J.D. THOMAS

Department of Invertebrate Zoology
National Museum of Natural History
Smithsonian Institution
Washington, D.C., 20560

State of Florida
Department of Environmental Protection
Tallahassee

Publication of this document was funded by a grant from
the Clean Water Act 205(j)(1)

Final Report for DEP Contract Number SP290
September 1993

Identification Manual for the Marine Amphipoda: (Gammaridea)

I. Common Coral Reef and Rocky Bottom Amphipods of South Florida

James Darwin Thomas, Ph.D.
MRC 163 - Crustacea
Smithsonian Institution
Washington, DC 20560

James L. Hulbert, Project Manager
Surface Water Ambient Monitoring Program
Division of Water Management
Florida Department of Environmental Protection

Requests for copies of this document should be addressed to:

Florida Department of Environmental Protection
Division of Water Management
Bureau of Surface Water Management
2600 Blair Stone Road
Tallahassee, Florida 32399
Phone 904-921-9911
Orlando, FL 32803

ABSTRACT

Amphipods are one of the dominant macrobenthic crustaceans of coral reef ecosystems. They are also one of the major ecological components. Despite these factors, very little is known of their ecology within the reef system and there is a lack of published taxonomic materials and keys treating the taxonomy of coral reef amphipods. This identification guide is intended to serve as a starting point for the non-specialist seeking to identify the more commonly occurring gammarid amphipods found in the coral reefs of the Florida Keys.

52 species of amphipods are presented with distributional notes and ecological information. These species consist of the more common taxa and represent approximately one-third of the total number of coral reef amphipod species found in Florida Keys Reefs. Illustrations of whole animals or diagnostic appendages are provided for each family, genus, and species. Of the taxa treated in this guidebook, 19 species and three genera were recognized as new to science at the initiation of this study. With the exception of several problematical species, all new taxa have been described to allow their inclusion in this guidebook. Numerous new records and range extensions for previously described species are also noted.

TABLE OF CONTENTS

INTRODUCTION

The need for identification guides to all tropical marine invertebrate groups has long been recognized. Aside from the corals and molluscs, there exists little comprehensive material to aid the non-specialist, and identification guides written specifically for coral reef fauna and flora are almost non-existent. Many new ecological data were gathered during the collecting phases of this publication.

The gammaridean Amphipoda are the dominant group of pericaridan crustaceans in the shallow seas of the world, including the tropics. Gammarid amphipods are small in size (1-8mm), free-living, shrimp-like crustaceans found nestling in crevices, burrowing in sediments, hovering or swimming above the substrate, and living in fixed or mobile habitats (tubes). Gammarid amphipods are important food items for certain groups of fish. Amphipods constitute a significant part of the demersal plankton, and inhabit virtually every available substrate on the reef. A number of species are nestlers among algae and seaweeds. Many species are found tucked away among the various crevices of live coral and coral rubble in reef complexes. Invertebrate hosts (in particular, sponges and tunicates) house a variety of commensal amphipods, the majority of them undescribed. Amphipods lack a larval stage, and tend to exhibit a high number of endemic species per geographical province and thus lend themselves to comparative biogeographic studies through species assemblage patterns.

The Amphipoda of the tropics in general, and coral reefs in particular, have never been the subject of intensive systematic study (Barnard, 1976). This lack of systematic activity is due in part to the fact that few specialists have resided in the tropics. As a result, most studies have been based on museum collections, whose materials can be inadequately collected, poorly preserved, and/or damaged. An obstacle hindering the taxonomic study of the coral reef Amphipoda is the physical collecting difficulties presented by the reef itself. Spread over large areas and varying depths, the reef presents a complex array of macro and microhabitats (live coral, coral rubble, turf algae, sessile invertebrates, reef-derived sediments), and can defy all methods of standard sampling techniques. Thus, the amphipod fauna of coral reefs, believed by many researchers to be depauperate, is in fact very rich, exceeding amphipod populations of other marine habitats. Adequate and representative collections can be made only with use of SCUBA, where specific sites and habitat types can be carefully sampled. For initial surveys the "formalin wash" technique of sampling (placing samples of specific habitats that have been collected and isolated underwater into a container of seawater laced with a small amount of formalin which drives the amphipods from cover). Elutriation with an air/water mixture captures amphipods and other small invertebrates in a surface film where they can be decanted into a straining device, (0.5-1.0 mm mesh size) This technique can be utilized on a variety of substrates to determine specific habitats and yields large numbers of undamaged specimens.

Identification of tropical amphipods is difficult owing to the scattered literature (much of which is old and unavailable) and the small size and fragile nature of the specimens. Proper identification to the specific level is tedious and usually requires the dissection and observation of various appendages by a specialist. J.L.Barnard (1970 a,b, 1971, 1972) has made strides in defining the amphipod fauna of the Indo-Pacific. The tropical Atlantic has received little attention from amphipod workers except for the early descriptive efforts of C.R. Shoemaker; 1926, 1933 a,b, 1934, 1935, 1943, 1956). Coral reef amphipods have never been the subject of detailed systematic study in the tropical Atlantic. A large number of species are undescribed and many known species are poorly described and inadequately figured. Therefore, much descriptive and revisionary work is needed before major monographic or faunistic treatments are attempted.

Gammarid amphipods are primarily non-parasitic, benthic inhabitants. The wide range of habitats found at any coral reef (sediment, seagrasses, sessile invertebrates, various types of algae, coral rubble, etc.) provide a diverse range of microhabitat. There is a pelagic amphipod component consisting primarily of the reproductive stages of certain amphipod species that rise from the reef at night and are associated with lunar phases. Some amphipods collected in great numbers during this migration into the water column are never taken in significant numbers at any other time.

Sexes are separate in amphipods although no cases of hermaphroditism have been reported (see Thomas and Barnard, 1983; Lowry and Stoddart, 1986). Amphipods hatch as small representatives of adults. The young are brooded in a thoracic pouch (marsupium) by the female and may even pass through several molts before leaving the relative safety of the brood pouch. Sexual dimorphism is usually pronounced in adults, with males generally bearing larger and more developed appendages. For this reason, males are preferred in identification. In some families the dimorphism is so pronounced that males and females have sometimes been assigned to separate families.

Amphipods are distributed according to habitat, available food supplies and specific feeding adaptations. While methods of feeding are diverse they fall into three general types; filter feeders, grazers, and gleaners. Filter feeders make use of a feeding current (generated by beating of the pleopods, or, in the case of a commensal, by the host) to trap food particles on setae lining the large gnathopods, antennae, and mouthparts. The animals usually concentrate the feeding current either by choice of habitat (i.e. a tube, or by living inside another filter feeding invertebrate such as a sponge or sea squirt), or by body morphology (enlarged anterior coxae which effectively enclose the animal and concentrate the current). The food material usually consists of fine particulate material carried in the feeding current. Filter feeders are usually found on the underside of coral rubble, along the underside of the ledges in the forereef, or inside sessile invertebrates (sponges and sea squirts). While they live in a relatively protected habitat, the constant wave action on the exposed portion of the substrate continually stirs up food particles which can be collected on the network of long setae, and ingested.

Grazers usually crop unicellular algae, diatoms, and other epiphytic growth from various substrates. Under certain conditions amphipods can consume epiphytic growth at a rate that may control the dominance of certain small fleshy algae. The population levels of this particular group of amphipods is directly related to the abundance of algal growth, especially in the shallow waters of the backreef zone. The die-off (summer, 1983) of the long-spined sea urchin *Diadema antillarum* significantly affected algal growth in the shallow rubble and backreef zones, allowing luxuriant growths of algae and the associated amphipods to flourish.

The last feeding category, gleaners, consists of amphipods that inhabit sediments (surface of sediment or active burrowers) and process them for the microbial flora and fauna associated with the outer surface of the constituent sediment grains. This group is usually found in the sandy areas between the fingers of the forereef, or in pockets of sediment in "blowouts" or holes in *Thalassia* beds in the lagoon.

ECOLOGY

Amphipods are primarily benthic animals, although they are represented by pelagic components (usually a reproductive stage). Types of benthic amphipods include; tube dwellers, nestlers, algal inhabitants, commensals, and fossorial (either burrowing in the sediment or inhabiting the surface layers). Pelagic amphipods are usually found in the water column during periods of reproductive activity. Some pelagic constituents are demersal infaunal tube-dwellers that enter the water column periodically (Ampeliscidae), or those that are normally found in the nighttime plankton on the reef (Synopiidae and Phoxocephalidae).

The ecology of amphipods in reef systems is defined more precisely by microhabitat conditions rather than general macrohabitat designations. This presents a problem in listing ecological habitats. An amphipod species may be collected from lagoon and the fore-reef sites (two different macrohabitat areas) and yet the microhabitat may be the same in both, e.g. the underside of coral rubble. Ecological information in this guidebook is presented at the most specific habitat level known for each particular species.

For coral reefs of the Florida Keys, the following terms are used: rubble zone, lagoon, and forereef. The rubble zone (or backreef) is the accumulation of coral and sand and is usually very shallow, occasionally intertidal. The rubble zone consists primarily of accumulations of coral rubble with myriad microhabitats provided in the surface growth of epiphytes and small internal cavities in the rubble. The lagoon region consists of shallow areas landward of the reef crest. Isolated patch-reef components, *Thalassia* beds, and pockets of sediment are found here. The forereef is the area of prominent spur and groove formation. Specific information on collection sites is presented for each species, the shallowest portion of which is the reef crest. (ie. undersides of ledges or overhangs, sediment between fingers, associates with sessile invertebrates). Other areas outside the core area within the Sanctuary boundaries will undoubtedly turn up a number of new additions to the list of amphipods found, but this treatment assumes the majority of initial scientific activities will focus in the core area of the Sanctuary. Other sites such as the deep reef, and patch reef systems north of the core area can be studied at a later date.

MORPHOLOGY

Amphipods are laterally flattened pericaridan crustaceans that lack a carapace and have seven distinct thoracic segments. They exhibit direct (lacking complex larval stages) development. The body is divided into three major regions; head, pereon (thorax), and abdomen (pleon). Gammaridean amphipods are distinguished by their flattened lateral shape, possession of three pairs of pleopods (swimmerets), and three pairs of uropods on the urosome. The head bears two pairs of antennae; the first three articles of the first antenna, and the first 5 articles of the second antenna, form the peduncle. The remaining smaller articles are referred to as the flagellum. The first antenna typically bears a small multisegmented article, the accessory flagellum. It can be seen arising from the base of the third peduncular segment and its presence or absence is an important taxonomic character.

Mouthparts.--The mouthparts project ventrally in a conical or cuboid bundle. Mouthparts will be summarized here, but the reader is again referred to Barnard (1969) and Barnard and Karaman, 1992 for amplification.

Upper lip: Usually a simple rounded flap forming the anterior margin of the mouth.

Lower lip: A lobate, bilaterally symmetrical flap forming the posterior margin of the mouth. Both the upper and lower lips are difficult to observe and dissect, and will not be used as diagnostic characters in this guidebook, but are included here for discussion.

Mandibles: A pair of structures enclosed by the upper and lower lips, and attached laterally, providing the conical shape exhibited by the mouthpart bundle. They are large and sclerotized (hardened) and can be difficult to remove due to insertion of large muscle fibers at their base. The distal end is usually formed into a series of teeth for cutting (incisor). A raised molar with a grinding surface of varying texture is located on the medial surface of the mandibles. In most gammarideans a three-segmented palp is attached basally on the lateral margin. The presence or absence of this palp and the shape of the third article is important.

First maxillae: Paired appendages posterior to the lower lip, consisting of inner and outer plates and a 1-2 articulate palp arising from the outer plate.

Second maxillae: Paired of lobate structures posterior to the first maxillae. Comprised of inner(medial) and outer(lateral) plates, generally with setose medial and apical margins.

Maxillipeds: The rearmost structure in the mouth part field, each member of this basally fused appendage consists of an inner and outer plate and a recurved, four-segmented palp.

Pereon.--The pereon (thorax) bears the seven pairs of legs (pereopods), the first two pairs of which are modified and called gnathopods. Gnathopods have various uses, among these are feeding and grasping the female during reproduction (amplexus). Commencing with the third pair of legs are pereopods 3-7. All thoracic appendages consist of seven segments and the reader should become familiar with their names and segment numbers as their morphology is frequently used in identification. The coxae, or side-plates (especially coxae 1-4) form part of the lateral shield and appear to be more part of the trunk than an article of an appendage. The general shape and configuration of coxae should be noted. At times, the rear margin of coxae can be difficult to observe but it is almost always visible in freshly collected material. Female amphipods bear brood plates (oostegites) basally on the medial surface of coxae 2-5. Small sac-like structure called coxal gills are found on the medial surface of coxae 2-7. Refer to the figures (1-3) for details of typical gnathopods and pereopods.

Pleon.--Following the pereon is the pleon (abdomen) which bears ventrally three pairs of biramous pleopods. Pleopods are used for swimming in the more motile amphipod species, or in respiration and generation of feeding currents in the more sedentary representatives. The lateral margins of the pleon (side plates) are referred to as epimera 1-3. Various features of the posterior margin of epimeron 3 are used in identifying certain amphipod groups. This detail can be observed by lifting or rotating the urosome dorsally to reveal a gap behind epimeron 3. Dorsal teeth and sculpturing can occasionally be an important feature of the pleon.

Urosome.--A compressed set of three segments, each bearing a pair of biramous (usually) appendages called uropods. Uropods are of primary taxonomic importance and the user should be familiar with all aspects of their structure. They are easily dislodged with rough handling so care must be taken when collecting, sorting, and preserving samples so the uropods remain attached to the specimen. The telson is a dorsal flap situated dorsal and posterior to the base of the third uropods. It is also an important taxonomic feature, depending whether it is cleft or entire. The telson may be difficult to detect if laminar, but can be easily lifted with the tip of a forceps, or barely moved if fleshy.

COLLECTION AND PRESERVATION

Much effort can be saved in the identification process if specimens to be identified are in good condition with all appendages intact. Taking precautions in the collection and sorting of amphipods will result in fewer problems when making identifications. It is preferable to make a number of small collections from specific habitats rather than undertaking an extensive sampling program in which information of specific habitats and ecological information is not adequately recorded. Specimens are more susceptible to damage in large scale collecting programs. There are two choices in collecting for any group of animals, that is whether live or preserved material is desired. Collection of live amphipod material is not difficult once specific habitats have been determined, but should be avoided until habitat information is known. Initially, a general sampling program of various representative habitats and substrate types is recommended. The following collecting procedures can be used in a variety of systems and habitat types.

