Storthyngura caribbea.*

7a. Lateral lappets on peraeonal segments I, II and III at least as long as segment is long; coxal plates not apparent ..... ***S. magnispinis***

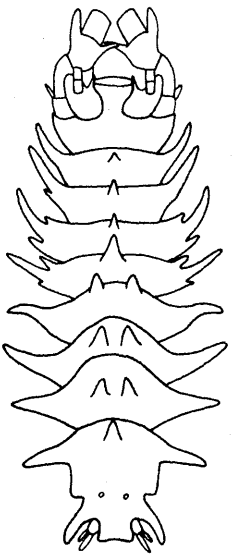


Figure 491. *Storthyngura magnispinis.*

Fig. 491. *Storthyngura magnispinis* (Richardson) (4 mm)

Range: Off Nantucket Shoals (2258 to 2704 m)

The species description is based on a single male specimen. It should be compared with specimens of *S. truncata* mentioned above (p. 306).

7b. Lateral lappets on peraeonal segments I, II and III shorter than peraeonal segment is long; coxal plates apparent in dorsal view ..... *S. vemae*

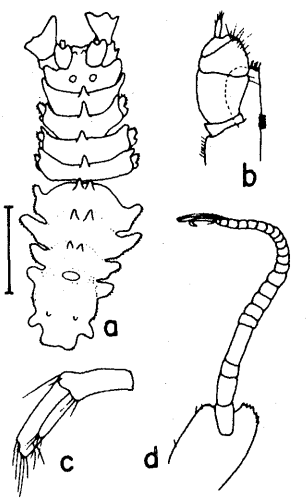


Figure 492. a. *Storthyngura vemae.* b. Maxilliped. c. Uropod. d. Antenna one.

Fig. 492. *Storthyngura vemae* (Menzies) (3.2 mm)

Range: Caribbean Sea, north of Columbia (4071 m)

SUBORDER EPICARIDEA

In the past the suborder Epicaridea has been called Bopyroidea. The species of the suborder range from very primitive isopods that are much like the archetype in body segmentation to very highly modified species that only superficially resemble other isopods. Epicaridean isopods undergo greater changes during development than do species of other groups. The egg develops into a larva with six peraeonal segments, the "epicaridean" stage. Animals of this stage free themselves from the marsupium and attach to a planktonic host (mostly copepods). There they molt to a stage with

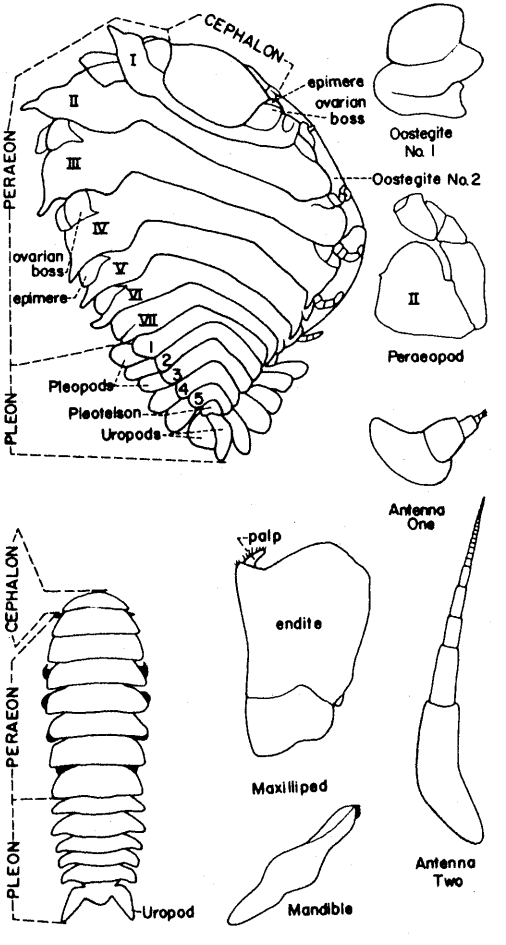


Figure. 493. Epicaridea (General nomenclature).

seven segments, the "microniscus" stage. The animals then molt again to a "cryptoniscus" stage and begin sexual differentiation (both males and females). The maturing juveniles detach from the first host and become planktonic again, then attach to a second host (almost any crustacean including other isopods) and grow. Through metamorphosis and maturity the female becomes somewhat of a peculiar egg case sometimes becoming quite indistinguishable as an isopod (Fig. 7h, i).

The male attaches to the pleopods or gets into the egg case of a female which is attached to a host and which is much larger than the male isopod. There it changes in form slightly, matures sexually, but does not usually grow. It is then able to fertilize the eggs of the female and the life cycle is repeated. The relations between the hosts and the life stages of the parasitic isopods are only bginning to become known, and the above stages have never been clearly recorded for any one species. Four families are recognized here as being present in North American waters although some workers recognize more.

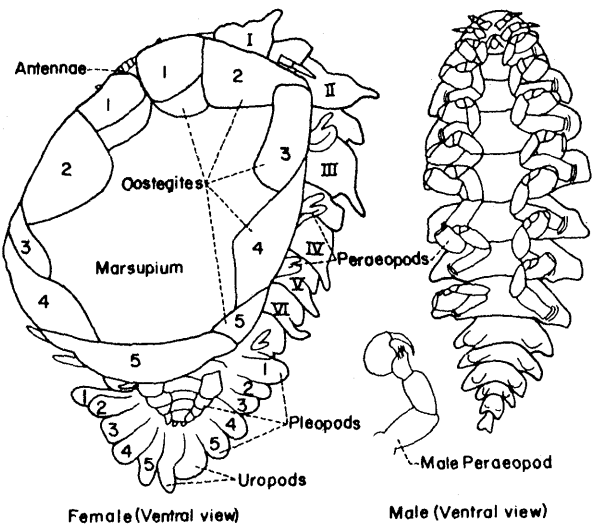


Figure 494. Epicaridea (Ventral view, general nomenclature).

KEY TO FAMILIES OF EPICARIDEA

1a. Sac of eggs around very small body; signs of segmentation feebly indicated if at all; true peraeopods and other appendages rudimentary if present ..... Cryptoniscidae (p. 337)

1b. Not as above 2

2a. **Body without indications of rigid exoskeleton; body segmentation present; peraeons laterally expanded into thin, pleural lamellae ..... Entoniscidae (p. 344)**

2b. Not as above 3

3a. **Body of female symmetrical or irregularly symmetrical in outline; segmentation apparent, but reduced; peraeopods from two to five; mouth in form of sucker ..... Dajidae (p. 341)**

3b. **Body of female distinctly segmented and more or less asymmetrical; seven pairs of peraeopods, six of which can be absent on one side (exception, peraeopods I which are always paired) ..... Bopyridae (p. 312)**

BOPYRIDAE

There are more described species of Bopyridae than in the other epicaridean families in North American waters. The species are parasitic on decapods (crabs and shrimp). The body of both the male and female is segmented, and peraeopods are present and differ little in size and shape. Females have large asymmetrical bodies and males are small and symmetrical, frequently being found attached to or among the pleopods, or in the brood pouch of the female. The cephalon is generally distinct and eyes, if present, are tiny. The antenna and mouth parts are rudimentary. All seven segments of the peraeon are always laterally distinct, but in some instances some of the anterior segments are fused with the cephalon. Five pairs of oostegites are present, and knowledge of their form is useful since the most commonly encountered bopyrid is the gravid female. Coxal separations are present on the edges of the peraeonal segments, and large bosses or swellings are frequently present just medially to the coxal sutures. Seven pairs of prehensile peraeopods are almost always present, but in one group peraeopods are absent on one side on peraeons II to VII.

The pleon is always distinct and generally segmented or with indications of segmentation on the lateral margins. The lateral margins are frequently elongate. The pleopods are sometimes absent and when present they can be uniramus, biramus or triramus. They can be mistaken for extensions of the peraeonal segments if one is not careful. The uropods, if present, are generally simple and composed of lobes which look like the ends of the pleonal segments. A distinct telson is sometimes present, but many times it is fused to a pleonal segment to form a pleotelson.

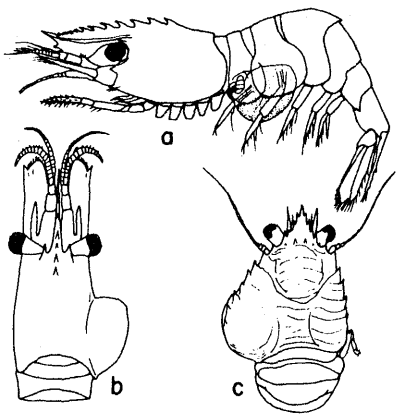


Figure 495. Bopyrid parasites on shrimp. a. On abdomen. b-c. Within branchial cavity of host (dorsal views). (After Sars).

A small male is frequently found clinging to the pleopods of the female in some species or living within the brood pouch with the eggs in other species. The male is small, symmetrical and distinctly segmented. It has very small antennae, mouth parts and short prehensile peraeopods that mostly have pointed dactyls. Sometimes the peraeopods are vestigal; i. e., consist only of stubs. The pleon is always distinct, but the segmentation of the pleon is not always distinct. The pleon usually lacks appendages, but a well defined pleotelson with long uropods are present in some species. The uropods are generally no longer than the ends of the pleonal segments in most species. The bopyrids are generally found in the branchial cavity of their decapod hosts. The males that are pictured here with the females are many times drawn at a scale much greater than that of the female. Most of the males are under 1.5 mm long.

Only a large male specimen is known for one species, *Bathygyge grandis Hansen* (7 mm), from Acapulco, Mexico. It was taken from the branchial cavity of the shrimp *Glyphocragon spinulosa*, and is sufficiently different from other males to be described as a new species. It is illustrated in figure 496.

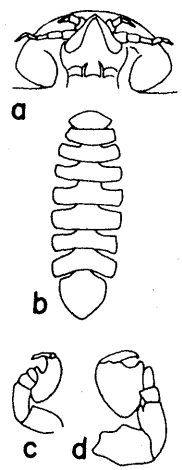


Figure 496. a. *Bathygyge grandis*, ventral view cephalon. b. Dorsal view. c. Peraeopod I. d. Peraeopod V.

KEY TO GENERA AND SPECIES OF BOPYRIDAE

1a. Body asymmetrical with one side greatly enlarged and longer than other side; only peraeopod I present on enlarged side; pleon composed of 4 segments and usually with pleotelson 2

1b. Body slightly to greatly asymmetrical, but with both sides more or less developed; i. e., with all peraeopods present although they might be small and difficult to find; pleon usually of 5 segments plus pleotelson (some segments are at least laterally indicated) 3

2a. Pleonal extensions large, ovate and single (uniramus) or double (biramus), but if biramus then pleonal extension on 4 much longer than on 1 to 3 ..... *Hemiarthrus*

Fig. 497. *Hemiarthrus subcaudalis* (Hay) (6 mm)

Range: Onslow Bay, North Carolina (about 20 miles off Beaufort Inlet) (18 m)

The species is from the gill chamber of the shrimp *Synalpheus longicarpus* which is found within the cavity of a sponge. The species of a different genus *Synsynella deformans* (p. 333) is found as a parasite on the same shrimp in the same locality. This is an example of two species of isopods exploiting the same host animal.

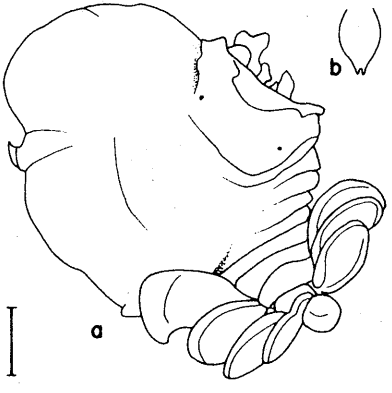


Figure 497. a. *Hemiarthrus subcaudalis*. b. Pleon male.

Fig. 498. *Hemiarthrus abdominalis* (Kroyer) (9 mm)

Range: Circumpolar south to Massachusetts and Washington State (9 to 642 m)

The species is found as a parasite on the decapods of the genera *Spirontocaris* and *Pandalus* inhabitants of northern waters.