An easy method to obtain large numbers of amphipods for study is to employ the formalin wash technique on various substrates. This is accomplished by lacing a container (the ubiquitous plastic five gallon plastic bucket with lid is an excellent choice) of sea water with a small amount of formalin (3-5 ml). Various substrate (rubble, sediment, coral fragments, algae, etc.) are then placed in the container with the formalin-sea water mixture for several minutes. The formalin solution, is not sufficient to kill the amphipods immediately, but drives them from hiding where they then fall to the bottom of the container. Two or three buckets of substrate should produce several hundred to several thousand specimens, depending on the substrate sampled. If the water is more than waist deep, the substrate must be collected and placed in the container while still underwater and covered with a tight fitting lid to prevent escape of the motile fauna while sampling continues. The materials can then be processed at the surface. I have used this method to depths of 160 feet with excellent results. If SCUBA is being used simply take several containers down with you, or arrange for an assistant on the surface to raise the bucket by an attached line by some predetermined signal. The container can be emptied and returned to the bottom to be filled and emptied as many times as necessary.

To avoid damage, specimens should be rough sorted (separated from other debris) immediately. This is accomplished by an elutrification process that traps the amphipods (and other small animals) in a surface film where they can be gently decanted and preserved for later examination. Large rocks and other debris, such as macro algae should be removed by hand prior to processing the sample. Gently pouring a stream of water from another container into the bucket containing the specimens aerates the water, trapping the small, soft-bodied animals in the surface film. The specimens can then be gently poured off into another small container or sieve with a mesh bottom (0.5-1 mm) and rinsed into a jar, petri dish, or ziplock bag with a squirt bottle. Repeat this elutriation process 2-3 times, or until no more animals appear on the surface. This manner of separating the small organisms works especially well in sediments. Stirring of the sediment sample while water is being introduced will effectively trap most of the infaunal amphipods on the surface film. A majority of animals separated and retained by this method will be amphipods.

To collect live material, use the separation techniques mentioned above but omit the formaldehyde. Also, be sure to provide adequate amounts of fresh sea water so the animals will remain alive. Kept in loosely covered, clean glass containers, with twice daily changes of sea water, specimens should last 5-7 days. Avoid overcrowding of specimens.

Amphipods should be stored in a two percent formalin sea water mixture until they can be examined. This weak solution preserves the color patterns and prevents etching of the cuticle and finer structures that can take place at stronger concentrations. After examination the specimens should be stored in 70 percent ethanol which keeps the cuticle pliable. Do *not* store specimens in isopropyl alcohol, as it can produce an agglutinated surface film on the cuticle and appendages, rendering the specimens useless. Use only distilled water to dilute ethanol.

I will include here a brief note about the benefits of rapid examination of amphipods once the collections have been returned to the lab. Fresh material exhibits color patterns and densities that fade after several days. Some species treated in this guidebook have distinctive color patterns that can be used for species identification. After these patterns fade, only dissection and mounting of appendages can provide specific determinations. Therefore, rapid sorting, or at the minimum, recording of color notes and separation of specimens into individual containers will save tedious hours of work during later identification.

EXAMINATION

The following items of equipment are suggested for the examination of amphipods:

-microscopes (dissecting and compound)
-fine forceps (Inox 5) and fine sharpening stone
-small syracuse or Petri dishes, microscope slides (regular and depression),
coverslips (#I or II thickness)
-small sand grains, glycerine.

Specimens to be examined should be placed in a container and immersed in preserving fluid. Initial sorting and identification procedures should be conducted with a dissecting microscope capable of at least 25X magnification. When handling or transferring the amphipods it is best to grasp them with tweezers by the pleopods. Never grab the antennae as they are fragile in most species and will easily break. Direct and transmitted light (through a translucent microscope base) should be experimented with to determine which source best illuminates a particular feature. When observing large surface structures, direct light usually gives the best results, while small details on the margins of appendages (spines, setae) will show up better when illuminated from below by transmitted light.

If details cannot be accurately observed and interpreted using the dissecting microscope, then you should proceed to the compound microscope. To prepare a specimen (or appendage) for examination under the compound microscope place the specimen in a small amount of alcohol and add five to ten drops of glycerine. If severe shriveling occurs, immediately add several drops of alcohol to minimize this condition. Thereafter, add several drops of glycerine every 5-10 minutes until the specimen is in full strength glycerine and alcohol has evaporated. The specimen is then placed in a depression slide filled with glycerine and a coverslip put in place. If there is too much glycerine and the specimen tends to drift, use the twisted point of a paper towel to remove some glycerine from the margin of the coverslip. The specimen is now ready to be placed on the microscope stage for examination. Appendages can be dissected and mounted on standard slides in the same manner. For thick or asymmetrical appendages such as uropods and mandibles, a few sand grains scattered in the glycerine will allow the coverslip to float above the appendage and not crush it. One may also rotate the particular appendage by moving the coverslip. For a detailed discussion of dissection and handling of specimens see Barnard, 1969.

Acknowledgments

Portions of this publication are the result of research sponsored by grants from the National Science Foundation, (DEB-7715883; DEB-7920534; DEB-8121128; BSR-8515186; BSR-89-15688); and the Smithsonian Institution. Contract support was furnished by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, contract NA-82-AAA-01157. Publication of this document was facilitated by Florida Department of Environmental Protection Grant, DER-SP290.

The following persons provided field and laboratory assistance: James Bohnsack, Sharon Thomas, Deb Coulombe, and my summer marine biology classes from Seacamp of Big Pine Key. Dr. J.L. Barnard (deceased) kindly provided financial assistance and laboratory support.

Elizabeth Harrison-Nelson located original figures, inked new figures as needed, prepared the literature cited, and provided considerable editing assistance.

Linda McCann provided critical technical expertise, scanned all figures and assisted substantially with editing and final preparation of the paper.

USE OF KEYS

A note of caution regarding the use of the following keys; they are constructed artificially to allow ease of identification to family without dissection and mounting of mouthparts. Once isolated to family, the generic and specific diagnoses are relatively simple. The keys are intended for use in identifying amphipods from a specific region, and are therefore limited in application. While the family key may prove of general use in other areas, it is not all-inclusive or exhaustive in its treatment. Several well-represented amphipod families that occur in shallow bays and coastal systems of the Florida Keys are not included (Bateidae, Atylidae, Dexaminidae) because they are found only occasionally, if at all, in coral reef habitats of the Florida Keys. The user should be aware of the limitations of both the family key and the generic and specific keys, and not expect total success with rare or infrequently encountered species. It is my hope that the ease of use and rapid identifications made possible by this type of key will offset any disadvantages inherent in such an artificial construction.

This key has been produced with computer scanning technology and can be easily modified by users for subsequent changes and additions to taxa, or "regionalized" by including local variations in species, or by adding additional figures and text as required. In this manner, a key can be "tuned" to varying levels of user expertise and applications. Standardization of this format for identification will provide timely access and modification in an area previously restricted to users with specific taxonomic expertise.

Prior to a detailed observation of a specimen to be identified, several important characters should be quickly noted. These characters are: 1.--presence or absence of an accessory flagellum on antenna 1 (may require careful observation if small). 2.--general shape of telson, whether cleft, entire, or notched. 3.-- uropods 1,2,and 3 biramous or uniramous. 4.--general morphology of uropod 3 rami/ramus, whether scalelike, elongate, shortened, multiarticulate, or bearing hooked spines, and the proportion of ramus/rami to peduncular length. 5.--shape and position of the eyes. 6.--dominance of gnathopods 1 and 2, and type of chelation, i.e. chelate, subchelate, carpochelate, simple. 7.--in fresh material, any distinctive markings or color patterns.

Each family section includes the following; full species listing with author and date; synonymies; pertinent references (usually those that provide good figures); distribution of known species; and any remarks needed for clarification or comparative purposes. In the keys, generic characteristics are presented before specific diagnoses.

Figure numbers in parentheses identify particular whole animals or parts of animals. In the family key, figures to parts are found in the body of the key. Figures for families (usually whole animals) are located immediately to the left of the family name. Some figures are used more than once. A glossary of terms is provided on pages 73-74.

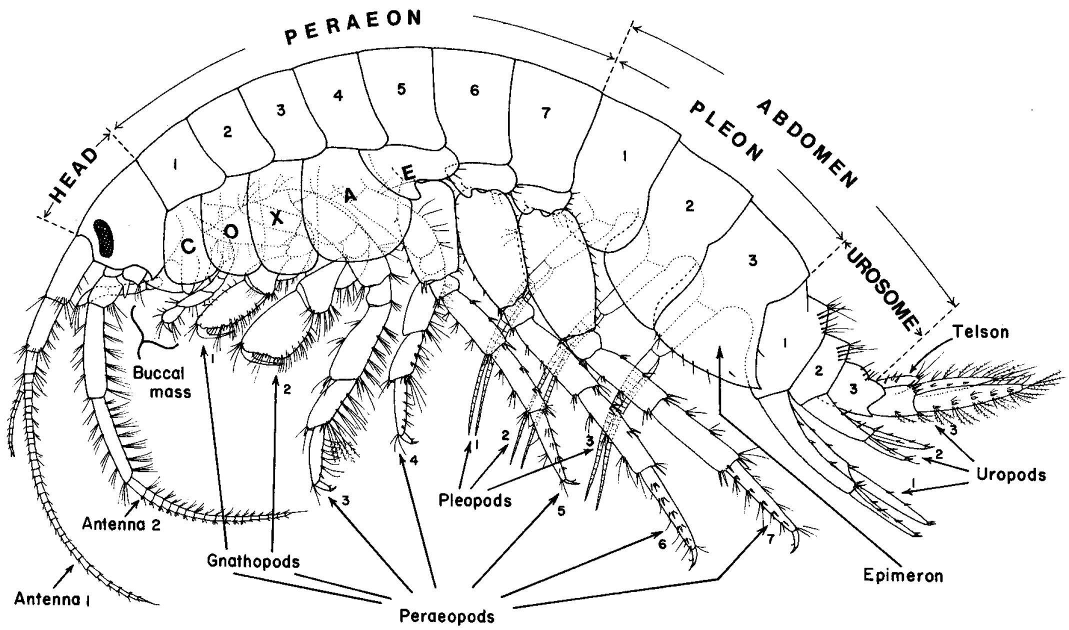


Figure 1. Basic Gammaridean Body Plan (Bousfield 1973, Cornell University Press).

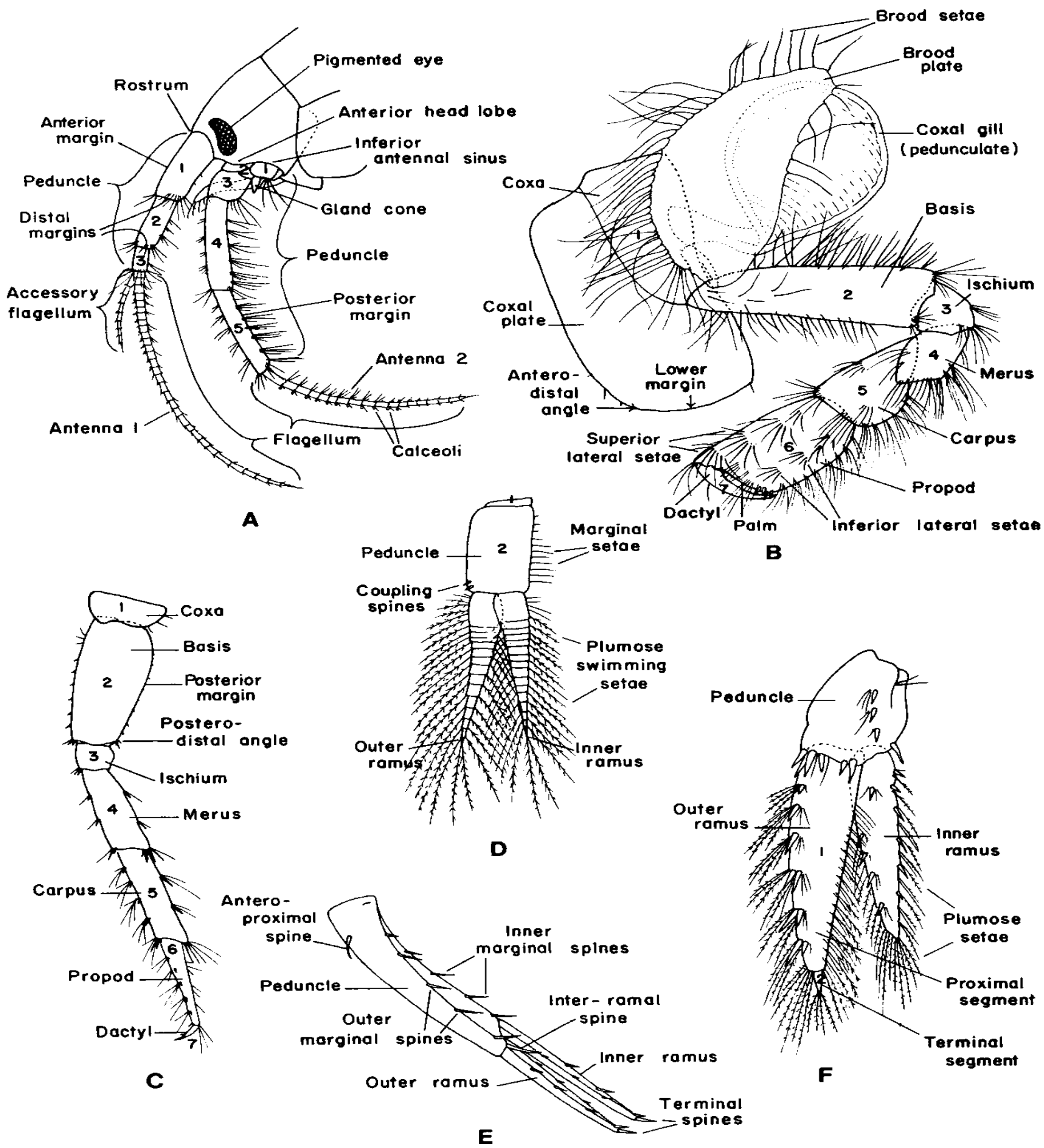


Figure 2. Terminology of basic gammaridean structures. A-F defined (from Bousfield).

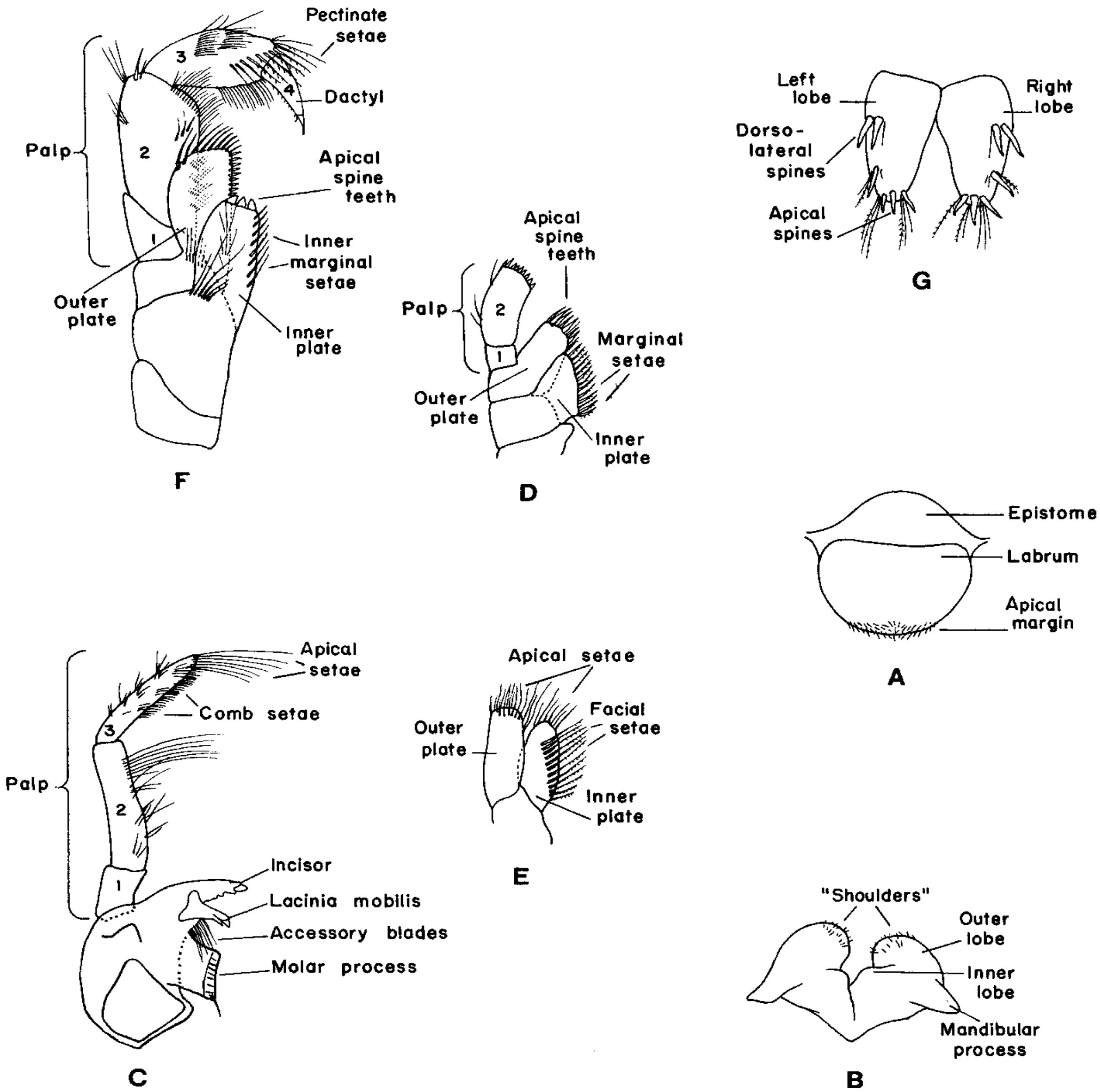


Figure 3. Mouthpart structure and terminology. A-G defined.

KEY TO FAMILIES OF FLORIDA GAMMARIDEAN AMPHIPODS

1. -- Eyes compound, a single eye on each side of the head 4

   -- Eyes not as above 2

2. --Eyes composed of 4 separate small corneal lenses (2 on either side of the head), overlying red internal pigment masses....................(Figure 4) AMPELISCIDAE

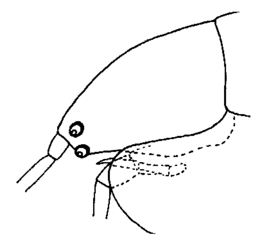


Figure 4

   -- Eyes fused dorsally into a single median eye (occasionally consisting of 2 partially-fused reddish crescents) (Figure 5) 3

Figure 5

3. -- 2-3 accessory ommatidia present below eye; gnathopods simple ....SYNOPIIDAE

   -- Accessory ommatidia lacking; gnathopods chelate or subchelate ....OEDICEROTIDAE

4. -- Article 3 of gnathopod 2 twice as long as article 4 (Figure 6)..............LYSIANASSIDAE

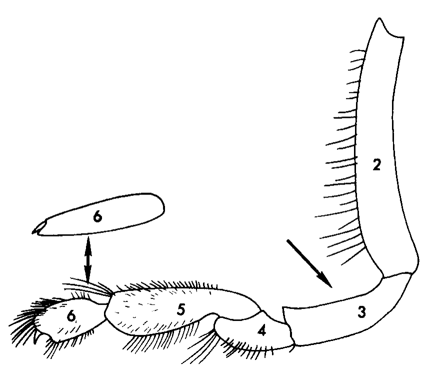


Figure 6

--Article 3 of gnathopod 2 equal to or less than article 4 5

5. -- Body strongly flattened dorsoventrally; coxae spread laterally; abdomenlexed beneath pereon ....(Figure 7) PHLIANTIDAE

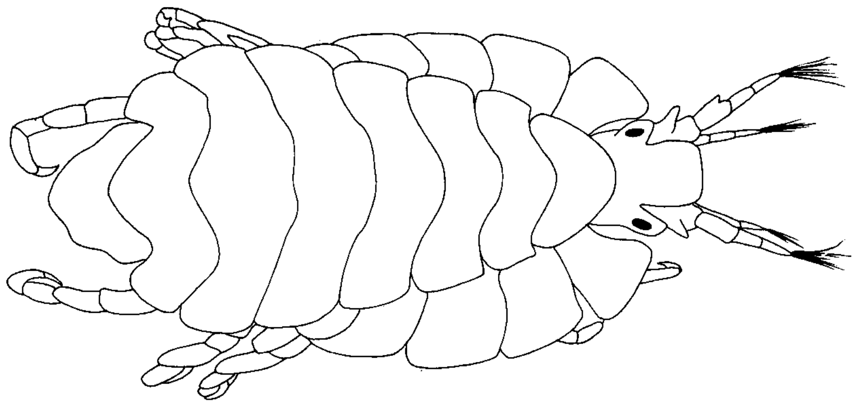


Figure 7

-- Body laterally compressed or vermiform, never dorsoventrally flattened; coxae vertical, abdomen variable 6

6. -- Body extremely flattened laterally; dorsum of pereon and pleon thin and sharp ....(Figure 8) OCHLESIDAE

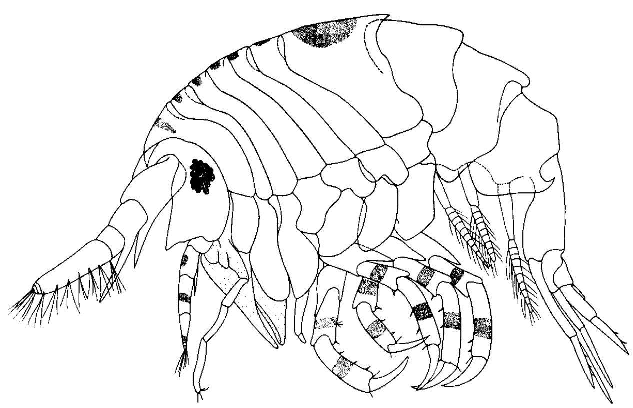


Figure 8

-- Body vermiform or normal, dorsum of pereon and pleon rounded 7

7. -- Body cylindrical; coxae reduced, barely touching serially 8

-- Body not cylindrical; coxae normal or enlarged, usually overlapping, (rarely reduced as in Podoceridae) 9

8. -- Coxae 1-4 wider than deep; eyes normal, composed of numerous ommatidia; gnathopod 1 reduced, simple ....(Figure 9) COLOMASTIGIDAE

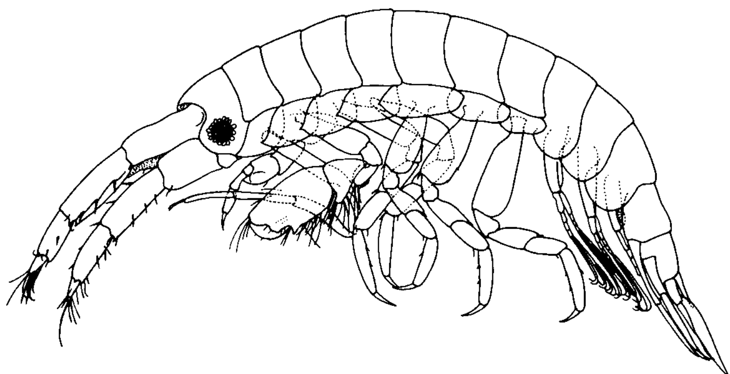


Figure 9

-- Coxae deeper than wide; eyes reduced, composed of few scattered ommatidia; gnathopods 1 and 2 chelate ....(Figure 10) SEBIDAE

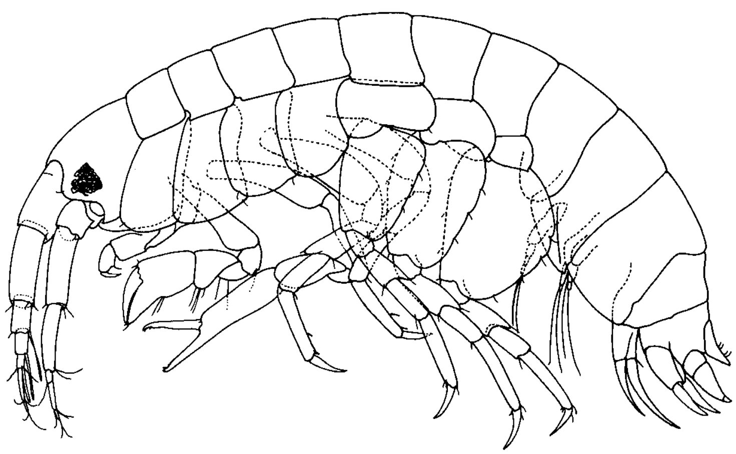


Figure 10

9. -- Pleosome and urosome strongly toothed (carinate), with dorsal carinae ....ACANTHONOTOZOMATIDAE

-- Pleosome and urosome not strongly toothed (carinate) dorsally 10

10. -- Coxa 1 reduced, partially or completely hidden by coxa 2 11

-- Coxa 1 normal, never hidden by coxa 2 13

11. -- Gnathopod 1 minute, chelate; gnathopod 2 greatly enlarged, carpochelate; mouthparts vestigial .... ANAMIXIDAE

-- Gnathopods 1 and 2 normal, subchelate; gnathopod 2 not greatly enlarged, mouthparts of normal size 12

12. -- Coxa 4 enlarged, much larger than coxae 2-3, posterior margin rounded;........................ uropod 3 uniramous, ramus 2-segmented (Figure 11) ........................STENOTHOIDAE

Figure 11

-- Coxa 4 only slightly larger than coxae 2-3, posterior margin excavate; uropod 3 biramous, outer ramus 1-segmented ....(Figure 12) AMPHILOCHIDAE

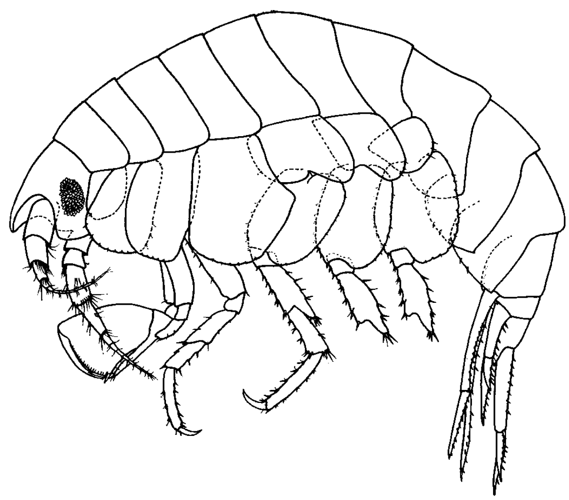


Figure 12

--Coxae 3 and 4 immensely broadened, forming large lateral shield, uropod 3, outer ramus 1-segmented ....(Figure 13) CYPROIDEIDAE

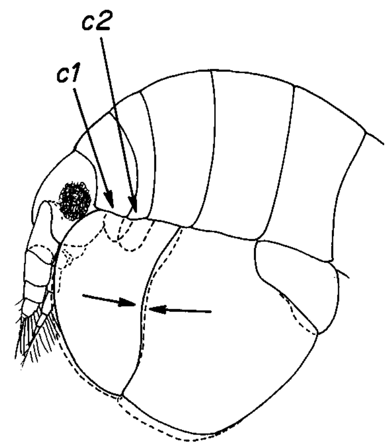


Figure 13

13.-- Gnathopod 1 much smaller than gnathopod 2, carpochelate ..............LEUCOTHOIDAE

--Gnathopod 1 large or small, but never carpochelate if smaller than gnathopod 2 14

14. -- Pereopods 5-7 strongly spinose (fossorial) 15

-- Pereopods 5-7 not fossorial 16

15. -- Eyes black, prominent; pereopod 7 shorter and of different structure than pereopod 6; rostrum strong, visor-like (Figure 14); body spinose, thickened, streamlined; pereopods heavily setose and spinose.................... PHOXOCEPHALIDAE

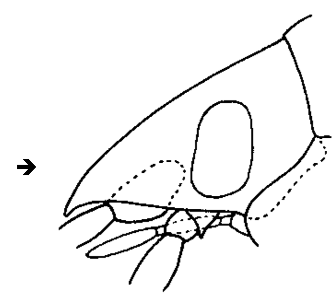


Figure 14

--Eyes black, small pereopod 7 larger and similar in structure to pereopod 6, rostrum strong, cylindrical (Figure 15); body thin, streamlined, pereopods moderately setose ....PLATYISCHNOPIDAE