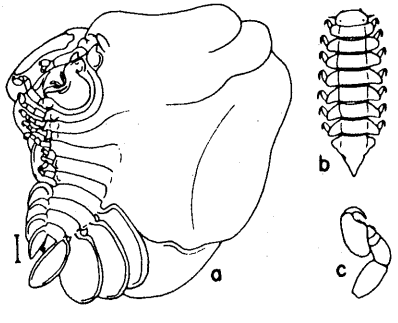


Figure 498. a. *Hemiarthrus abdominalis*. b. Male. c. Peraeopod of male.

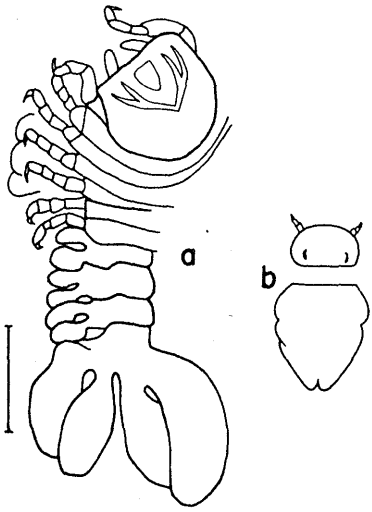


Figure 499. a. *Hemiarthrus schmitti*. b. Anterior and posterior parts of male.

Fig. 499. *Hemiarthrus schmitti* (Pearse) (4.6 mm)

Range: East coast and Bimini, Bahamas

The species is parasitic on the shrimp *Synalpheus brooksi*. The lateral extensions of the pleonal segments are bifid with those of segment 4 the longest in this species.

2b. All (bifid number, eight) pleonal extensions about same size on each side ..... *Diplophryxus*

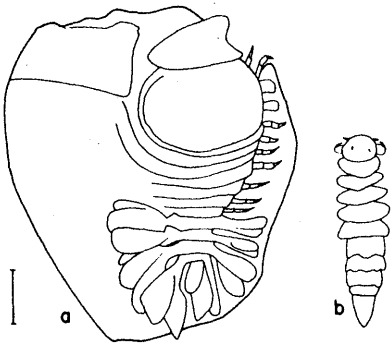


Figure 500(a). a. *Diplophryxus synalphei*. b. Male.

Fig. 500(a). *Diplophryxus synalphei* (Pearse) (6.2 mm)

Range: South Carolina near mouth of New River

The species is found on the snapping shrimp *Synalpheus fritsmulleri elongatus*.

3a. Cephalon more or less symmetrical with lateral lobes on anterior third and set slightly in front of body margin; pleon with five segments indicated; pleotelson (no telson indicated) with elongate, lobate uropods ..... *Aporobopyrus*

Fig. 500(b). *Aporobopyrus muguensis* Shiino (4 mm)

Range: Off Pt. Mugu, California (11 m)

The species is from the branchial cavity of *Pachycheles rudis*. A second species *A. oviformis* Shiino (3.5 mm) is also found in the same locality.

A. oviformis Shiino 1934

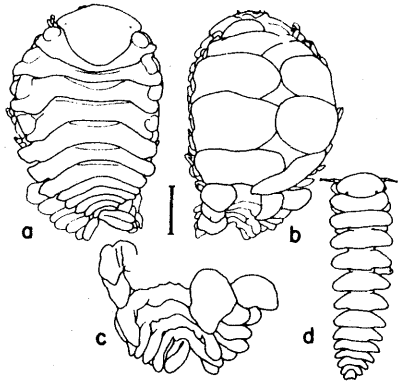


Figure 500(b). a. *Aporobopyrus muguensis*. b. Ventral view c. Ventral view, pleon. d. Male.

3b. Cephalon various; pleon and pleotelson various 4

4a. Pleon with lateral extensions of segments elongate and digitate, or with simple crenulated margins (Figs. 501 and 502) 5

4b. Pleon with lateral extensions long at times, but never digitate or crenulate; pleotelson or telson various 9

5a. All pleonal extensions elongate and digitate 6

5b. All pleonal extensions with simple crenulate margins ... *Ergyne*

Fig. 501. *Erygne rissoi* (Nierstrasz and Brender (2 mm)

Range: Curacao, Dutch West Indies

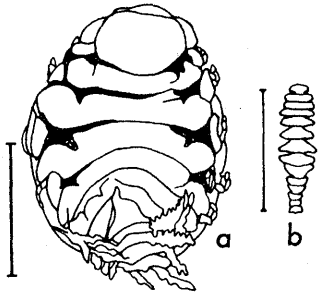


Figure 501. a. *Ergyne rissoi*. b. Male.

6a. Pleon with 6 segments visible; telson elongate, but never with digitate borders ..... *Ione*

Fig. 502. *Ione thompsoni* (Richardson) (16 mm)

Range: Massachusetts

The species is found on the mud shrimp *Callianassa stimpsoni.*

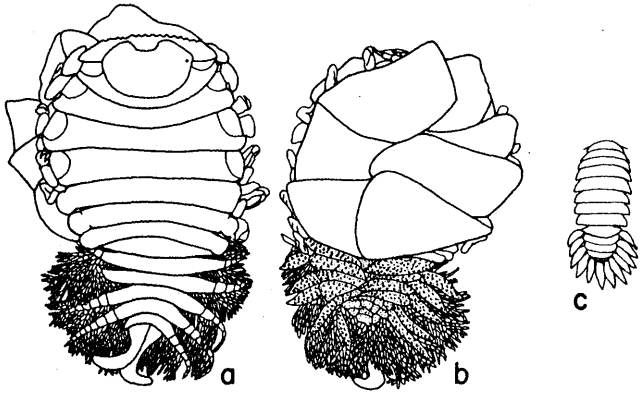


Figure 502. a. *Ione tompsoni.* b. Ventral view. c. Male.

= *I. cornuta*

Fig. 503. *Ione brevicauda* (Bonnier) (6.7 mm)

Range: San Francisco Bay, California

A third species has been found at Puget Sound, Washington, and is called *Ione cornuta* Spence-Bate (15.5 mm). It was found in the branchial cavity of *Callianassa longimana*, but it was never illustrated.

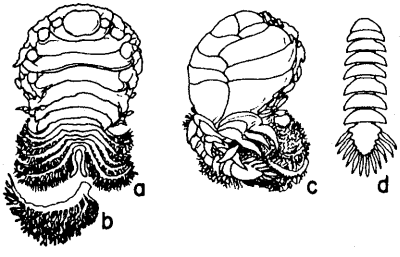


Figure 503. a. *Ione brevicaudata.* b. Detail, pleural lamella. c. Ventral view. d. Male.

6b. Pleon with 6 or less segments; telson or pleotelson always with digitate boarders 7

7a. Cephalon without lateral extensions or with lateral extensions much wider than cephalon 8

7b. Cephalon with very little, if any, extension beyond lateral margin of oval cephalon (frontal extension present, however) ..... *Dactylokepon*

Fig. 504. *Dactylokepon hunterae* (Wells and Wells) (6 mm)

Range: Off Core Bank, North Carolina (22 m)

The species is a branchial cavity parasite of the crab *Pinnotheres maculatus* which is associated with the calico scallop. Two specimens were found on the host.

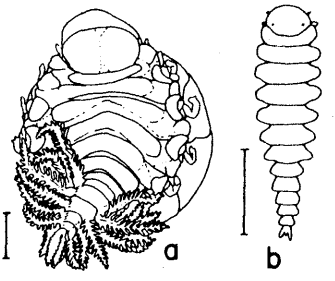


Figure 504. a. *Dactylokepon hunterae*. b. Male.

8a. Cephalon narrow, without frontal or lateral extensions ..... *Leidya*

Fig. 505. *Leidya distorta* (Leidy) (8 mm)

Range: New Jersey, North Carolina and Bermuda

The species is found in the branchial cavity of the common fiddler crab, *Uca pugilator*, an abundant species in the salt marshes of the east coast of the United States. In Bermuda the species is parasitic on a different species of crab from a different family, *Pachygropsus transversus*. It thus is an example of a parasitic isopod which has several host species.

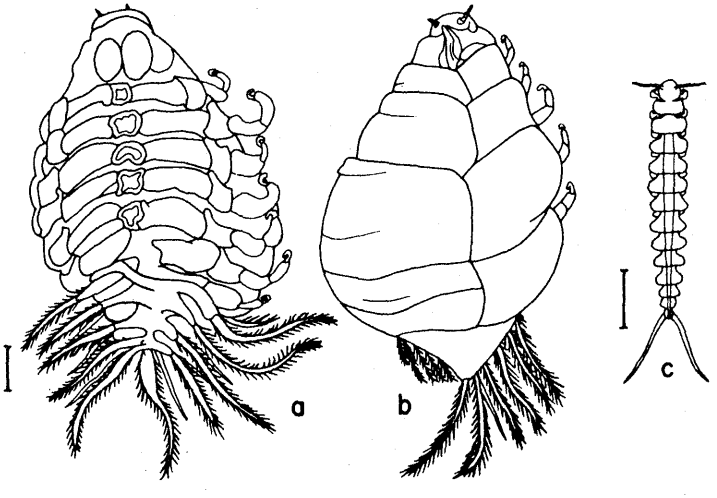


Figure 505. a. *Leidya distorta*. b. Ventral view. c. Male.

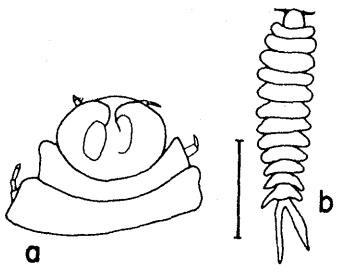


Figure 506. a. *Leidya bimini*, anterior part. b. Male.

Fig. 506. *Leidya bimini* (Pearse) (6.7 mm)

Range: Bimini Island, Bahamas

The species is found in the branchial chamber of *Pachygrapsus transversus*. It perhaps is really only a different form of *L. distorta*.

8b. Cephalon with large lateral and frontal extensions on ovate cephalon ..... *Grapsicepon*

Fig. 507. *Grapsicepon edwardii* (Giard and Bonnier) (19 mm)

Range: Gulf Stream and Sargasso Sea

The species is a branchial parasite of crabs. Several males sometimes are found attached to one female. Large mediodorsal projections are found on peraeonal segments VI and VII.

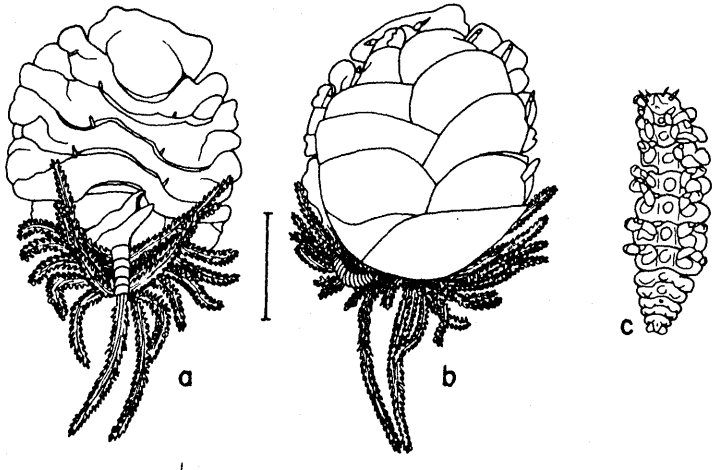


Figure 507. ♂. *Grapsicepon edwardii*. b. Ventral view. c. Male.

(6) M. irritans Boone. Florida & Belize (host: M. irrasa)

(7) M. laterale Richardson. Philippines & Java Sea. (host: ?)