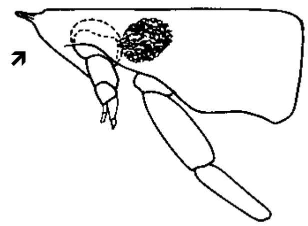


Figure 15

-- Eyes small, silvery (when visible); pereopod 7 about equal to pereopod 6; rostrum lacking; body barrel-shaped; pereopods densely setose and spinose .... (Figure 16) HAUSTORIIDAE

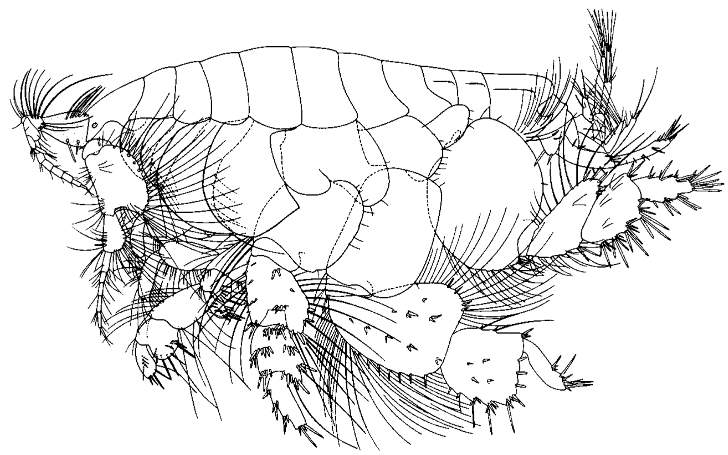


Figure 16, 60

16. -- Gnathopod 2 equal to or larger than gnathopod 1 17

-- Gnathopod 1 distinctly larger than gnathopod 2 ....AORIDAE

17. -- Article 2 of pereopods 5-7, posterior margin fully serrate (Figure 17);
elements of eyes diffuse...NUUANIDAE

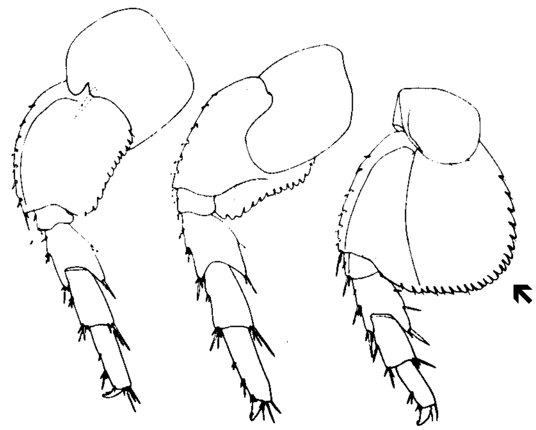
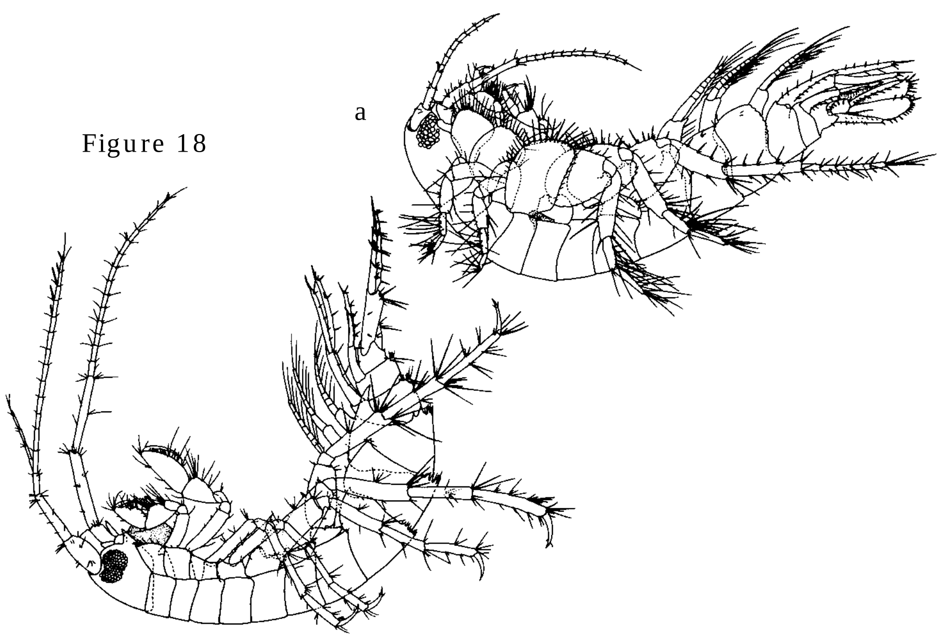


Figure 17

-- Posterior margin of article 2, pereopods 5-7 not serrate; elements of eyes
not diffuse 18

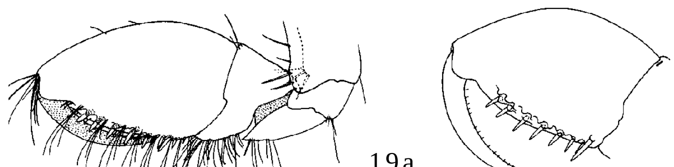
18. -- Uropod 3 rami subequal, elongate or ovate, longer than peduncle;
pleonites and urosomites serrate, bearing numerous teeth...
.... (Figure 18a,b) MELPHIDIPPIDAE

Figure 18



-- Uropod 3 rami not elongate, or if so, only outer ramus elongate, inner
ramus short, scalelike; pleonites and urosomites not serrate 19

19. -- Palm of gnathopod 2 oblique, bearing thick, blunt spines (Figure 19a), hind margin of epimeron 3 with 3-6 teeth .... (Figure 19b) EUSIRIDAE



19a

With setae

Without setae

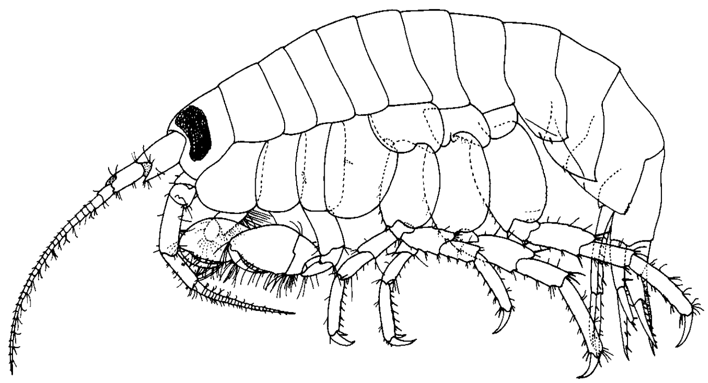
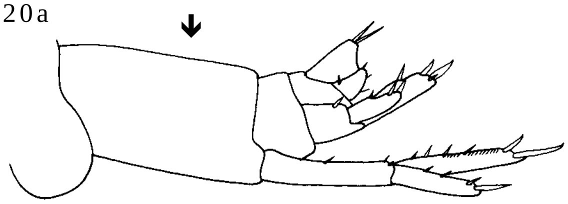


Figure 19b

--Palm of gnathopod 2 varying in armament and morphology, but never bearing thick blunt spines on palmar margin; hind margin of epimeron 3 rounded or produced as a sharp prœess 20

20. -- Urosomite 1 more than twice as long as urosomite 2 (Figure 20a) .... (Figure 20b) PODOCERIDAE

Figure 20a



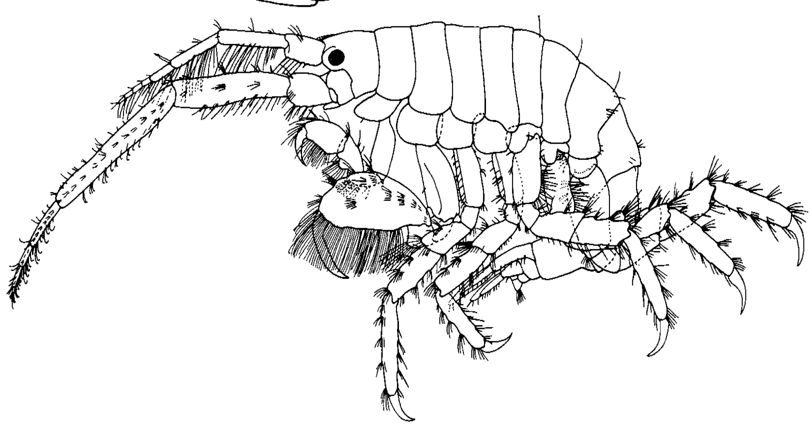


Figure 20b

-- Urosomite 1 equal to or shorter than urosomite 2 21

21. -- Uropod 3, rami short, broadened, outer ramus always bearing 1-2 large, recurved hooks (Figure 21) .... AMPITHOIDAE

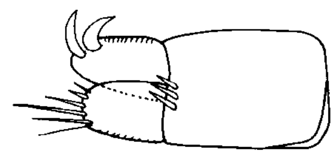


Figure 21

-- Uropod 3 rami variable but generally not broadened, never bearing large hooks (occasionally Ischyroceridae with small hook(s) present).......................................22

22. --Telson entire, thick and fleshy, immovable, occasionally with weak lobation..............23

-- Telson cleft more than halfway to base, thin, laminar and movable............................24

23. -- Gnathopod 2 carpochelate; uropod 3 uniramous, lacking setae, ramus one-half length of peduncle or less; telson much broader than long, bearing numerous dorsal denticles .... ISCHYROCERIDAE

-- Gnathopod 2 subchelate; uropod 3 biramous, setose; telson at least as long as broad, bearing 0-2 dorsal denticles ....COROPHIIDAE

24. -- Gnathopod 1 of both sexes more than 80 percent as large as gnathopod 2, both gnathopods in both sexes always large (Figure 67).................. LILJEBORGIIDAE

-- Gnathopod 1 of males less than 50 percent as large as gnathopod 2, both gnathopods of female very small relative to gnathopod 2 of males ....GAMMAROIDEA

Family Acanthonotozomatidae

Diagnosis.--Accessory flagellum absent or vestigial; mouthparts grouped into a cone-shaped bundle projecting ventrally from head; body usually with sharp dorsal processes (carinae); rami of uropod 3 longer than peduncle, rami flattened or lanceolate; article 2 of pereopods 6 and 7 usually with posterior teeth.

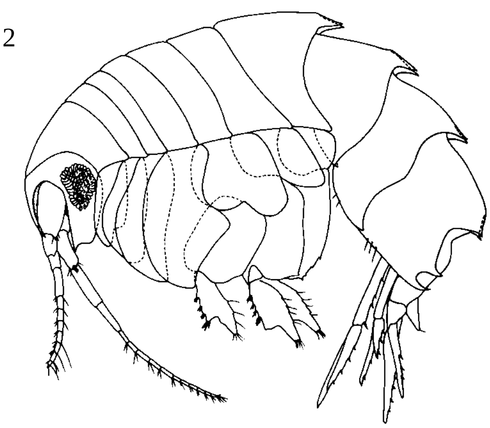
Key to the genera and species

1. --Pereon segment 7 and pleon segments 1-3 dorsally carinate; gnathopod 2 minutely subchelate; pereopod 7, coxa rounded posteriorly, ventral margin of article 2 reaching halfway into article 4; epimera 2 lacking midlateral tooth ....*Iphimedia zora*

Iphimedia zora Thomas and Barnard, 1991a
Figure 22

-*Iphimedia zora* **Thomas & Barnard, 1991a:475-479, figs. 4-6.**

Figure 22



Distribution.--Atlantic Ocean: Florida Keys: 3-10m.

Ecology.--Forereef. *Iphimedia zora* inhabits algal lawns cultivated by the three spot damselfish, *Eupomacentrus planifrons,* in stands of staghorn coral, *Acropora cervicornis* (Kaufman, 1977). Color is brownish-black with flecks of grey or white.

Remarks.--This species is close to *I. rickettsi* Shoemaker, 1931, but differs in the denticulation of epimera 2 and 3, and the shape of article 2 of pereopod 7.

Family Ampeliscidae

Diagnosis.--Accessory flagellum absent; head elongate; eyes when present usually consisting of two pairs of corneal lenses, inside of head with large patches of red or brown pigment; urosomites 2-3 coalesced.

Remarks.--The ampeliscids are an important soft-bottom component in the oceans of the world. Their tubes are constructed from organic debris, or sand or silt grains.

Key to genera and species

1. --Eyes lenses large, occupying entire anterior portion of head; pereopod 7 article 2 with anterior edge bearing setae to junction with article 3 (Figure 23a), telson square, apically notched (Figure 23b) .... *Byblis* sp. 1

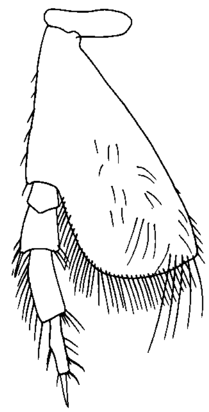


Figure 23a

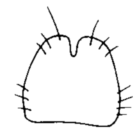


Figure 23b

--Eyes lenses small; anterior edge of article 2, pereopod 7 not setose to junction with article 3 (Figure 24a); telson elongate, cleft more than one-half to base (Figure 24b)..*Ampelisca burkei*

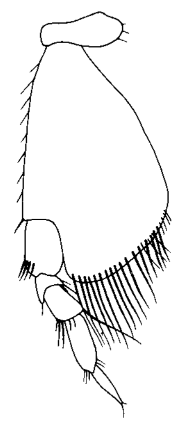


Figure 24a

Figure 24b

Ampelisca burkei Barnard and Thomas, 1989b
Figure 24a-c

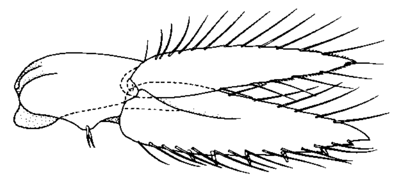
-*Ampelisca burkei* **Barnard & Thomas, 1989b:375-384, figures 1-5.**

Distribution.--Atlantic Ocean: Florida Keys; 1-12m.

Ecology.--Forereef, sand, rubble zone, 1-12 m, cryptofaunal. Unlike most species of ampeliscids which are taken from soft bottom sediments, this undescribed species is found among coral rubble or other rocky substrate where it probably inhabits pockets of fine sediments that collect in holes and crevices.

Remarks.--This species is readily recognized by the presence of blunt spines on the inner margin of the inner ramus of uropod 3 (Figure 24c), and in this regard resembles *A. lobata* Holmes, (1908).

Figure 24c



Byblis sp. 1

Distribution.--Atlantic Ocean: Florida Keys, 4-6m.

Ecology.--Taken only at night on the forereef from demersal plankton traps or by use of underwater lights while diving where it has been observed in shoals above the reef.