Fig. 508. *Grapsicepon choprae* (Nierstrasz and Brender) (4mm)

Range: Curacao, Dutch West Indies

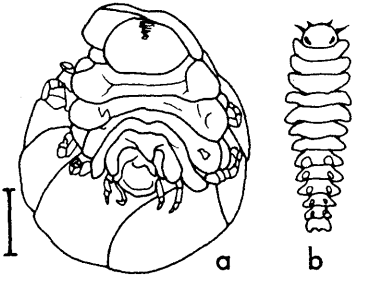


Figure 508. a. *Grapsicepon choprae*. b. Male.

9a. Pleonal terga produced into long pleural lamellae (Fig. 509a) 10

9b. Pleonal targa short, not produced into pleural lamellae (Fig. 509b) 14

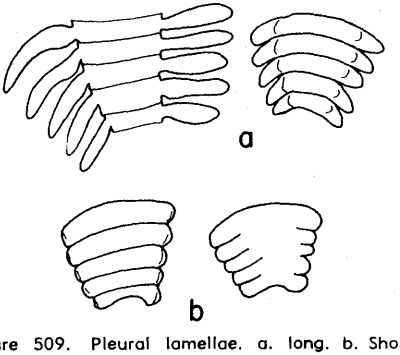


Figure 509. Pleural lamellae. a. long. b. Short.

note: There are 7 species of N. American Munidon (see Markham, 1975)

10a. Dorsal processes present near lateral borders of all peraeonal segments; uropods bifurcate ..... *Munidon*

(1) Fig. 510. *Munidion parvum* (Richardson) (9 mm)

Range: Puget Sound, Washington and Departure Bay, British Columbia

The species is a parasite on the galatheid crab *Munida quadrispina*.

(2) M. princeps Hansen. Pacific coast of Colombia (host: Munida refulgens Faxon).

(3) M. pleuroncodis Markham. British Columbia to Baja (host: Ple roncodes planipes).

(4) M. cubense Bourdon (formerly M. parvum cubensis) Caribbean (hosts: Munida stimpsoni & M. flinti)

22b. Pleotelson with rounded appendages ..... *P. panopei*

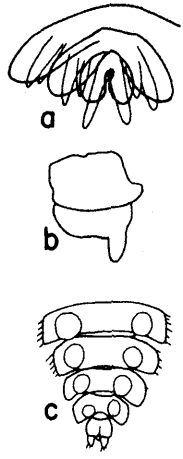


Figure 525. a. *Pseudione panopei*, posterior part. b. Oostegite 1. c. Posterior part, ventral view male.

Fig. 525. *Pseudione panopei* (Pearse) (13.5 mm)

Range: Beaufort, North Carolina

The species is parasitic on the crab *Panopeus herbstei.*

23a. Pleon with five complete, free segments showing; mostly blind species 24

23b. Pleon never with five complete, free segments showing; mostly species with eyes 26

24a. Pleon much narrower than peraeon, at least on short body side; posterior margin of pleotelson slit medially ... *Palaegyge*

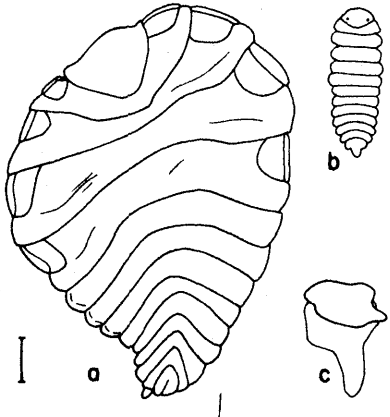


Figure 526. a. *Palaegyge meeki*. b. Male. c. Oostegite 1.

Fig. 526. *Palaegyge meeki* (Richardson) (9 mm)

Range: Freshwater streams on Atlantic coast of Panama

The species is a branchial parasite on the young of shrimps. The uropods of this species are in the form of two oval sac-like structures.

24b. Body margins of peraeon gradually tapering into that of pleon (no abrupt change on either side); pleotelson with posterior margin various, but never slit 25

25a. Peraeon smooth without distinct dorsal differentiation of any kind; posterior margin of pleon and pleotelson truncate ..... *Bopyroides*

Fig. 527. *Bopyroides hippolytes* (Kroyer) (8 mm)

Range: Circumpolar, south to Cape Cod and to Puget Sound, Washington

There have been many different forms described for this widespread species that is parasitic on species of the genera *Pandalus, Pandalopsis* and *Spirontocaris.*

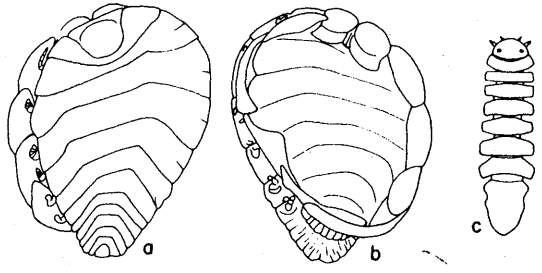


Figure 527. a. *Bopyroides hippolytes.* b. Ventral view. c. Male.

25b. Peraeonal segments with distinct lateral segmentation indicated in dorsal view; posterior margin of pleon rounded and pleotelson with posterior margin various ..... *Probopyrus*

GENUS PROBOPYRUS

It is very difficult to tell the six species of the genus apart without knowledge of the host and of the structure of the male. The species are parasites of shrimp.

Fig. 528. *Probopyrus alphei* (Richardson)

Range: North Carolina to Brazil

The host species is the snapping shrimp *Alpheus heterochaelis*

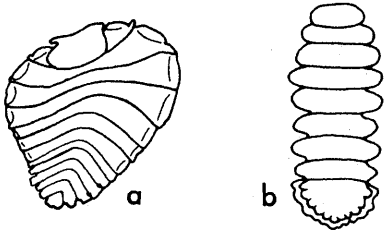


Figure 528. a. *Probopyrus alphei.* b. Male.

Figs. 529 and 530. *Probopyrus pandalicola* (Packard) (10 mm)

Range: New Hampshire to Florida and Mississippi

The species is parasitic on the shrimp of the genus *Palaemonetes* on the east and gulf coasts of the United States.

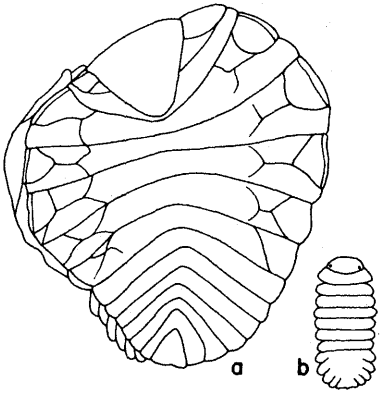


Figure 529. *a*, *Probopyrus pandicola*. b. Male.

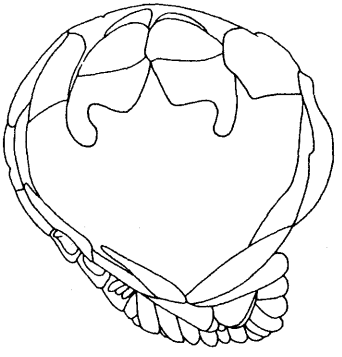


Figure 530. *Probopyrus pandicola* (ventral view).

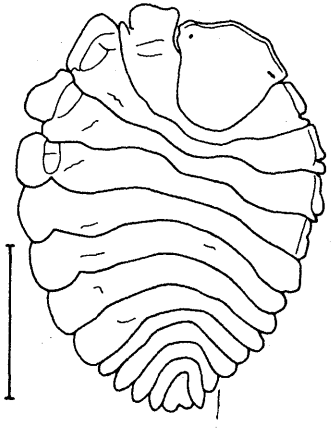


Figure 531. *Probopyrus oviformis*.

Fig. 531. *Probopyrus oviformis* (Nierstrasz and Brender) (2.5 mm)

Range: Jolly Hill, St. Croix, West Indies

The species is parasitic on the shrimp of small brooks of the genus *Macrobrachium*.

Fig. 532. *Probopyrus panamensis* (Richardson) (12 mm)

Range: Canal Zone, Panama

The species is a branchial parasite of the shrimp *Macrobrachium acanthurus*.

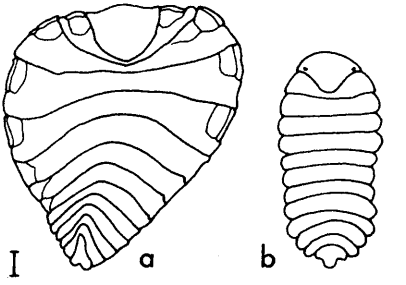


Figure 532. a. *Probopyrus panamensis*. b. Male.

Fig. 533. *Probopyrus floridensis* (Richardson) (4 mm)

Range: Northern Florida

The shrimp *Palaemonetes exilipes* is the host of the species.

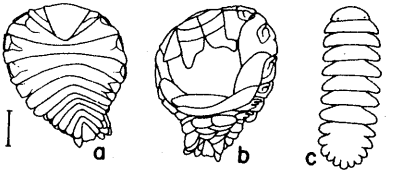


Figure 533. a. *Probopyrus floridensis*. b. Ventral view. c. Male.

Fig. 534(a). *Probopyrus bithynis* (Richardson) (3 mm)

Range: Mississippi River to Nicaragua

Shrimp of the genus *Macrobrachium* are the hosts.

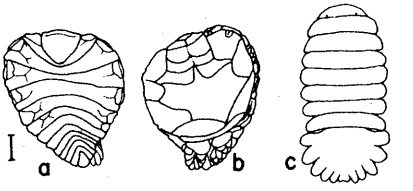


Figure 534(a). a. *Probopyrus bithynis*. b. Ventral view. c. Male.

26a. Cephalon and peraeonal segment I fused or cephalon and peraeonal segments I and II fused 27

26b. Cephalon never fused with peraeonal segment I and II ... 29

27a. Cephalon and peraeonal segment I fused ..... *Bopyrella*

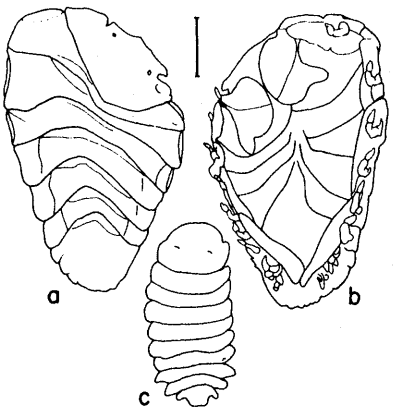


Figure 534(b). a. *Bopyrella harmopleon*. b. Ventral view. c. Male.

Fig. 534(b). *Bopyrella harmopleon* (Bowman) (4.8 mm)

Range: Los Roques Islands, Venezuela

The species is a parasite of a shrimp of the genus *Synalpheus*.

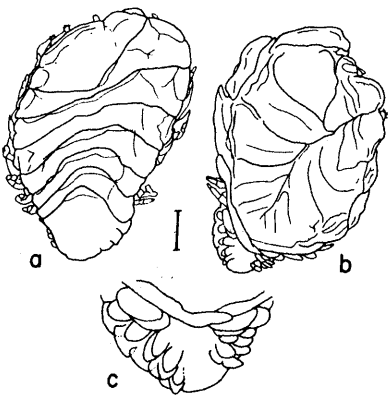


Figure 534(c). a. *Bopyrella maginitiei*. b. Ventral view. c. ventral view, pleon.

this is the jr. syn. of B. calmani. (see Sassaman et al. 1984)

Fig. 534(c). *Bopyrella maginitiei* Shiino 1964 (5.7 mm)

Range: Santa Cruz Island, California (13 m)

The species is a branchial cavity parasite of the shrimp *Crangon equidactylus*. ♀ Synalpheus lockingtoni

27b. Cephalon and peraeonal segments I and II fused 28

28a. Eyes present; pleonal segments I and II at least, free; lateral margins of pleonal segments pointed ..... *Synsynella*

Fig. 535. *Synsynella deformans* (Hay) (3.1 mm)

Range: Onslow Bay, North Carolina, (20 miles off Beaufort Inlet) (18 m)

The species is found in the gill chambers of *Synalpheus longicarpus*, a shrimp. *Hemiarthrus subcaudalis* (p. 313) is also a parasite on the shrimp.