Remarks.--This species is prevalent at certain times of the month, but has never been collected in the daytime. It is similar to *B. rhinoceros* Pirlot, 1936 reported from the Indo-Pacific.

Family Amphilochidae

Diagnosis.--Accessory flagellum absent; coxa 1 small, partially hidden by following coxae; coxae 3 and 4 enlarged; gnathopods of medium size, subchelate; uropod 3 biramous, peduncle elongate.

Remarks.--There are probably a number of undescribed amphilochid species in Florida Keys waters. Their small size makes them difficult to identify, even by a specialist; therefore only the most common species of this family is presented here.

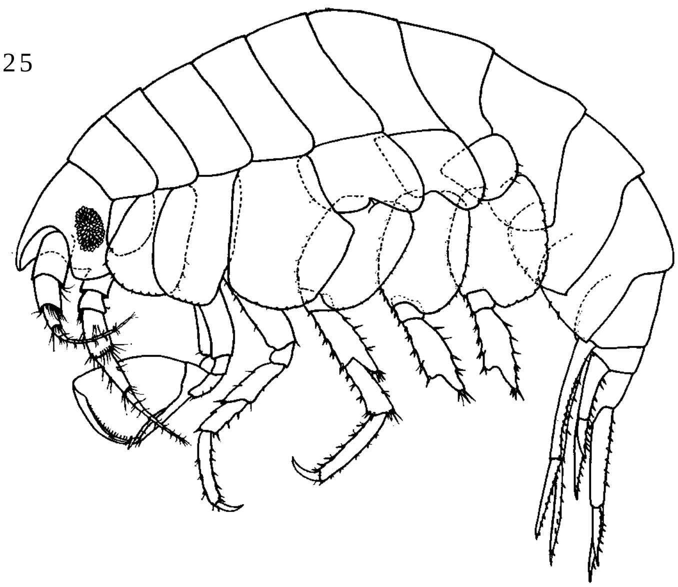
Key to genera and species

1. --Coxae 3 and 4 of moderate size, not concealing coxa 2, telson entire .... *Amphilochus neapolitanus*

Amphilochus neopolitanus Della Valle, 1893
Figure 25

-*Amphilochus neopolitanus* **Chevreux and Fage 1925:112-113, figs 106-108; J.L. Barnard 1962c:126, fig 3.**

Figure 25



Distribution.--Circumtropical and warm-temperate; 1-15m.

Ecology.--A common amphipod taken from hard substrates in all forereef and lagoon areas, usually associated with hydroids and octocorals. The genus *Amphilochus* is closely related to *Gitanopsis* which has been reported from the Florida Keys area and can be separated only by dissection of the mandible and examination of the molar. *Gitanopsis* was not collected during this study, but could be encountered in other parts of the Keys.

Remarks.--Another amphilochid, *A. pillaii* Barnard and Thomas, (1983) has been reported from inshore areas of the keys, as an ectocommensal on the purple gorgonian, *Pterogorgia anceps* (Pallas, 1776). The intense purple color of *A. pillaii* and its apparent restriction to its host, would limit its distribution to inshore areas where *P. anceps* is more common. See McKinney (1978) for amphilochids from the Gulf of Mexico and Caribbean Sea.

Family Ampithoidae

Diagnosis.--Accessory flagellum present or absent; telson entire; uropod 3 with rami small, shorter than peduncle, blunt apically, outer ramus armed with one or two recurved hooks.

Key to genera and species

1. --Accessory flagellum absent; anterior margin of male gnathopod 2 produced and setose (Figure 26) .... *Ampithoe ramondi*

--Accessory flagellum present; anterior margin of male gnathopod 2 not produced and setose .... *Cymadusa compta*

Ampithoe ramondi Audoin, 1826
Figure 26

-*A. divisura* Shoemaker, 1933a:255-256, fig. 8.
-*A. ramondi* Barnard 1965a:25-26, figs. 15-16.

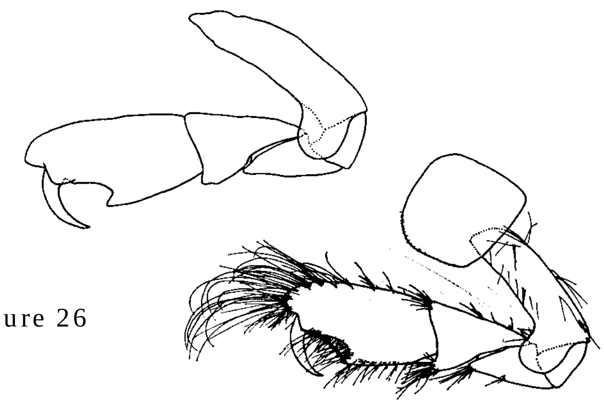


Figure 26

Distribution.--Circumtropical and warm-temperate.

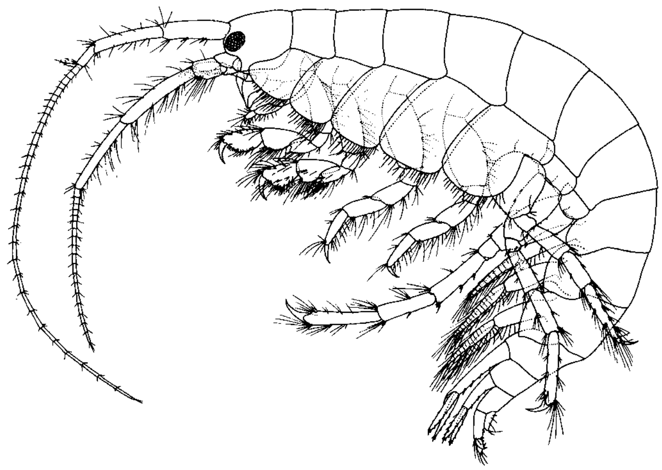
Ecology.--Abundant in algal growth and fouling communities; 1-2m.

Remarks.--Coloration in fresh material distinctive: first pereonite segment with a dorsal white band, remainder of body ranging from reddish-purple to brown in color.

Cymadusa compta (Smith, 1873)
Figure 27

-*Grubia compta* Kunkel, 1918:151-153, fig. 45.
-*Cymadusa compta* Bousfield, 1973:182-183, pl. LV.2.

Figure 27



Distribution.--Atlantic Ocean: central Maine to Florida, Gulf of Mexico.

Ecology.--Lagoon, shallow forereef areas. Common on grass flats and lagoons, and rocky substrates with algal growth; 1-3m.

Remarks.--A temperate species whose expected tropical counterpart, *C. filosa* Savigny, 1816, was not encountered during this study, possibly due to seasonal changes in distribution. Sampling during the warmer summer months may reveal the presence of this common tropical species.

Family Anamixidae

Diagnosis.--Accessory flagellum absent; mandible reduced, palp 1- articulate; upper and lower lips present; maxillae reduced, or fleshy and sparsely setose; outer plates of maxillipeds much reduced or absent, inner plates small, partially or wholly fused, palp elongate; second gnathopods, carpochelate; coxa 1 when present, hidden by enlarged coxae 2-4; uropod 3, rami styliform, as long as peduncle; telson entire.

Remarks.--The family Anamixidae was amended by Thomas and Barnard, 1983b, to include previous members of the genus *Leucothoides* (Leucothoidae) which has been shown to be the female and subadult growth stage of *Anamixis*. *Anamixis* represents terminal adult males. Members of this family are commensals, found inside sponges and tunicates. For further discussion see Thomas, 1979; Thomas and Taylor, 1981. The key below allows recognition of both forms found in the anamixids, however, only *A. cavitura* was collected from Florida Keys reefs.

Key to growth forms

1. --Gnathopod 1 with terminal setae (Figure 28a); gnathopod 2 carpochelate (Figure 28b) .... *Anamixis* stage

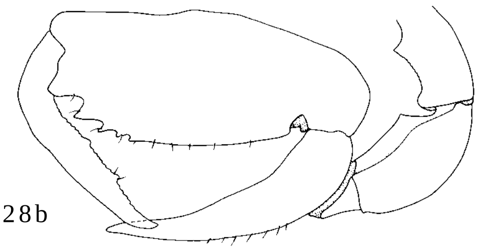


Figure 28b

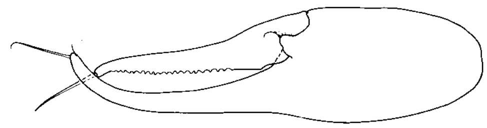


Figure 28a

--Gnathopod 1 with terminal spine (Figure 29a), setae lacking; gnathopod 2 subchelate (Figure 29b) ....*Leucothoides* stage

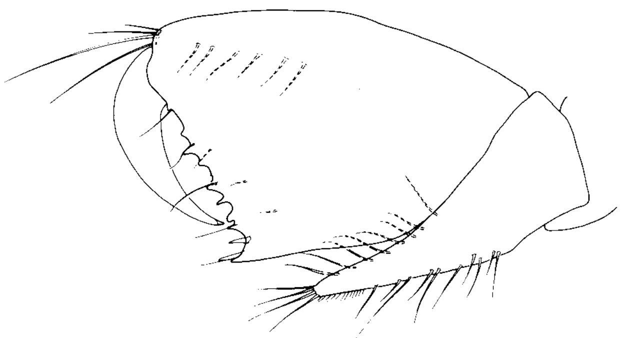


Figure 29b

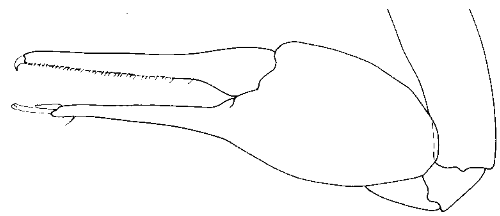
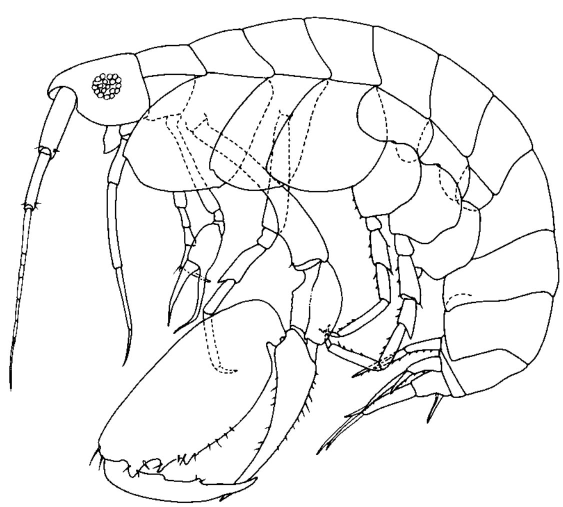


Figure 29a

Anamixis cavitura Thomas, in press
Figures 28-30

-*A. hanseni* **Pearse, 1912:370; Thomas, 1979:107-109; Thomas and Taylor, 1981:462-467, 4 figs.; Thomas and Barnard, 1983b:154-157.**

Figure 30



Distribution.--Tropical Atlantic: South Florida, Florida Keys, Biscayne Bay. Gulf of Mexico: Texas, Northern Gulf, Tortugas. Caribbean Sea: Yucatan, Mexico, Belize, WestIndies; 1-6m.

Ecology.--*A. cavitura* was common in the rubble zone and forereef areas where it is a commensal associated with sessile, filter feeding invertebrates, primarily small asconoid sponges and solitary and compound tunicates.

Remarks.--The striking color pattern of transverse dorsal red bands on the pereon and the large gnathopod 2 make the *Anamixis* stage easy to identify. The *Leucothoides* stage is smaller and lacks any distinguishing color pattern, but the small gnathopod 1 is diagnostic and usually easily observed under a dissecting microscope. Earlier references by the author to *A. hanseni* are incorrect.

Family Aoridae

Diagnosis.--Accessory flagellum variable; gnathopod 1 larger than 2; coxa 1 variable, moderately or greatly enlarged; head moderately or strongly recessed at insertion of antenna 2; uropod 3 rarely projecting beyond uropods 1 and 2; telson entire, fleshy, immovable.

Remarks.--The family Aoridae is used here for convenience in identification. Various authors have amended or submerged it within other families, e.g., Ischyroceridae. The entire Corophioidean group is in a state of taxonomic flux, so that the use of the Aoridae in this present guidebook is justified. The aberrant genera *Konatopus* and *Neomegamphopus* are included in this discussion of the aorids. The reader is referred to Barnard & Karaman (1991) for a complete taxonomic treatment of the pertinent genera. Myers (1988) revised the genus *Lembos* placing species in *Globoslembos*, *Bemlos* and *Lembos*. The distinctions among those genera can be difficult to interpret by non-specialists. No attempt is made to key to genera. The following key is based on adult males.

Key to genera and species

1. --Male gnathopod 1 carpochelate; coxae moderately or greatly enlarged; head strongly recessed at insertion of antenna 2; antennae subequal in length; eyelobes produced 2

   --Male gnathopod 2 subchelate; coxae normal; head only moderately recessed at insertion of antenna 2; antenna 1 longer than 2; eyelobes never produced ....*Bemlos*, *Globoslembos, Lembos*

2. --Male coxa 1 immense; head deeply recessed for insertion of antenna 2 (Figure 31a); article 5 of gnathopod 1 linear (Figure 31b) ....*Konatopus* sp. 1

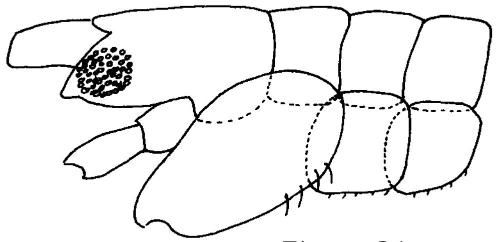


Figure 31a

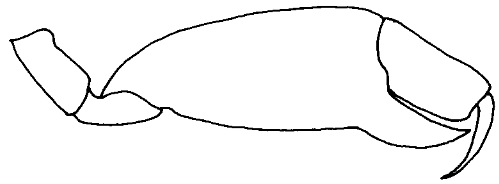
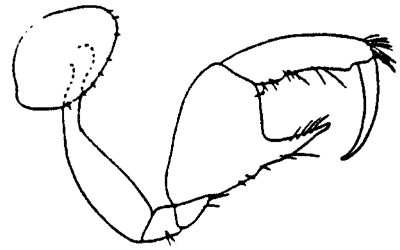


Figure 31b

--Male coxa 1 not immense; head not deeply recessed for insertion of antenna 2 article 5 (palm) of gnathopod 1 expanded, broad gape present (Figure 32) .... *Neomegamphopus hiatus*

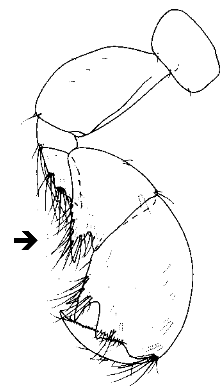
Figure 32



Key to *Globoslembos*, *Bemlos*, *Lembos* species

1. --Article 5 of male gnathopod 1 with prominent tooth (Figure 33) .... *Bemlos spinicarpus*

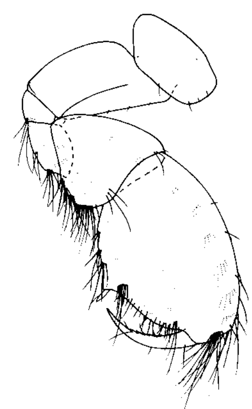
Figure 33



--Article 5 of male gnathopod 1 lacking tooth 2

2. --Article 6 of gnathopod 1 smooth, lacking any palmar excavation near posterior margin (Figure 34) .... *Globoslembos smithi*

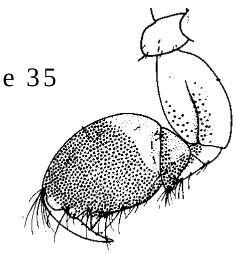
Figure 34



--Article 6 of gnathopod 1 always with palmar excavation or indentation at posterior margin 3

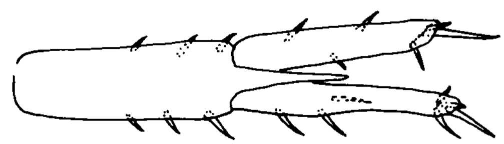
3. --Surface of male gnathopod 1 with "pebbled" appearance (Figure 35); uropods 1 and 2 lacking a distoventral process; dark bands of color on head, pereonites 2-5, and pleonite 1 ....*Bemlos unicornis*

Figure 35



--Surface of male gnathopod 1 not "pebbled"; uropods 1 and 2 with distoventral process (Figure 36); dark bands of color lacking ....*Lembos unifasciatus*

Figure 36



Bemlos spinicarpus (Pearse) 1912
Figure 33

-*Lembopsis spinicarpus* **Pearse, 1912:372-373, fig. 4.**
-*Lembos spinicarpus spinicarpus* **Myers, 1981:22, fig. 7.**

Distribution.--Atlantic Ocean: tropical Florida and the Bahamas; 1-4m.

Ecology.--Found in protected habitats in the forereef and lagoon.

Remarks.--Adult males are easily recognized by the toothed carpus (article 5) of gnathopod 1.

Bemlos unicornis Bynum and Fox, 1977
Figures 35, 37

-*Lembos unicornis* **Bynum and Fox, 1977:23-28, figs. 15-16; Myers, 1977b:146-153, figs. 148-152; Myers, 1981:26-29, figs. 10-11.**

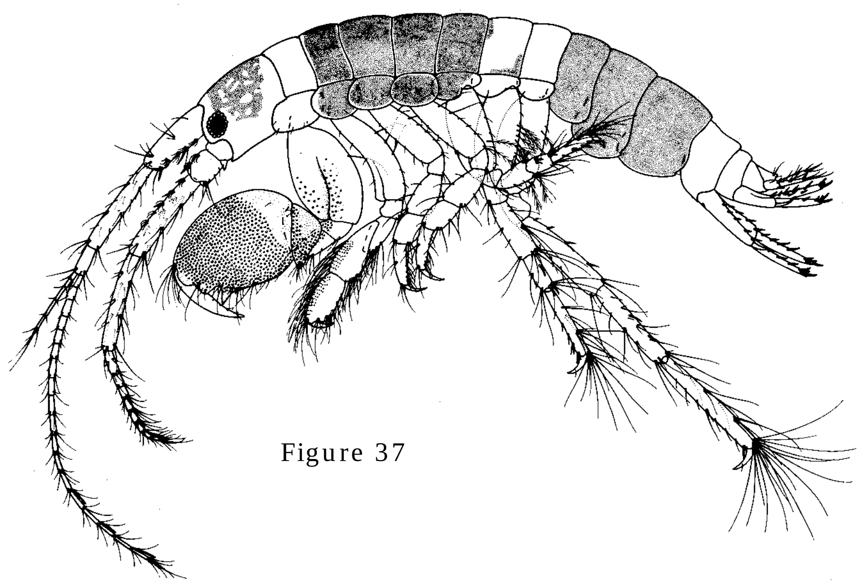


Figure 37

Distribution.--Atlantic Ocean: North Carolina to Florida and the Florida Keys; Bahamas; Puerto Rico; Belize; from 18 m shoreward.

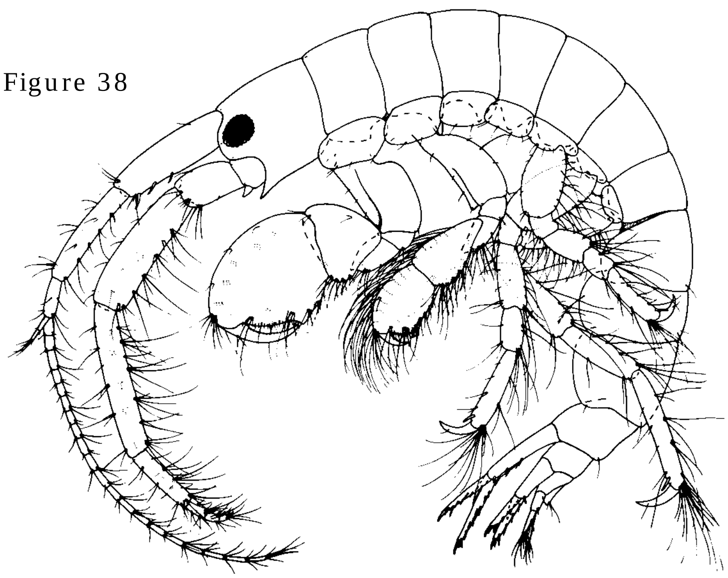
Ecology.--A common species inhabiting the same areas as *B. spinicarpus*.

Remarks.--The pigmentation bands and tuberculate surface of male gnathopod 1 are characteristic of this species.

Globoslembos smithi (Holmes, 1905)
Figures 34, 38

-*Autonoe smithi* **Holmes, 1905:516-517, unnumbered fig.**
-*Lembos smithi* **Stebbing, 1906:737; Bousfield, 1973:170, LI.1; Myers 1977a:95-102, figs. 112-116; Myers, 1981:44-47, figs. 22-23.**

Figure 38



Distribution.--Atlantic Ocean: Cape Cod to tropical Florida and Florida Keys. Gulf of Mexico from Florida to Yucatan; 1-4m.

Ecology.--Same as *B. spinicarpus*.

Remarks.--The characteristic gnathopod 1 in both sexes distinguishes this species.

Konatopus sp. 1
Figure 31a, b

Distribution.--Florida Keys, Looe Key Reef.

Ecology.--Found primarily at forereef stations, on the underside of ledges and rubble; to 10m.

Remarks.--Males of this species are readily identified by the enormous coxa 1, deep recession in the head at the insertion of antenna 2, and characteristic gnathopod 1. This species remains to be described by the author.

Lembos unifasciatus Myers, 1977a
Figure 36

-*Lembos unifasciatus* **Myers, 1977a:117-124, figs. 128-132.**
-*Lembos unifasciatus unifasciatus* **Myers, 1981:29, fig 12.**

Distribution.--Atlantic Ocean: tropical Florida, Florida Keys, Bahamas, Puerto Rico; 1-4m.

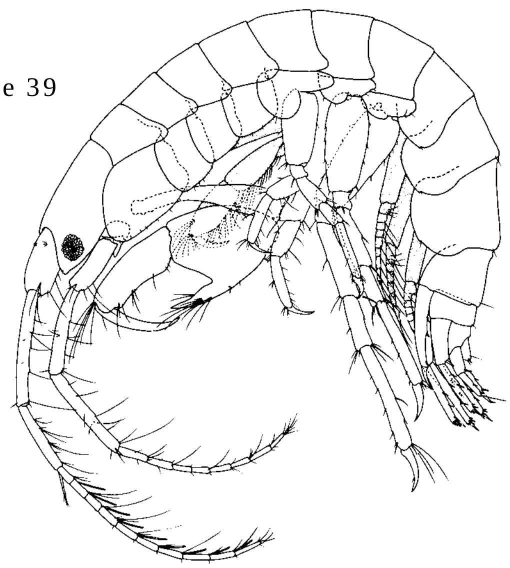
Ecology.--Similar to *B. spinicarpus*.

Remarks.--The distoventral process on the peduncles of uropods 1 and 2 is distinctive.

Neomegamphopus hiatus Barnard and Thomas, 1987a
Figures 32, 39

-*Neomegamphopus hiatus* **Barnard and Thomas, 1987a:152-156, figs. 1-3.**

Figure 39



Distribution.--Atlantic Ocean: Jacksonville, Florida to Venezuela; 0.8-49m.

Ecology.--Taken from the same habitats as *Konatopus*.

Remarks.--The morphology of male gnathopod 2 is distinctive (Figure 32).

Family Colomastigidae

Diagnosis.--Accessory flagellum absent; antennae short, thick, subequal; body cylindrical; mandibular palp absent; coxae short but overlapping; urosomites 2 and 3 coalesced; uropod 3 lacking inner ramus.

Remarks.--The colomastigids have a distinctive mandibular incisor, which is the most reliable means of definite identification. The family Sebidae can be confused with colomastigids in gross body morphology, but sebids are distinguished by chelate gnathopods 1 and 2. The small size of colomastigids causes them to be overlooked during sorting, but careful observation will reveal this commensal family to be common. Members of this family are almost always found living in the coelomic canals of sponges. The only other colomastigid from the area, *Colomastix janiceae* Heard and Perlmutter, 1977 has been reported from loggerhead sponges in the Keys but is not reported from reefs. Sara LeCroy of the

Gulf Coast Research Lab, Ocean Springs, Mississippi is currently working on this family. Color patterns in freshly preserved colomastigids can be striking.

Key to genera and species

1. --Dorsum of pereon with a series of paired longitudinal brown patches on either side of midline; pleosome with u-shaped color pattern .... *Colomastix* sp. 1

Colomastix sp 1

Distribution.--Looe Key Reef, Florida Keys.

Ecology.--This colorful undescribed species is frequently taken from the protected undersides of coral overhangs in the forereef zone.

Remarks.--The above species can be separated from *C. janiceae* on the basis of color, the latter being completely white, with no color markings, while *Colomastix* sp. 1 has a series of paired brown blotches on either side of middorsum on the pereon, each pleosome segment with a u-shaped marking of the same color.

Family Corophiidae

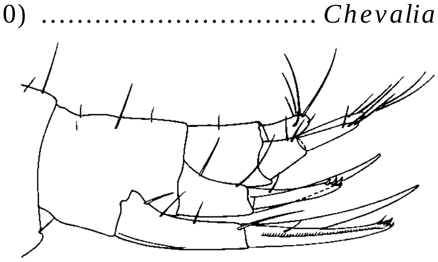
Diagnosis.--Accessory flagellum variable, often absent; urosomite 1 not elongate,
rarely coalesced with other somites; uropod 3 of two forms: (1) lacking rami, peduncle setose; (2) bearing ramus or rami as long or longer than peduncle, at least one ramus with terminal setae, or bare; telson pillow- shaped and immovable.

Remarks.--The revision of the Corophiidae and related families by J.L. Barnard (1973) and Barnard and Karaman (1991) established criteria for distinguishing genera. The Ischyroceridae and Ampithoidae now form a counterpart to the diverse Corophiidae, but are distinguished from each other by the condition of uropod 3. I have modified this scheme for use in the guidebook by reestablishing the Aoridae to accept those genera with gnathopod 1 larger than gnathopod 2 (*Bemlos*, *Globoslembos*, *Konatopus*, *Lembos*, and *Neomegamphopus*). The corophiids are generally tube builders feeding on particulate matter trapped on setose appendages or antennae.

Key to genera and species

1. --Eyes circular; urosomites 1-2 fused (Figure 40) .... *Chevalia* (2)

Figure 40



--Eyes "streamed" (Figure 41); urosomites 1-2 separate ....*Gammaropisis*

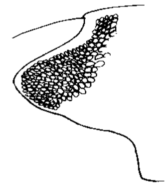


Figure 41

2. --Pereopod 7, article 2 linear. .... *Chevalia carpenteri*

--Pereopod 7, article 2 expanded distally, posterior lobe present .*Chevalia aviculae*

Chevalia aviculae Walker, 1904
Figure 42

-*Chevalia aviculae* **J.L. Barnard, 1962a:17-20, fig. 5; 1970:166-170, fig. 107.**

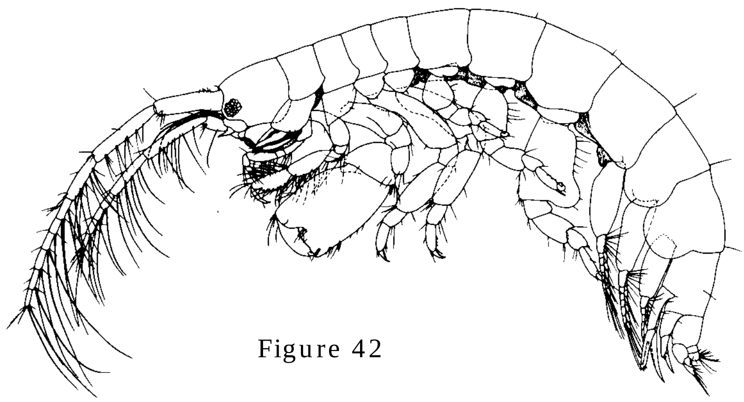


Figure 42

Distribution.--Circumtropical; 3-12m.

Ecology.--Forereef, abundant on the underside of coral overhangs, and around the excurrent openings of larger sponges.

Remarks.--Many of the early records of *C. aviculae* probably represent more than one species, making it difficult to determine the true distribution of *C. aviculae*. In addition to new species from the Caribbean, another new species has been reported from southern California, characterized by a long medial spine on gnathopod 2 and a distally expanded but non-lobate article 2 on pereopod 7. As this complex of species is sorted out, distribution patterns will be clarified. See Barnard and Thomas, (1987b) for a discussion of Caribbean *Chevalia*.