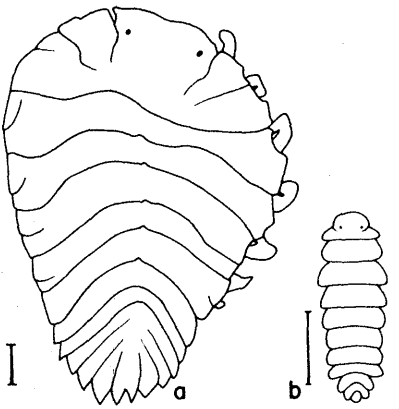


Figure 535. a. *Synsynella deformans*. b. Male.

28b. Blind; no free pleonal segments; lateral margins of pleonal segments not pointed ..... *Bopyrinella*

Fig. 536. *Bopyrinella antillensis* (Nierstrasz and Brender) (3 mm)

Range: Curacao, Dutch West Indies

The host shrimp is *Thor floridanus* which is also the host of *Bopyrina thorii* in Florida (p. 335).

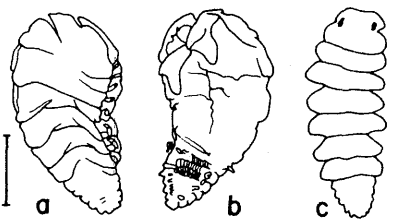


Figure 536. a. *Bopyrinella antillensis*. b. Ventral view. c. Male.

29a. Three or four free pleonal segments; pleotelson various ... 33

29b. All peraeonal segments fused, but generally indicated laterally (on one side or ventral view if not indicated on both sides in dorsal view); pleotelson never dorsally indicated (i. e., pleotelson equals pleon) ..... *Bopyrina*

GENUS BOPYRINA

The six species of the genus are found on five different shrimp genera. Two species are found on the same host from different geographic regions.

KEY TO SPECIES OF BOPYRINA

30a. **Pleon with indications of segmentation on one lateral margin only** 31

30b. **Pleon with indications of segmentation of both lateral margins** 32

31a. **Body asymmetrical, but medial axis almost straight** ..... *B. crangona*

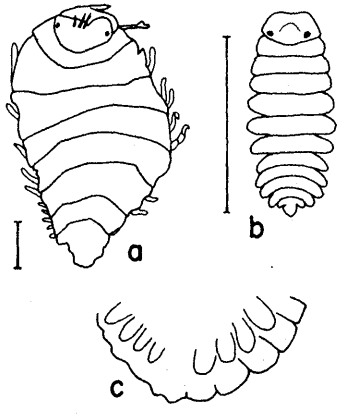


Figure 537. a. *Bopyrina crangona*. b. Male. c. Pleon, ventral view.

Fig. 537. *Bopyrina crangona* (Pearse) (5.5 mm)

Range: Coast of Carolinas (Shallow water)

The host shrimp is *Crangon formosa.*

31b. **Body asymmetrical with curved medial axis** ..... *B. abbreviata*

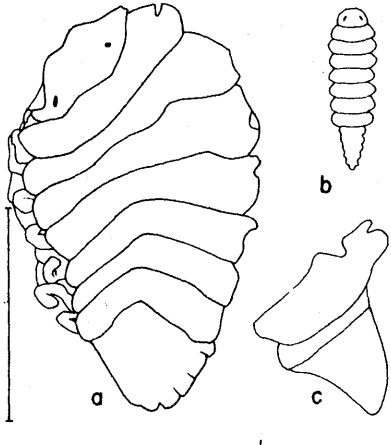


Figure 538. a. *Bopyrina abbreviata*. b. Male. c. Oostegite 1.

Fig. 538. *Bopyrina abbreviata* (Richardson) (2 mm)

Range: Puntarasa, Florida

The host shrimp is *Hippolyte zostericola.*

32a. First incubatory oostegite with hook on posterior margin (Fig. 542b) **33**

32b. First incubatory oostegite with rounded posterior margin (Fig. 538c) **35**

33a. Peraeonal segment I deeply set into peraeonal segment II ..... ***B. thorii***

Fig. 539. *Bopyrina thorii* (Richardson) (3.2 mm)

Range: Key West, Florida

The host is *Thor floridanus* the same as for the species *Bopyrinella antillensis* (p. 333)

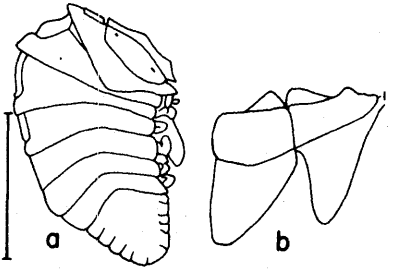


Figure 539. a. *Bopyrina thorii*. b. Oostegites 1.

33b. Peraeonal segment I not deeply set into peraeonal segment II ..... ***B. latreuticola***

Fig. 540. *Bopyrina latreuticola* (Gissler) (1.7 mm)

Range: Carolinas, Bermuda and Bahamas

Host animal for the species is *Latreutes ensiferus*. The species formerly was considered to be a member of *Probopyrus*, but because of the presence of eyes, the size, the fused pleon and the general body of configuration, it is included here in *Bopyrina*.

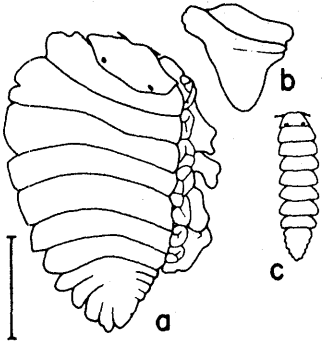


Figure 540. a. *Bopyrina latreuticola*. b. Oostegite 1. c. Male.

34a. Borders of pleonal segments angulate; frontal margin of cephalon not greatly curved ..... ***B pontoniae***

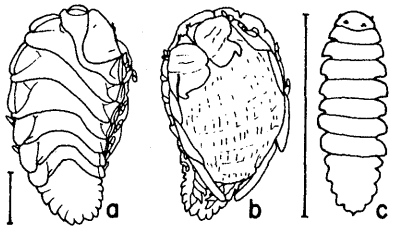


Figure 541. a. *Bopyrina pontoniae*. b. Ventral view. c. Male.

Fig. 541. *Bopyrina pontoniae* (Wells and Wells) (6 mm)

Range: Off Core Bank, North Carolina (22 m)

The host is the shrimp *Pontonia margarita* and it was associated with callico scallop. *B. urocardis* was found on the same host in Florida.

34b. Borders of pleonal segmnts sinuate; frontal margin of cephalon greatly curved ..... *B. urocardis*

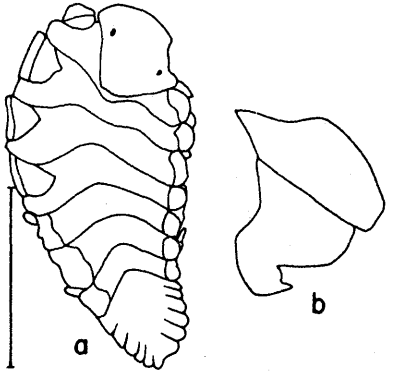


Figure 542. a. *Bopyrina urocardis*. b. Oostegite 1.

Fig. 542. *Bopyrina urocardis* (Richardson) (2.1 mm)

Range: Puntarasa, Florida

The host shrimp is *Pontonia margarita* the same as for *B. pontoniae* from North Carolina.

35a. Four free pleonal segments; fifth indicated in lateral margins of pleotelson by indentations ..... *Bopyriscus*

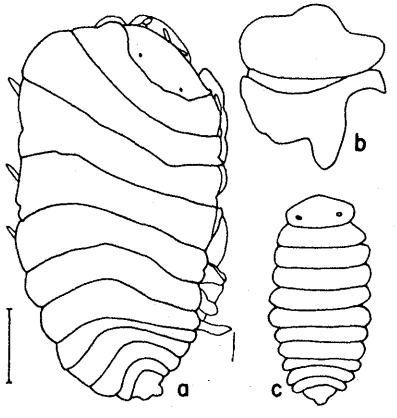


Figure 543. a. ~~*Bopyrina*~~ *Bopyriscus calmani*. b. Oostegite 1. c. Male.

Fig. 543. *Bopyriscus calmani* (Richardson) (5 mm)

Range: Southern California
Host unknown.

35b. Three free pleonal segments; fourth laterally indicated by slits in pleotelson margin ..... *Bopyro*

Fig. 544. *Bopyro choprae* (Pearse) (6.2 mm)

Range: North Carolina to Bahamas

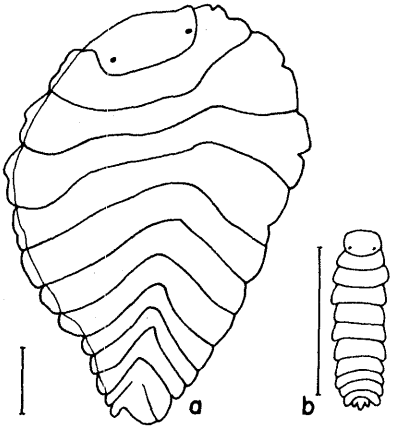


Figure 544. a. *Bopyro choprae*. b. Male.

CRYPTONISCIDAE

The species of the family are among the least known members of the isopod fauna of North American waters, because the female is composed of little more than just an egg sac and the males have rarely been found. It is known, however, that the species are isopods (for some species there is even a legitimate doubt of that!) because the juvenile stage looks like that of the juvenile of other species of bopyrids. Apparently the juveniles are at first planktonic and fend for themselves soon after being released from the brood sac. They soon must attach to a host, and most of the early attachment stages have never been seen by scientists because they are small and easily overlooked. The life history of no species has ever been completely explored and explained.

Most appendages including the mouth parts are absent, and the appendages which remain are greatly modified as suctorial or clinging structures. The females are composed mainly of ovarian tissue, and of eggs formed from ovarian tissue. Sometimes some sign of segmentation is found, but most frequently the form of the adult female is simply rotund or lobular, and there is only a general pattern to the body form of the various species. The details of the form depend upon the place and conditions of attachment

to the host. The males are like the males of other families of the suborder, but unfortunately they have never been extensively illustrated even when found. The isopods are probably frequently overlooked, even as adults, because they are small and look like many of the other encrusting plants and animals found on the host.

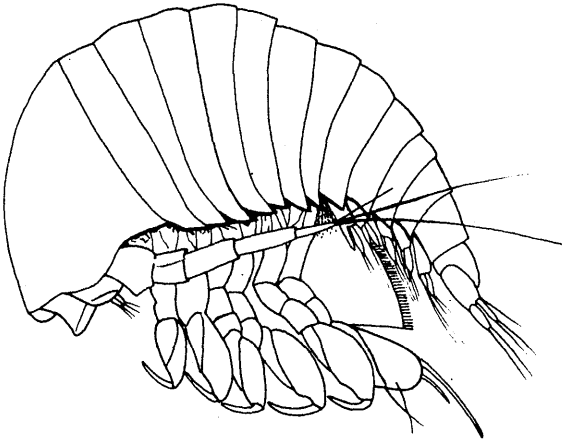


Figure 545. *Clyptoniscus meinerti*, lateral view larva.

There is some evidence that species of the family are host specific, but there are not enough observations to form any solid conclusions. The approximately 25 genera of the family have been divided into seven separate families, but since little other than the juvenile stage is known in most species, they are included here as one family. Members of the family are parasites on many other groups of crustaceans including other isopods. Occasionally they are parasites of crustaceans which are in turn parasites of other crustaceans or other animals. Probably they have some influence on the life history of their hosts, but not as much as that of the entoniscids. Six species in six genera have been recorded in North American waters. The key to genera which follows is only an aid, not the final word since the form of the animals is so changeable.

KEY TO GENERA AND SPECIES OF CRYPTONISCIDAE

1a. Specimen rolled into ball; much longer than wide ..... *Danalia*

Fig. 546. *Danalia fraissei* (Nierstrasz and Brender) (4.4 mm)

Range: Curac ıo, Dutch West Indies. The host of the parasite is the

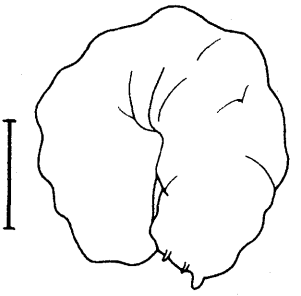


Figure 546. *Danalia fraissei*, lateral view.