Chevalia carpenteri Barnard and Thomas 1987b
Figures 40, 43

-*Chevalia carpenteri* **Barnard & Thomas, 1987b; 541, figs. 4-6.**

Figure 43

Distribution.--Atlantic Ocean: Florida Keys, Belize; 3-15m.

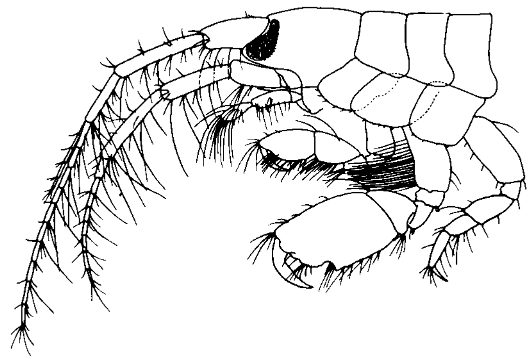
Ecology.--Forereef, 3-15m, among coral rubble and on the underside of coral overhangs.

Remarks.--This species has been collected with *C. aviculae* from Biscayne Bay, Looe Key, and Belize. *C. aviculae* dominates samples from Belize, while *C. carpenteri* is more abundant in Florida waters. Color in fresh material is translucent pink. *C. mexicana* Pearse, 1912 is also reported from the area, but not collected in this study.

Gammaropsis atlantica Stebbing, 1888
Figure 44

-*Gammaropsis zeylanicus* Walker, 1904:282-283, fig 41, pl. 6.
-*Gammaropsis atlantica* J.L. Barnard, 1970:174-178, figs. 111-113.

Figure 44



Distribution.--Indian Ocean; Pacific Ocean; Atlantic Ocean: tropical Florida; Caribbean Sea: Belize.

Ecology.--Periodically abundant in forereef rubble, 2-12m.

Remarks.--*G. atlantica* is distinguished from other species in the genus by the presence of a stout spine above a distal tooth on gnathopod 2. Color in fresh material is distinctive; head and antennae purple, remainder of body with a brownish tint. See J.L. Barnard 1969, 1973, for further information.

Family Cyproideidae

Diagnosis.--Coxae 3 and 4 immensely enlarged and broadened, dominating lateral margin (Figure 46); coxae 1-2 very small, mostly hidden by coxa 3. Peduncle of uropod 3 elongate, often with dorsal keel. Telson entire.

Remarks.--Members of this family are small and are cryptically colored, making them easy to overlook while sorting. The distinctive "wedge-shaped" body and immense coxae 3 and 4 allow easy visual identification of cyproids despite their small size.

Key to genera and species

1.-- Antenna 1 peduncle stout, flagella shorter than peduncle article 3 (Figure 45a, detail enlarged), pereonite segments 3 and 4 expanded and tumid dorsolaterally; uropod 1 peduncle elongate, bearing thin dorsal crest (Figure 45b) ....*Hoplophenoides obesa*

Figure 45b

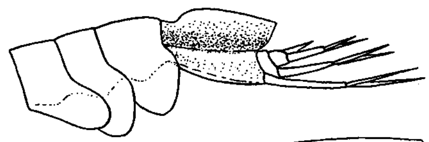
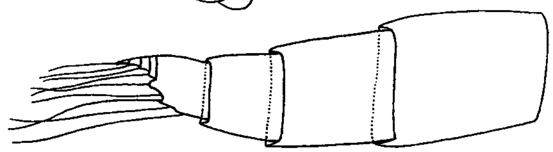


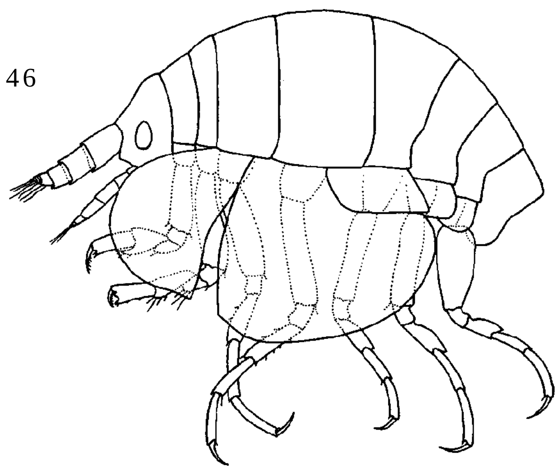
Figure 45a



Hoplophenoides obesa Shoemaker, 1956
Figure 45a,b, 46

-*Hoplophenoides obesa* Shoemaker, 1956:61-64, figs. 1-2; Barnard and Karaman, 1991:255.

Figure 46



Distribution.--Western Atlantic: Florida Keys to Dry Tortugas; Caribbean Sea: Antigua, Barbados, St. Lucia, Belize; 1-6m.

Ecology.--Reef flat, forereef, and backreef habitats, among coral rubble with algal turf, in sand, 1-6m.

Remarks.--This species is reported for the first time since its original description from Loggerhead Key in the Dry Tortugas in 1956. Various color patterns from hues of green, brown, and white, often mottled, have been reported. Coloration patterns probably reflect the variable coloration found among the diverse marine growth on coral rubble. The large lateral protuberances on pereonite 4 are unusual, their function is unknown.

Family Eusiridae

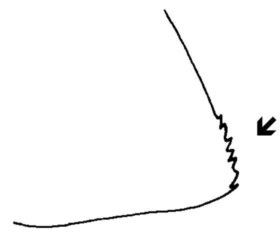
Diagnosis.--Accessory flagellum reduced or absent; pleon with small dorsal carina; eyes large, kidney-shaped; epimeral plate 3 posterior margin at least partially serrate; uropod 3 rami elongate, lanceolate; telson elongate and cleft.

Remarks.--Some difficulty can be encountered in separating the Eusiridae from the Gammaridae and the Liljeborgiidae. For Florida Keys material, the thick blunt spines on the palm of gnathopod 2 are diagnostic for eusirids. Generally, the gammarids have a longer accessory flagellum and a short, truncate telson. A single species of the genus *Eusiroides* is reported from Keys waters.

Key to genera and species

1. --Posterior margin of epimeral plate 3 with 5-7 teeth (Figure 47); anterior part of body with reddish maroon tint (fresh material) ....*Eusiroides* sp. 1

Figure 47



Eusiroides sp. 1
Figure 47

Distribution.--Looe Key Reef, Florida Keys; 1-10m.

Ecology.--Backreef rubble zone and forereef, 1-10m; associated with algal turf substrates.

Remarks.--*Eusiroides* sp.1 appears to be closely related to *E. yucatanensis* McKinney, 1980, from the shallow coastal waters of Mexico. *E. diplonyx* Walker, 1904, from Ceylon also appears to be close to, if not a synonym of, *E. yucatanensis*. Florida Keys material differs from both species in: the larger number of serrations on epimeron 3 (6 vs 3); spination of the uropods; and differences in mouthpart morphology. An exact determination will require a detailed examination of voucher specimens of all closely related species from type localities. For identification purposes, the color pattern in fresh material and the spines on article 6 of gnathopod 2 should help in separating this species.

SUPERFAMILY GAMMAROIDEA

Diagnosis.--Accessory flagellum present; mandible with molar and 3-articulate palp; gnathopods usually large and subchelate; uropod 3 biramous, inner ramus occasionally reduced; telson usually cleft.

Remarks.--The gammarids are a widespread family represented by freshwater, estuarine, and marine species. The following genera are commonly found in the tropics; *Ceradocus*, *Melita*, *Maera*, *Elasmopus*. Two new gammarid genera are now reported from the Florida Keys forereefs: *Spathiopus* and *Anamaera*. These genera are nestlers being found among the algae covered rocks and coral rubble in shallow reef areas. There is a high probability that other gammarids, especially species of *Elasmopus*, will be reported from the reef areas. See Barnard, 1979 for a current discussion and keys to *Elasmopus*.

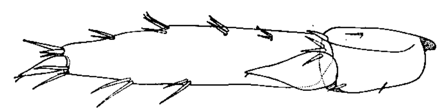
Key to genera and species

1. --Uropod 3, rami equal, short or elongate, 1-segmented 5

--Uropod 3, inner ramus small, scale-like, outer ramus long, 1 or 2-segmented 2

2. --Uropod 3, outer ramus 2-segmented (Fig 48) .... *Protohadzia schoenerae*

Figure 48



--Uropod 3, outer ramus 1-segmented 3

3. --Male gnathopod 2, setose on inner margin; much larger than gnathopod 1; eyes composed of numerous lightly packed ommatidia; posterior margin of article 2, pereopods 5-7 smooth .... *Melita* sp. 1

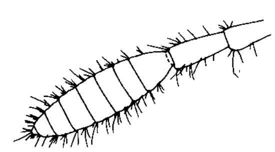
--Male gnathopod 2, not setose on inner margin, small equal to gnathopod 1; eyes composed of loosely scattered ommatidia; posterior margin of article 2, pereopods serrate (Figure 57) .... *Netamelita brocha*

4. --Gnathopod 2 asymmetrical, one side greatly enlarged .... *Anamaera hixoni*

--Gnathopod 2, left and right equal in size 5

5. --Flagellum of male antenna 2 paddle-shaped (Figure 49) .... *Spathiopus looensis*

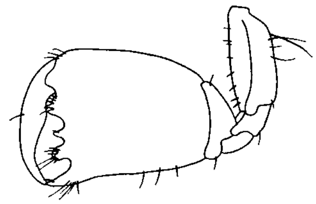
Figure 49



--Flagellum of male antenna 2 not paddle-shaped 6

6. --Palm of gnathopod 2 transverse (Figure 50) ....*Maera quadrimana*

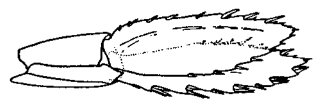
Figure 50



--Palm of gnathopod 2 oblique 7

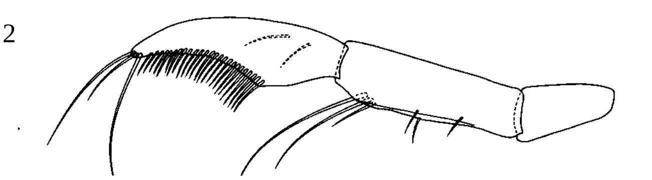
7. --Pleosome, urosome, and epimera serrate; uropod 3 rami long, greatly exceeding peduncle, lanceolate (Figure 51); mandibular palp article 3 half as long as article 2 .... *Ceradocus sheardi*

Figure 51



--Pleosome, urosome, and epimera lacking serrations; uropod 3 rami subequal to peduncle, truncate; mandibular palp article 3 as long as 2, scythe-shaped with dense comb of setae (Figure 52) ....(*Elasmopus*) 8

Figure 52



8. --Male gnathopod 2, lateral margin of article 6 with distinct ridge; medial margin without excavations (Figure 53) ....*Elasmopus balkomanus*

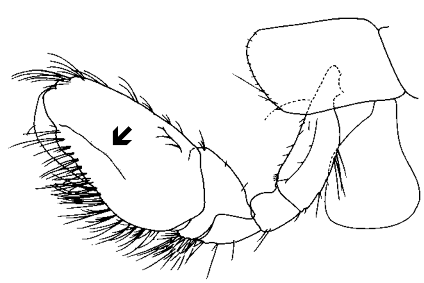
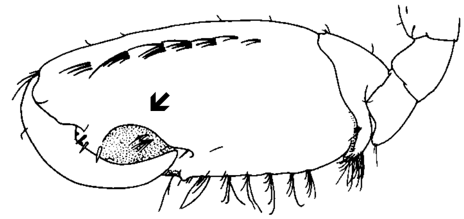


Figure 53

--Male gnathopod 2, lateral margin of article 6 smooth; medial margin with deep hollow (Figure 54) .... *Elasmopus pocillimanus*

Figure 54



Anamaera hixoni Thomas and Barnard, 1985a
Figure 55 a,b

-*Anamaera hixoni* **Thomas and Barnard, 1985a:191-203, figs. 4-7.**

Figure 55a

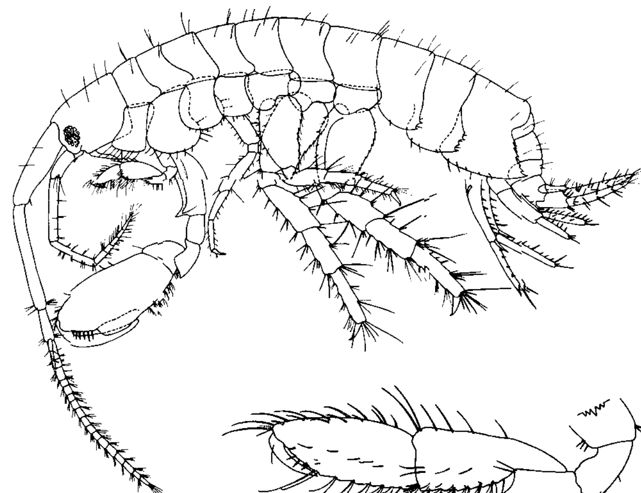


Figure 55b

Distribution.--Atlantic Ocean, Tropical Florida, Biscayne Bay to Key West; 1-2m.

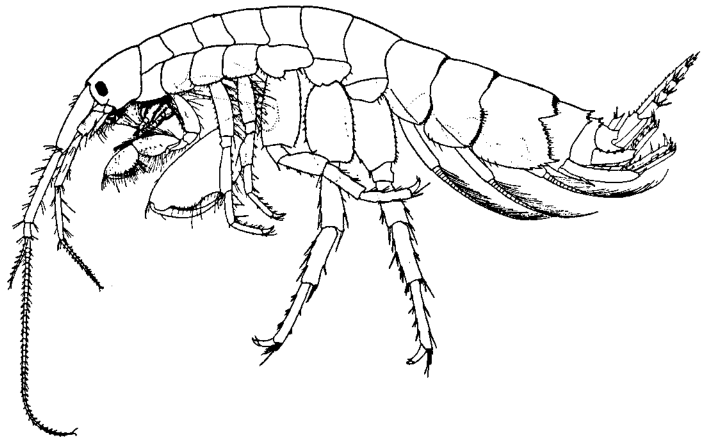
Ecology.--Lagoon and rubble zone, on rocks with attached algae, 1-2m.

Remarks.--Immediately distinguished by the characteristic asymmetrical gnathopod 2 in adult males (Figure 55b). This species is intermediate between *Maera* and *Ceradomaera*. Another species with asymmetrical gnathopods, *Dulichiella appendiculata* (Say, 1818) is found in fouling communities and in *Halimeda*. *D. appendiculata* also has serrations similar to *Ceradocus sheardi* Shoemaker, 1948.