1b. Not as above **2**

2a. Species of two large lobes; peraeonal segments showing between two lobular egg masses ..... ***Clypeoniscus***

Fig. 547. *Clypeoniscus meinerti* (Giard and Bonnier) (2 mm)

Range: Greenland (11 to 18 m)

The species illustrated here is a parasite in the marsupium of another isopod, *Synidotea nodulosa* (p. 70), which is a relatively small isopod about 7.5 mm long. The host is found in the intertidal zone on the coast of Greenland. The species looks like a large egg in the marsupium of the female. Upon close examinatio ı it is found to be a sac of tiny eggs itself. A male is sometimes found attached to the egg mass and it looks much like other bopyrid isopod males.

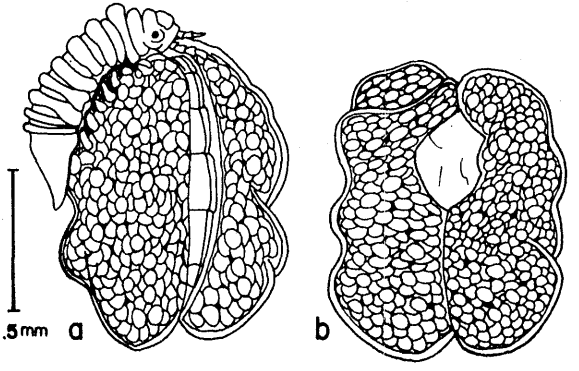


Figure 547. a. *Clyptoniscus meinerti*, female with male. b. Opposite view of a.

2b. Specimen not of only two lobes of egg masses; peraeonal segmentation not apparent 3

3a. Seven lobes apparent; five lobes somewhat radially arranged ..... *Heptalobus*

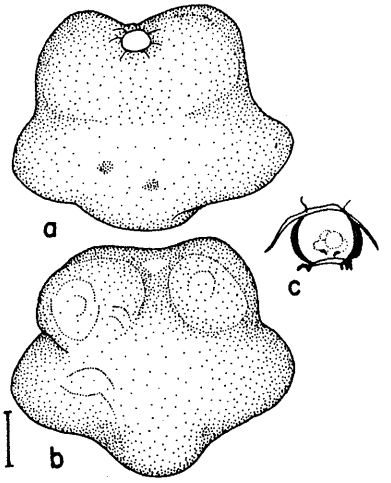


Figure 548. a. *Heptalobus paradoxus*, oral view. b. Aboral view. c. Detail, oral region.

Fig. 548. *Heptalobus paradoxus* (Nierstrasz and Brender) (4 mm)

Range: Bering Sea (730 m)

The host ~~crab~~ shrimp was *Spirontocaris buinguis*. The ring structure apparently represents the oral region. No males were found.

3b. Bean-shaped, ocarina-shaped or composed of two subspherical parts 4

4a. Bean-shaped ..... *Faba*

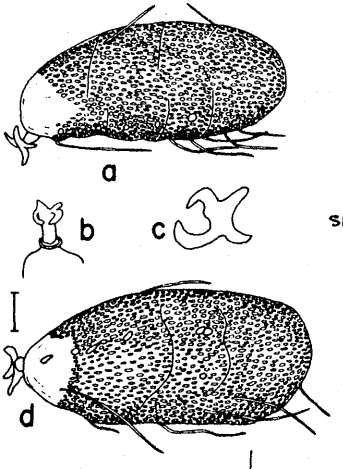


Figure 549. a. *Faba setosa*, lateral view. b. Attachment stalk. c. Detail, attachment stalk. d. Opposite view of a.

Fig. 549. *Faba setosa* (Nierstrasz and Brender) (8 mm)

Range: Off central California (305 m)

The species was found on the ~~crab~~ shrimp *Spirontocaris bispinosa*. A second species of the genus is found in Hawaii. The male has never been seen. Apparently the species attaches to the host by means of the four pointed anterior (?) processes.

Faba glabra - Hawaii

? *Cryptothir balani* (Bate 1860)

(= Hemioniscus balani)

4b. Ocarina-shaped or composed of two subspherical parts 5

5a. Ocarina-shaped ..... *Duplorbis*

Fig. 550(a). *Duplorbis ocarina* (Nierstrasz and Brender) (4 mm)

Range: Aleutian Islands (132 m)

The parasite shaped like the musical instrument, the ocarina, is from the branchial cavity of a crab. A cross section[A to B, Fig. 505(a)] of the animal is shown with the small intestine indicated. The large cavity of the ovary is surrounded by ovarian tissue.

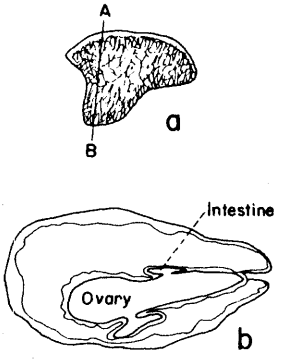


Figure 550(a). a. *Duplorbis ocarina*. b. Section cut at A-B.

5b. Body composed of two subspherical parts .....*Liriopsis*

Fig. 550(b). *Liriopsis pygmaea* (Rathkei) (5 mm)

Range Puget Sound, Washington (Shallow water)

The species is parasitic on the rhizocephalans *Peltogaster paguri* and *P. gasterella gracilis* which in turn are parasitic on hermit crabs.

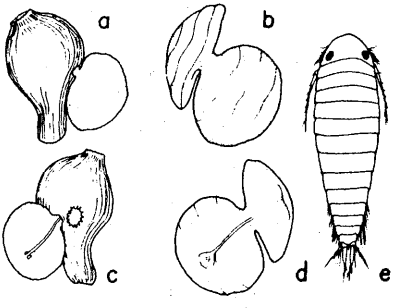


Figure 550(b). a. *Liriopsis pygmaea* on host, dorsal view. b. Isolated from host, dorsal view. c. Isopod and host, ventral view d. Isolated from host, ventral view. e. Male (After Sars).

DAJIDAE

The body of the female is composed mostly of a mass of eggs that is sometimes symmetrically arranged around a segmented body. The mouth, even in the young female stages, is composed of an attachment sucker. The sucker is not found in mature males, but whether or not it is present in larval males has not been determined. The antennae are severely reduced in size or absent, and only two to five pair of anterior peraeopods are present. The pleo-

pods, if present, are rudimentary, and the uropods are absent or very small if present. The males are much like those of other families, but in some species the cephalon and peraeonal segment I are fused. The pleonal segments are also fused. The species are parasites on species of Mysidacea and Euphausiacea. Four species in four genera are known from North American waters.

KEY TO GENERA AND SPECIES OF DAJIDAE

1a. Peraeonal segmentation visible in dorsal view; body flanked laterally by large egg masses **2**

1b. Peraeonal segmentation not at once apparent if at all; egg cases laterally placed on each side of body **3**

2a. Uropods distinct; body bilaterally symmetrical with anterior parts greatly wider than posterior part; two large egg masses laterally placed in gravid females ..... ***Dajus***

Fig. 551. *Dajus mysidis* (Kroyer) (4 mm)

Range: Laborador and Greenland (5 to 37 mm)

The species is a parasite which attaches to the abdomen of mysid shrimps.

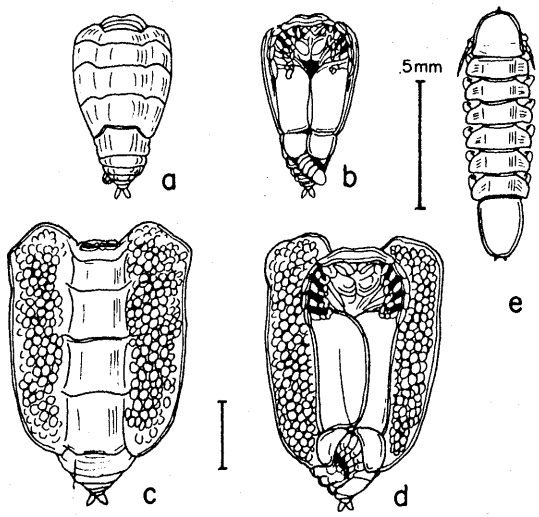


Figure 551. a. *Dajus mysidis*, dorsal view young female. b. Ventral view. c. Dorsal view, mature female. d. Ventral view. e. Male.

also. Arthrophryxus beringianus Rich. 1908

2b. Uropods not distinct; body with somewhat of a symmetry ..... ***Colophryxus***

Fig. 552. *Colophryxus novangliae* (Richardson)

Range: South of Long Island, New York (1293 m)

This species is the type and only species in the genus. It was found unattached in a fishing trawl net, therefore, the host is not known.

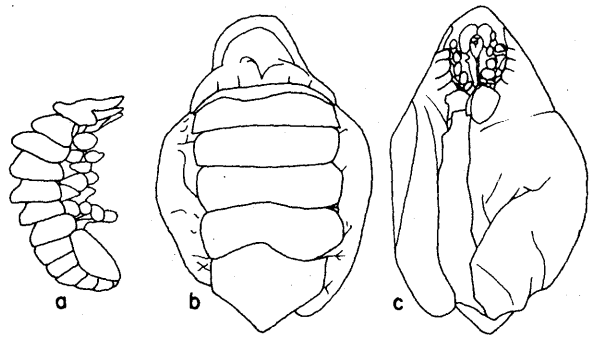


Figure 552. a. *Colophryxus novangliae*, male. b. Dorsal view, female. c. Ventral view.

3a. Pleon with segmentation apparent; anterior peraeonal segments distinct ..... ***Prophryxus***

Figs. 553 and 554. ***Prophryxus alascensis*** Richardson *1909*

Range: Off Alaskan panhandle (3658 m)

This species is perhaps parasitic on a schizopod since one was caught with it. The name of the schizopod was not given.

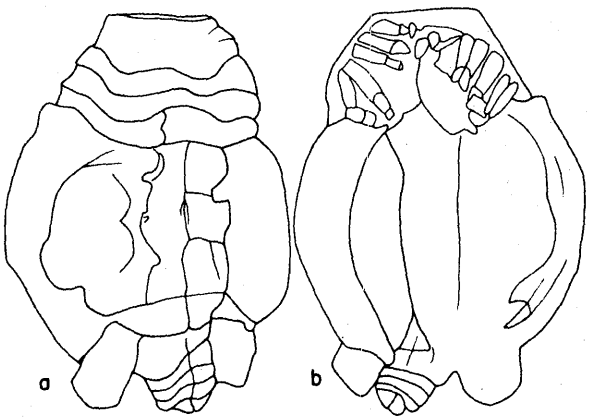
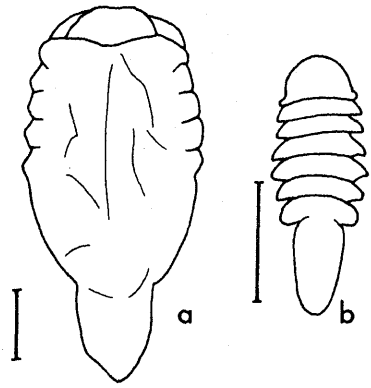


Figure 553. a. *Prophryxus alascensis*. b. Ventral view.



Holophryxus giardi Rich. 1908
Bering Islands, Alaska
Holophryxus californianus Rich. 1908
Central California

Figure 554. a. *Prophryxus alascensis* (from another host). b. Male.

3b. No major body segmentation apparent ..... *Holophryxus*

Fig. 535. *Holophryxus alascensis* (Richardson)
Range: Alaska, near Juneau (269 to 640 m)
The host for this species is an unnamed stomatopod.

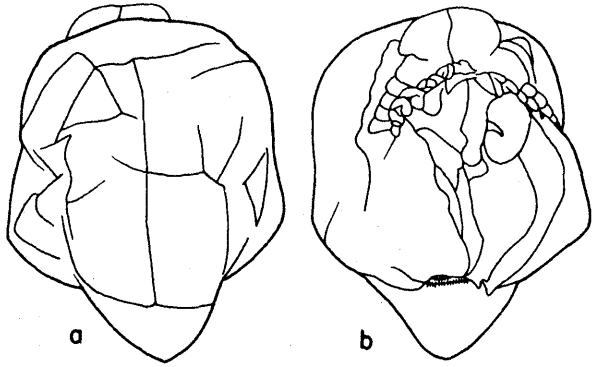


Figure 555. a. *Holophryxus alascensis*. b. Ventral view.

ENTONISCIDAE

Species of entoniscids are true endoparasites and are found within the body cavity of their decapod hosts. Although at first the specimens appear to be a mass of undifferentiated host tissue, it is interesting to note that all the body tagmata are present and almost all of the segments of each tagmata are represented. It is only after careful study, however, that they can be properly identified. The cephalon is generally composed of two large cephalic lobes and the pleon is long and slender. Large lamellae are present on the peraeonal segments of many species. All appendages are

rudimentary or absent, and only the mandibles are recognizable of the mouth parts. The peraeopods are present as buds or completely absent, and there are five segments plus a pleotelson present and distinct and the segments are sometimes equipped with pleopods that are long and pointed. Gravid females appear to be simply an undifferentiated mass of eggs, and only after careful examination is the body of an isopod recognized. The males are found on the body of the non-gravid female or in the egg mass of the gravid female. Their body is generally wide at the anterior end and tapers to a thin pleon, but it is in almost every other respect like that of other bopyrid males.

There is a small hole in the body wall of the host leading from the branchial cavity to the body cavity (haemocoel) where the parasite is found. In at least one species, the hole regularly penetrates from the eye cavity to the body cavity. The parasite is bathed in the body fluid of its host, and this is one of the criteria for calling the isopod a true endoparasite. There are about 34 species known and four are from the Atlantic coast and one from the Pacific coast of North America.

It is not easy to make a useful key to the genera or species of entoniscids so one is not attempted here. When decapods that are parasitized by the isopods are collected, they should be preserved and identified as well as the parasite. The structure of the male also is a useful identifying character. The species of entoniscids are economically important. Five species in four genera are found in North American waters.

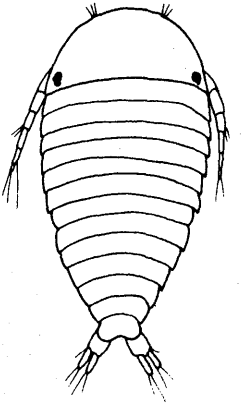


Figure 556. Larva of entoniscid.

GENERA OF THE FAMILY ENTONISCIDAE

Fig. 557. *Cancrion carolinus* (Pearse and Walker) (24 mm)

Range: Coast of Carolinas

At Beaufort, North Carolina, the species was found in the crab *Panopeus herbstii.*

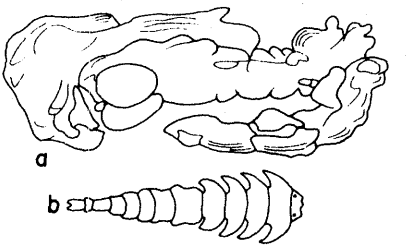


Figure 557. a. *Cancrion carolinus.* b. Male.

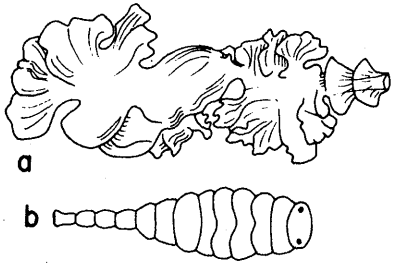


Figure 558. a. *Cancrion needleri*. b. Male.

Fig. 558. *Cancrion needleri* (Pearse and Walker) (18 mm)

Range: Prince Edward Island, Canada

The host crab is *Neopanope texana.*

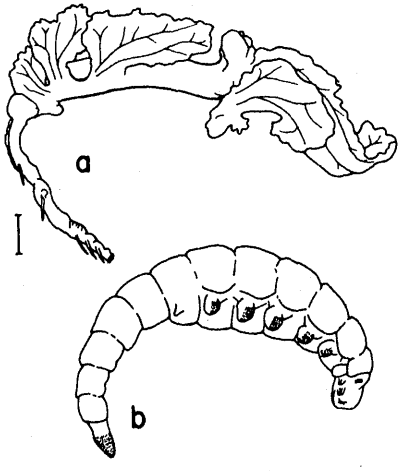


Figure 559. a. *Paguritherium altum*. b. Male.

Fig. 559. *Paguritherium altum* (Reinhard) (15 mm)

Range: Woods Hole, Massachusetts

The species is parasitic on the hermit crab *Pagurus longicarpus,* and it enters the body cavity through the region of the eyestalk, not the branchial cavity as in other entoniscids. In the male the peraeopods are stumps, not jointed peraeopods. The crab host is also host of another bopyrid isopod, *Stegophryxus hyptius,* a branchial cavity parasite (p. 321)

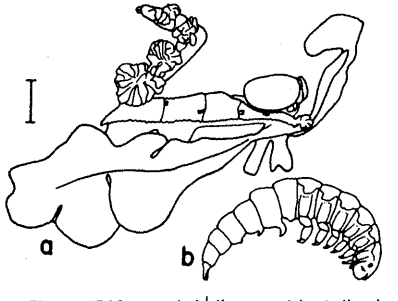


Figure 560. a. *Achelion occidentalis*. b. Male.

Fig. 560. *Achelion occidentalis* (Hartnoll) (4.8 mm)

Range: Jamaica

The parasite is found in the spider crabs *Microphryus bicornutus* and *Stenorhynchus seticornis.*

Fig. 561. *Portunion conformis* (Muscatine) (14 mm)

Range: Puget Sound, Washington to San Francisco Bay, California

The host is *Hemigrapus oregonensis*, a decapod. More than one parasite is frequently found on each host.

also *H. nudus* (see Pillai, 1969)

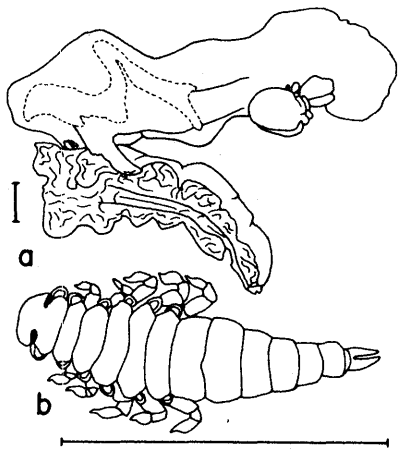


Figure 561. a. *Portunion conformis*. b. Male.

SOME USEFUL REFERENCES

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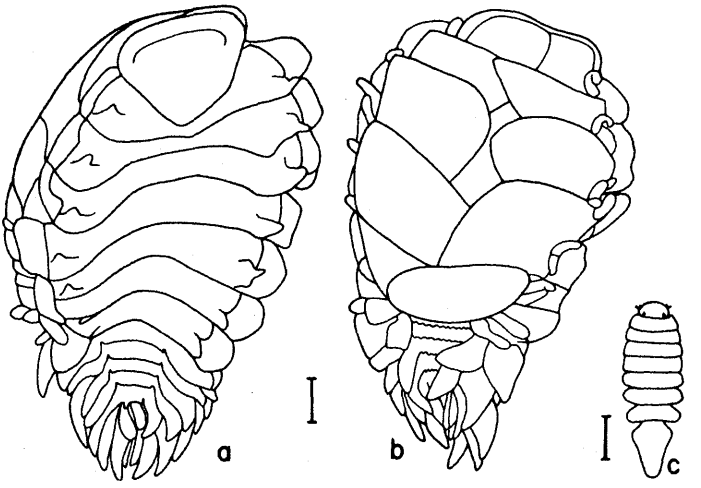


Figure 510. a. *Munidion parvum*. b. Ventral view. c. Male.

10b. Dorsal processes absent near lateral borders of peraeonal segments; uropods uniramus **11**

11a. Cephalon rounded and protruding far out of surrounding peraeonal segment I ..... ***Cryptione***

Fig. 511. ***Cryptione elongata*** (Hansen) (19 mm)

Range: Galapagos Islands and perhaps west coast of Mexico

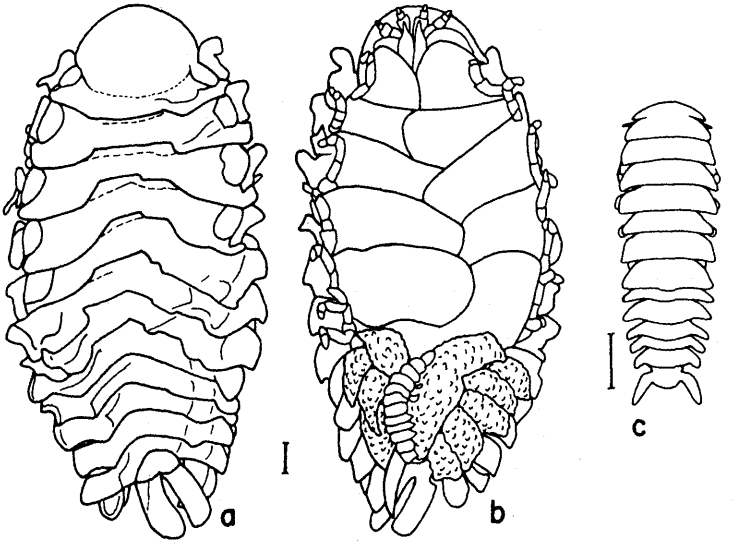


Figure 511. a. *Cryptione elongata*. b. Ventral view (with male on pleopods). c. Male.

Neither the male nor the female have eyes. The species is found in the branchial cavity of the crabs of the genus *Nematocarcinus*.

11b. Cephalon broadly rounded or with frontal n argin nearly straight and contained almost or completely within peraeonal segment I **12**

12a. Some or all pleopods triramus; no papillae dorsolaterally placed on pleonal segment I **13**

12b. No pleopods triramus; papillae dorsolaterally placed on pleonal segment I ..... ***Phyllodurus***

Fig. 512. *Phyllodurus abdominalis* (Stimpson) (14 mm)

Range: Puget Sound, Washington to San Francisco Bay, California

The species is parasitic on the ~~crab~~ *Upogebia pugettensis*. mud shrimp

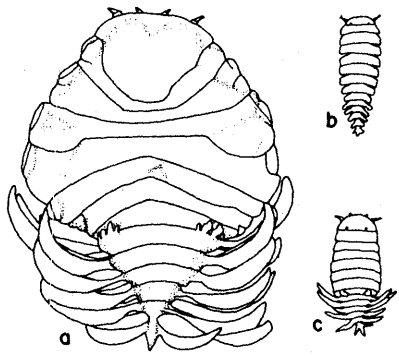


Figure 512. a. *Phyllodurus abdominalis*. b. Male. c. Juvenile female.

Phyllodurus robustus = *Pseudione upogebiae*

13a. All pleopods triramus ..... ***Stegophryxus***

Fig. 513. *Stegophryxus hyptius* (Thompson) (9.1 mm)

Range: Massachusetts and Rhode Island & Georgia.

The species is a parasite on the abdomen of the hermit crab, *Pegurus longicarpus* which is found on the shore and in shallow water. The crab is also host of another isopod of the family Entoniscidae, *Paguruitherium altum* (p. 346), an endoparasite. Also infests *P. annulipes* in N. Carolina & Georgia; and *P. bonairensis* & *P. miamensis* in Florida.

Stegophryxus hyphalus: So. Calif. to Baja

see Markham, 1974 for review of genus

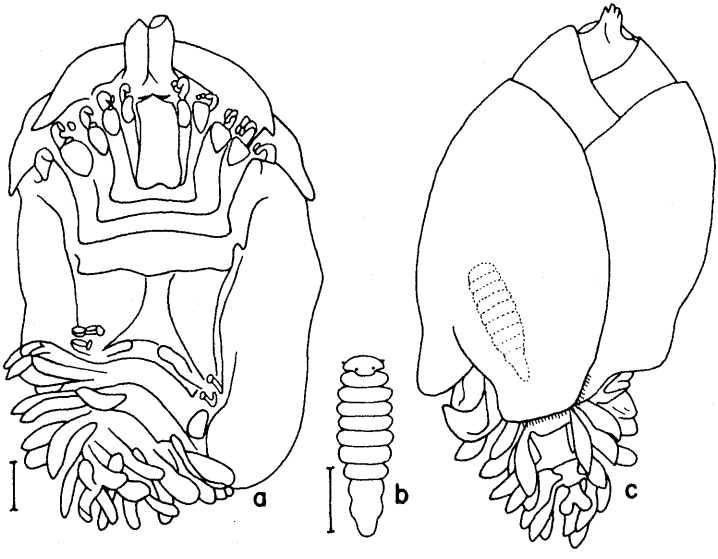


Figure 513. a. *Stegophryxus hyptius*. b. Male. c. Ventral view.

13b. Only anterior three pleopods triramus ..... *Stegias*

Figs. 514 and 515. *Stegias clibanarii* (Richardson) (16 mm)
Range: Bermuda
The host species is *Clibanarius tricolor*.

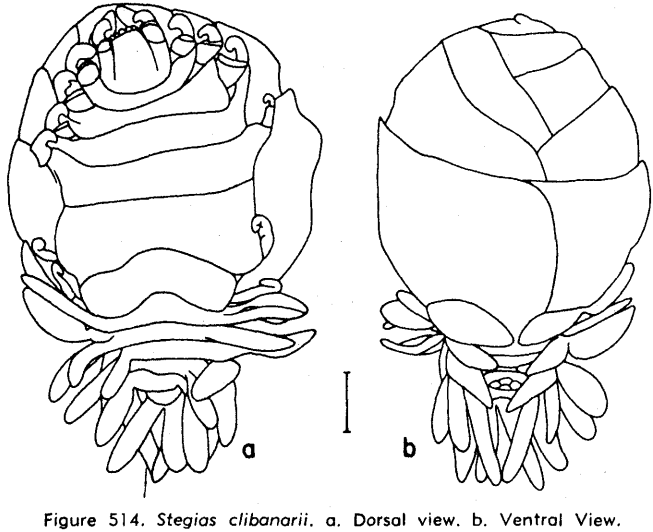


Figure 514. *Stegias clibanarii*. a. Dorsal view. b. Ventral View.

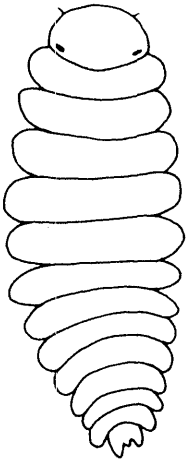


Figure 515. *Stegias clibanarii* (male).

14a. Pleopods very long; pleonal lateral edges usually moderately long; telson or pleotelson with long rami 15

14b. Pleopods short, rudimentary or absent; pleonal lateral edges short; telson or pleotelson never with distinct rami 23

15a. Peraeonal segments I to III with secondarily produced posterolateral edges at least on long body side, and secondarily produced posterolateral edges on both edges of segments IV to VII; pleonal segments with lateral margins rounded ..... *Argeia*

Figs. 516 and 517. *Argeia pugettensis* (Dana) (14 mm)

Range: Bering Sea to southern California

At times half a population of shrimp have been recorded to have the parasite in their branchial chamber. Shrimp of the family Cragonidae are the hosts. *Argeia pauperata* Stimpson (14 mm) from San Francisco Bay and parasitic on *Crago franciscorum* has been considered to be a separate species although it is very similar to *A. pugettensis.*

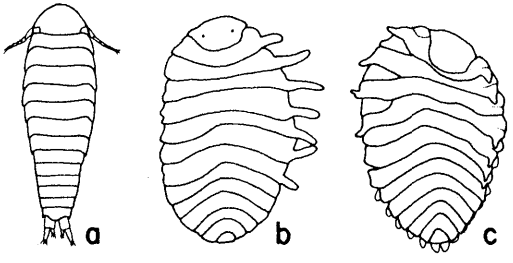


Figure 516. a. *Argeia pugettensis,* larva. b. Juvenile female d. Young female.

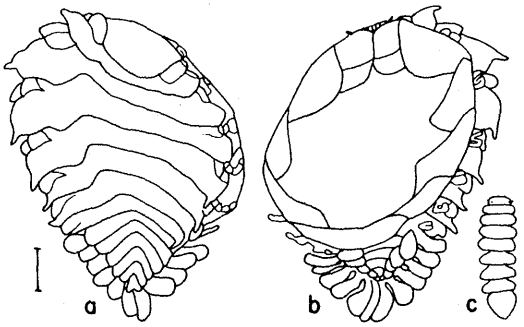


Figure 517. a. *Argeia pugettensis* (gravid female). b. Ventral view. b. Male.

15b. Not as above **16**

16a. Pleonal segments with lateral edges short and lateral margins square ..... ***Parageia***

Fig. 518. *Parageia ornata* (Hansen) (7 mm)

Range: Acapulco, Mexico

The species is parasitic on the shrimp *Sclerocrangon procax.*

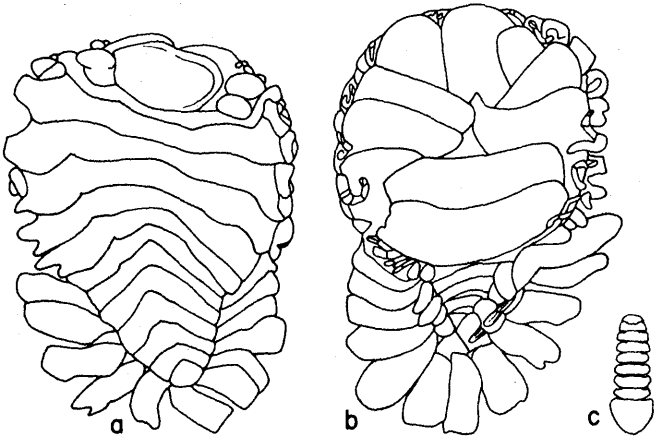


Figure 518. a. *Parargeia ornata.* b. Ventral view. c. Male.

16b. Pleonal segments with lateral edges moderately long and lateral margins various (for example, square, lobular, secondarily produced, etc.) ..... ***Pseudione***

GENUS PSEUDIONE

The genus contains species that are parasitic on crabs and shrimp. The species constitute one of the most widespread groups of parasitic isopods, and when they are more closely examined they will probably be separated into several genera. They are most commonly encountered in the branchial cavity of hermit crabs, but they are occasionally found in shrimps.

KEY TO SPECIES OF PSEUDIONE

17a. With eyes; cephalon ovate ..... *P. trilobata*

Fig. 519. *Pseudione trilobata* (Nierstrasz and Brender) (3 mm)

Range: Curacao, Dutch West Indies

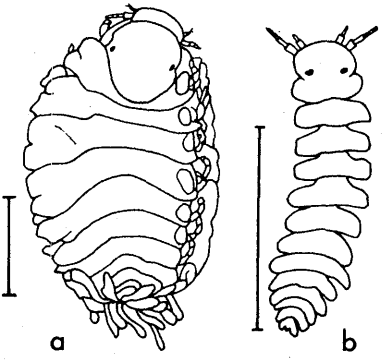


Figure 519 a. *Pseudione trilobata*. b. Male.

17b. Blind; cephalon not ovate **18**

18a. Pleopods digitate ..... *P. upogebiae*

Fig. 520. *Pseudione upogebiae* (Hay) (1¹ mm)

Range: Beaufort, North Carolina

The species is a parasite of the gill chambers of the shrimp *Upogebia affinis*. The distinct digitate pleopods distinguish the species from other species in the genus. When more observations are made, the peculiar pleopods might serve as criteria for establishing a new genus.

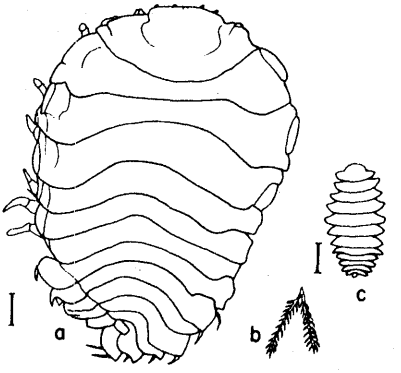


Figure 520. a. *Pseudione urogebiae*. b. Detail, pleopod. c. Male.

Markham (1974) placed Phyllodurus robustus
Pearse (1953) into jr. synonomy with Pseudione
upogebiae.

18b. Pleopods not digitate **19**

19a. Posterior part of body abruptly narrower than anterior part; pleonal secondary lamellae not distinct ..... *P. giardi*

Fig. 521. *Pseudione giardi* (Calman) (12 mm)
Range: Puget Sound, Washington
The species is parasitic on the hermit crab *Pagurus ochotensis.*

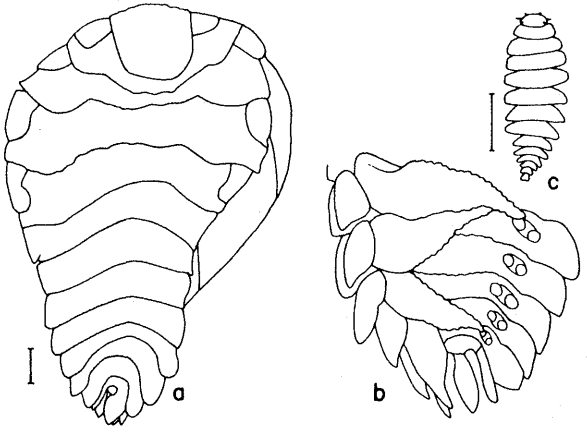


Figure 521. a. *Pseudione giardi.* b. Ventral view, posterior part. c. Male.

19b. Posterior part of body narrower, but not abruptly narrower, than anterior half; pleonal secondary lamellae various **20**

20a. Pleonal terga produced to narrow secondary lappets ..... *P. curtata*

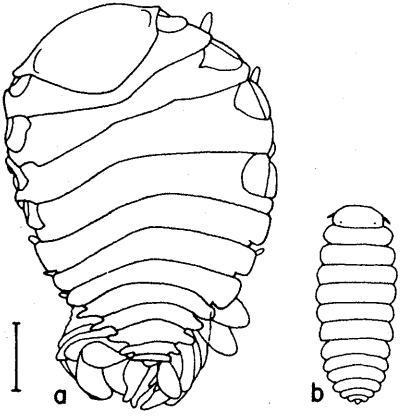


Fig. 522. *Pseudione curtata* (Richardson) (5.5 mm)
Range: Key West, Florida

Only one specimen of the species was taken from the branchial cavity of the crab *Petrolisthes sexspinous.*

Figure 522. a. *Pseudione curtata.* b. Male.

20b. Pleonal terga not produced or produced into large secondary lamellae **21**

21a. Pleonal terga not produced into large lamellae **22**

21b. Pleonal terga produced into large secondary lamellae ..... *P. galacanthae*

Fig. 523. *Pseudione galacanthae* (Hansen) (11 mm)

Range: Gulf of California to Washington State

The species was found in the branchial cavity of the galatheid crab *Munnida quadrispina.*

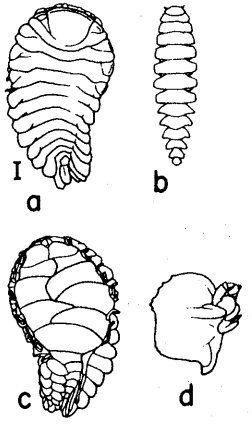


Figure 523. a. *Pseudione galacanthae.* b. Male. c. Ventral view. d. Oostegite 1.

22a. Pleotelson with elongate appendages ..... *P. furcata*

Fig. 524. *Pseudione furcata* (Richardson) (11 mm)

Range: Virginia

Host unknown.

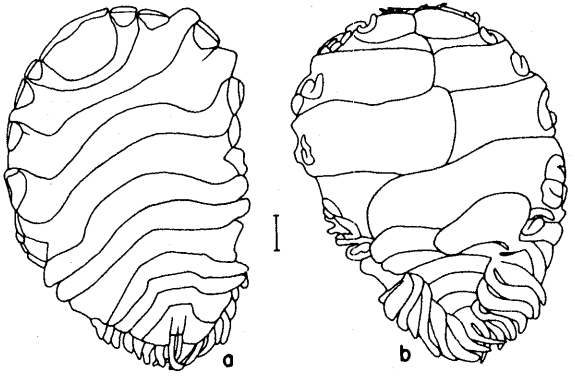


Figure 524. a. *Pseudione furcata.* b. Ventral view.

Menzies, R. J. and D. Frankenberg 1966. Handbook on the Common Marine Isopod Crustacea of Georgia. Univ. Georgia Press, pp. viii-93.

An account of isopods collected in a small region on the Atlantic coast with good figures of the species.

Menzies, R. J. and P. Glynn 1968. The common marine isopod Crustacea of Puerto Rico: A handbook for marine biologists. Stud. Fauna Curagao and other Carib. Isl., 27:1-133.

Unfortunately the author did not see this reference in time to incorporate it into the text. There are 44 species described—14 are new species and three are in new genera.

Monod, T. 1926. Les Gnathiidae, Essai Monographique (Morphologie, Biologie, Systématique.). Mem. Soc. Sci. Nat. Maroc, 13:1-667.

The summary of all knowledge on the gnathiids until 1926.

Richardson, H. 1904. Contributions to the natural history of the Isopoda. Proc. U. S. Nat. Mus., 27:1-89.

Richardson, H. 1904. Contributions to the natural history of the Isopoda (Second Part.). Proc. U. S. Nat. Mus., 27:657-681.

The two references to the work of Richardson contain a very good general account of the biology of isopods.

Richardson, H. 1905. Monograph on the isopods of North America. Bull. U. S. Nat. Mus., 54:liii-727.

It is essentially this monograph plus the added work from its publication until the present that forms the basis of this book.

Wolff, T. 1962. The systematics and biology of bathyal and abyssal Isopoda Asellota. *Galathea* Report, 6:7-320.

The latest, most comprehensive study of all Asellota.

INDEX AND PICTURED-GLOSSARY

A

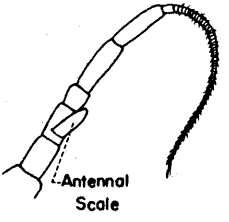


Figure 562. Antennal scale (Antenna two).

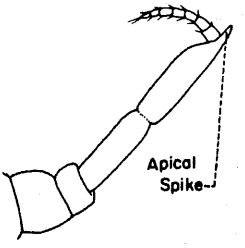


Figure 563. Apical spike (*Antennulonis-cus*).

B

C

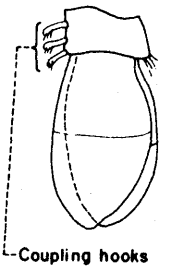


Figure 564. Pleopod with coupling hooks on basis.

D

E

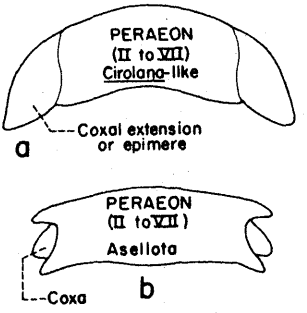


Figure 565. Coxa and coxal extensions (epimeres) on peraeonal segments. a. General Flabellifera. b. Some Asellota.

F

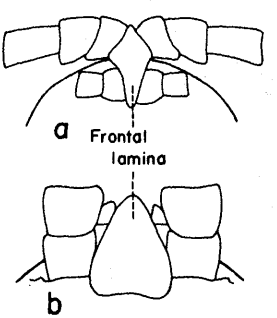


Figure 566. Frontal lamina between antennae (ventral view). a. *Eurydice*-like. b. *Antennuloniscus*.

G

H

L

M

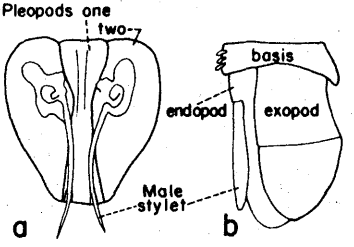


Figure 567. Male sexual pleopods 2. a. Asellota (Paraselloidea). b. General.

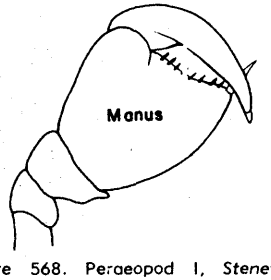


Figure 568. Peraeopod I, *Stenetrium*-like.

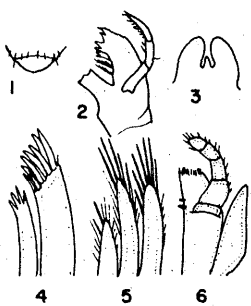


Figure 569. Mouth parts, 1-6 anterior to posterior. 1. Labrum. 2. Mandible. 3. Hypopharynx. 4. Maxilla one (Maxillula). 5. Maxilla two. 6. Maxilliped.

N

O

P

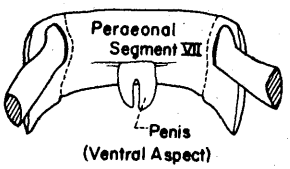


Figure 570. Penis on peraeonal segment VII (ventral view).
type 1-5.

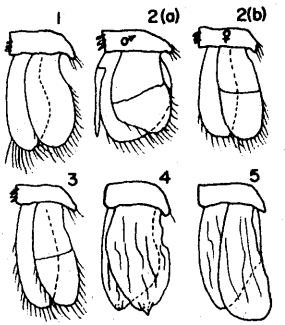


Figure 571. Pleopods — Sphaeromatid

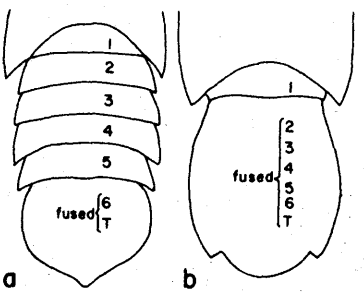


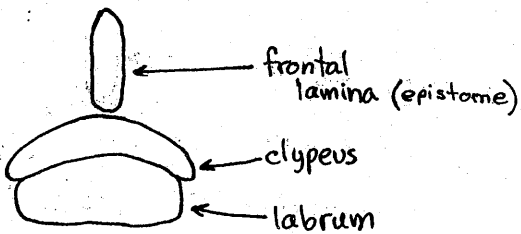
Figure 572. Fusion of pleonal segments. "T" equals telson. a. Generalized. b. Asellota.

R

S

unguar	
penis	penes
masculinum	masculina
mobilis	mobiles

of percon, pereonite & pereopod corresponds with tanaid workers (Torbin Wolff, L. Gardiner, J. Sieg, R. Winn)

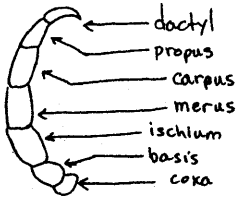


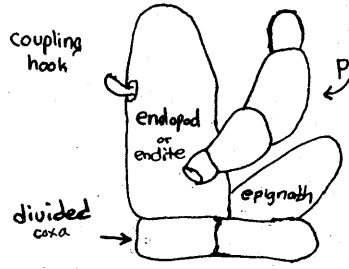
Isopods with first coxal plate free (not fused to somite)

- Bathynomus
- Anuropus
- Plakarthrium
- some asellotes & some epicarids
- Some phreatoicids

Isopods with appendix masculinum attached distally on endopod

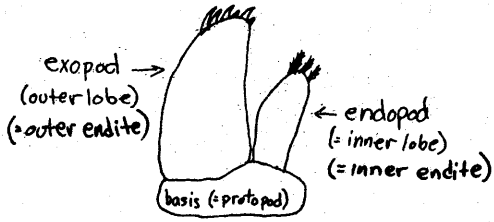
- Plakarthrium (mediodistally on endopod)
- serolidae
- cerceis, Paracerceis, Geocerceis
- Cleantioides (medially on endopod)



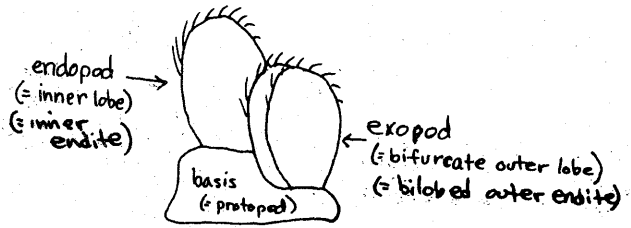


Maxilliped

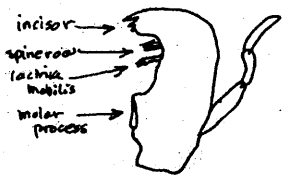
endopod = blade; endite; endognath; basis
epignath = epipod; exite

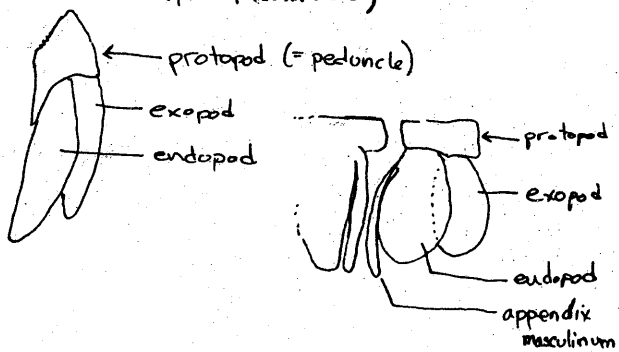


Maxilla 1
(= maxillule)
(= maxillula)
(pl. = maxillulae)



Maxilla 2
(pl. = Maxillae)





Pleopods: Trille (1972) [& Calman & Kaestner] claims anterior (= ventral) plp. is exopodite; posterior (= dorsal) plp. is endopodite (w/appendix masculinum). Hale (1929) agrees.

Antenna 1: generally of 3 peduncular articles.

Antenna 2: generally of 4-5 peduncular articles (actually 5-6 but basalmost article not visible, except in some asellotes

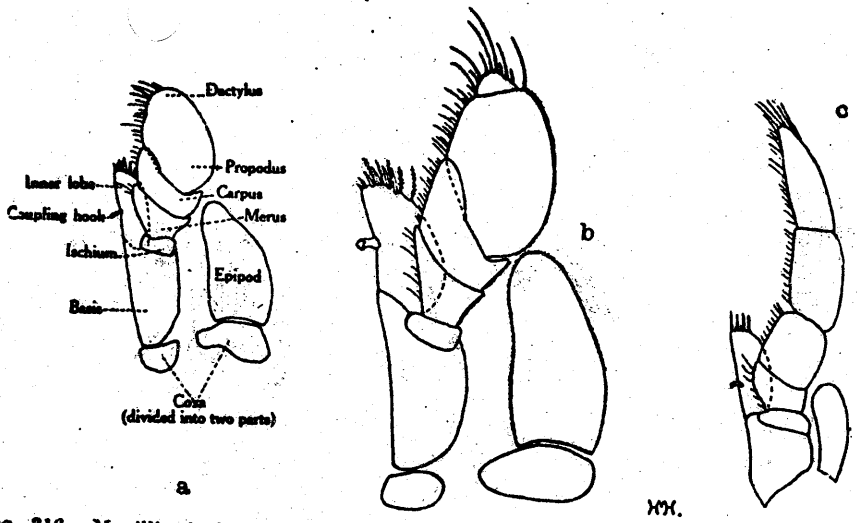


FIG. 316.—Maxilliped of (a) *Euidotea peronii*, (b) *Synischia levidensis* and (c) *Crabyzos longicaudatus* (x 16-40).

from Hale (1929)

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