Ceradocus sheardi Shoemaker, 1948
Figures 51, 56

-*C. sheardi* **Shoemaker, 1948:1-9, fig. 2.**

Figure 56



Distribution.--Atlantic Ocean: Biscayne Bay to Key West Florida. Caribbean Sea: Belize, Yucatan, Mexico. Gulf of Mexico: Tortugas, Florida; to 52m.

Ecology.--Rubble zone, lagoon, forereef, 1-2 m, under rocks on sandy bottoms.

Remarks.--A large species, very abundant on the undersides of rocks and rubble in coarse sediments. This species can be recognized by the serrations on the posterior portion of the body, and the large, lanceolate rami of uropod 3. Color in life and preserved material is ivory.

Elasmopus balkomanus Thomas and Barnard, 1988
Figures 52, 53

Elasmopus balkomanus **Thomas and Barnard, 1988: 838-842, figs. 1-3; Barnard, 1971: 75, fig 33.**

Distribution.--Florida; Florida Keys; Looe Key Reef, 2m.

Ecology.--Algal turf on coral rubble, back reef and lagoon.

Remarks.--Apparently rare, collected infrequently. Precise sampling of microhabitats may reveal *E. balkomanus* to be more common than currently reported. The distinct lateral ridge on the propodus of male gnathopod 2 distinguishes this species. *E. balkomanus* is close to the eastern Pacific *E. antennatus*, but differs in several characters (See Barnard, 1962).

Elasmopus pocillimanus (Bate) 1862
Figure 54

-*Moera pocillimanus* **Bate, 1862:191, pl. 34, fig. 7; Barnard, 1970: 132, fig. 77.**

Distribution.--Circumtropical; 0-30m.

Ecology.--Lagoon, coral and coral rubble zone, 1-2m.

Remarks.--Distinguished in all stages by 2 large locking spines on article 6 of pereopods 3-4. The hollow palm on male gnathopod 2 also distinguishes this species.

Maera quadrimana (Dana) 1853
Figure 50

-*Gammarus quadrimana* **Dana, 1853:955-956, pl. 65, fig. 9.**
-*Maera quadrimana* **Schellenberg, 1938:45-48, figs 21-22; J.L. Barnard, 1965b:511-512, fig. 17; 1970:152-155, figs. 94-95.**

Distribution.--Pacific Ocean: Micronesia, Polynesia, Hawaii. Caribbean Sea: Yuca-tan, Mexico, Belize. Atlantic Ocean: Florida Keys, Biscayne Bay; 1-3m.

Ecology.--Lagoon and rubble zone, on rocky substrates with abundant algae, 1-3m.

Remarks.--The large second gnathopod in males with its transverse palm allows ready identification of this species, common in shallow habitats and among algae.

Melita sp. 1

Distribution.--Looe Key Reef, Florida Keys; 1-4m.

Ecology.--Lagoon, rubble zone, shallow forereef, under rocks.

Remarks.--The elongate outer rami of uropod 3 and medial setae on gnathopod 2 are characteristic of this genus. The dactyl of gnathopod 2 always closes on the medial margin. The Looe Key species is related to *M. pahuwai* Barnard, 1970, from the Hawaiian Islands but differs in the following characters: gnathopod 1 with 1 (vs 3) spines on posteromedial margin of article 6; pereopod 7 less stout; male gnathopod 2, article 2 densely setose along anteromedial margin, face of article 6 densely setose.

Netamelita brocha Thomas and Barnard, 1991b
Figure 57

-*Netamelita brocha* Thomas and Barnard, 1991b:583-588, figs. 1-3.

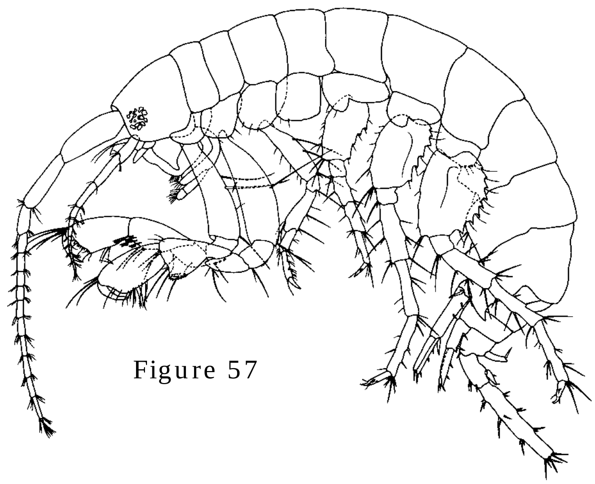


Figure 57

Distribution.--Atlantic Ocean: Florida Keys; 35-50m.

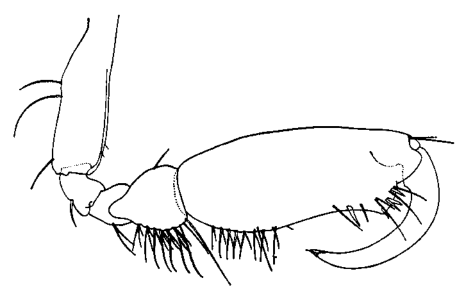
Ecology.--Deep forereef sediments, with coralgal mud and *Halimeda* flakes.

Remarks.--*N. brocha* is found in the finer deeper sediments of the reef areas. A closely related species, *N. tabaci* (Thomas and Barnard, 1991b), inhabits similar habitats on the barrier reefs of Belize.

Protohadzia schoenerae (Fox) 1973
Figures 48, 58

-*Eriopisa schoenerae* **Fox, 1973:153-159, figs. 5-8.**
-*Protohadzia schoenerae* **Zimmerman and Barnard, 1977:565-580, figs. 1-5.**

Figure 58



Distribution.--Atlantic Ocean: Bahama Islands, Bimini Lagoon; Puerto Rico; Florida, Biscayne Bay to Dry Tortugas; 1-3m.

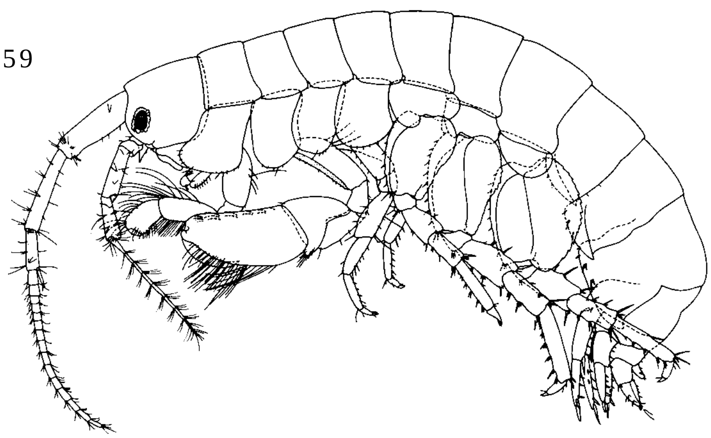
Ecology.--Common in the rubble zone in and near growths of *Thalassia*.

Remarks.--The evenly scattered ommatidia in a ring of 4, is distinctive, persisting even in preserved material. Gnathopod 2 of the male is distinctive, but adult males are not always present in general collections. Uropod 3, also distinctive, is sometimes lost during collection and sorting of specimens.

Spathiopus looensis Thomas and Barnard, 1985a
Figures 49, 59

-*Spathiopus looensis* **Thomas and Barnard, 1985a:191-203, figs. 1-3.**

Figure 59



Distribution.--Atlantic Ocean: Florida, Biscayne Bay south to Looe Key Reef, 1-7m.

Ecology.--Reef flat, on rocks with filamentous algae, among *Halimeda*, and in shallow protected areas adjacent to deeper water where algal covered rocky substrates are available.

Remarks.--This unusual genus is close to *Elasmopus*, but can be distinguished by the large paddle-shaped flagellum of male antenna 2. To date, this species has been collected only from the Florida Keys north to Biscayne Bay. The use of the paddle-shaped flagellum is unknown.

Family Haustoriidae

Diagnosis.--Body barrel-shaped; accessory flagellum usually present, distinct; gnathopods feeble; pereopods heavily spinose and setose (fossorial), and adapted for burrowing; uropod 3 variable, but with one or both rami longer than peduncle.

Remarks.--Bousfield, 1973, provides a thorough treatment of New England haustoriids. The Haustoriidae are common burrowers in quartzose sands in temperate and cool-temperate waters. Identifications can be difficult owing to the dense amount of spines and setae covering the body. The occurrence of a haustoriid from poorly sorted, carbonate reef sediments is unusual. Because haustoriids are primarily continental and cool-temperate in distribution, it is doubtful they will be collected from coral reefs other than those in Florida.

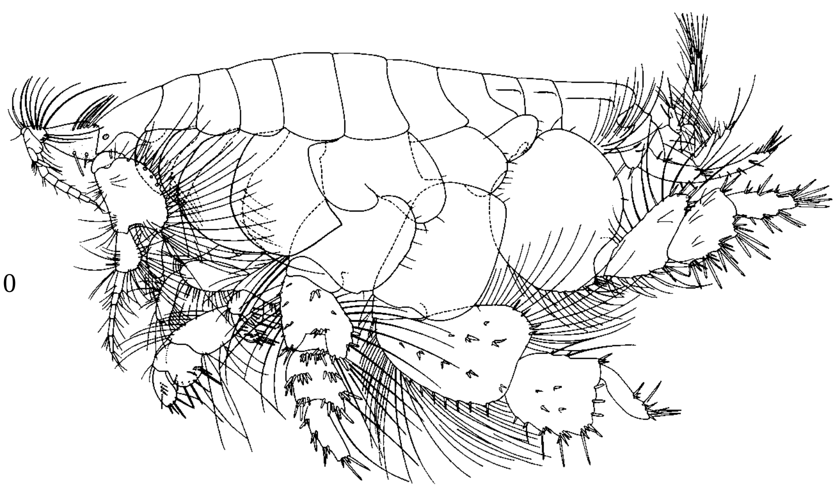
Key to genera and species

1. --Pereopods 3 and 4 similar; epimera 3 with posterior hook; uropod 1, inner ramus ....
shorter and thinner than outer; telson lobes widely separated
....*Acanthohaustorius pansus*

Acanthohaustorius pansus Thomas and Barnard, 1984
Figures 16, 60

-*Acanthohaustorius pansus* **Thomas and Barnard, 1984:909-926, figs. 1-5.**

Figure 60



Distribution.--Atlantic Ocean: Florida Keys from Looe Key Reef, Florida Keys to Eastern and Northern Gulf of Mexico, 8-40m

Ecology.--Found in the apron of coarse carbonate sands in the forereef, and in fine to medium fine sediments; 6-10m.

Remarks.--*A. pansus* is immediately separated from all other species of *Acanthohaustorius* by the widely separated lobes of the telson. No other species in the genus exhibits this feature. *A. pansus* is abundant in the winter months of December-April, perhaps reflecting the coldwater origins of this group. This species has been collected as far north as the panhandle of Florida, with the Florida Keys probably representing the southern limits of distribution. Color in life and freshly preserved material is cream-colored, eyes small, silvery.

Family Ischyroceridae

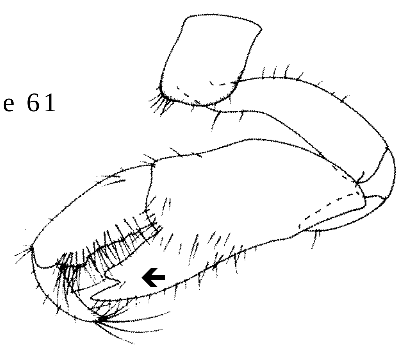
Diagnosis.--Accessory flagellum present; gnathopod 2 larger than gnathopod 1, subchelate or carpochelate; peduncle of uropod 3 elongate relative to short rami; inner ramus, when present, not apically setose. Telson fleshy.

Remarks.--See discussion under Corophiidae. This family is represented in the Keys by the genera *Cerapus* and *Erichthonius*.

Key to genera and species

1. --Antenna 1 peduncle article 1 enlarged and thickened; uropods 1 and 2 biramous; uropod 3 uniramous; male gnathopod 2 carpochelate, article 5 elongate, carpal lobe produced, with mid carpal process on inner margin (Figure 61); telson entire, short and broad ....*Erichthonius brasiliensis*

Figure 61



--Antenna 1, peduncle article 1 enlarged and thickened; uropod 1 biramous;
uropods 2 and 3 uniramus (Figure 62a); male gnathopod 2 carpochelate, carpal lobe not produced, mid carpal process lacking (Figure 62b); telson cleft ....*Cerapus cudjoe*

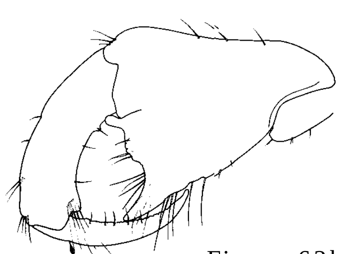
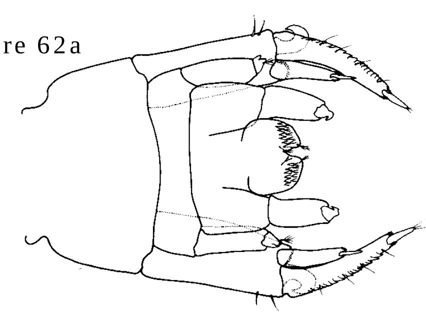


Figure 62b

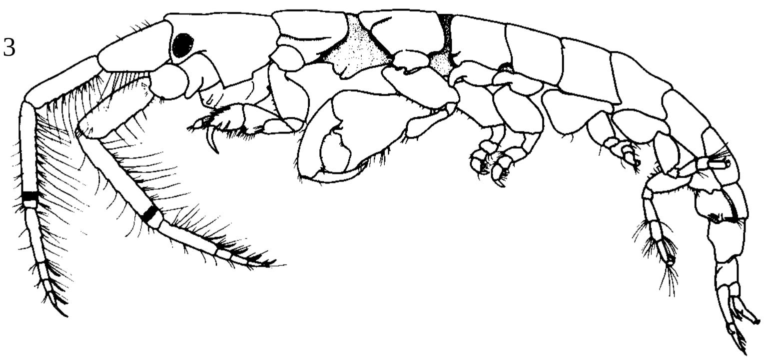
Figure 62a



Cerapus cudjoe Lowry and Thomas, 1991
Figures 62, 63

-*Cerapus cudjoe* Lowry and Thomas, 1992:1461-1467, figs. 1-4.

Figure 63



Distribution:--Atlantic Ocean: Florida Keys, 2-6m.

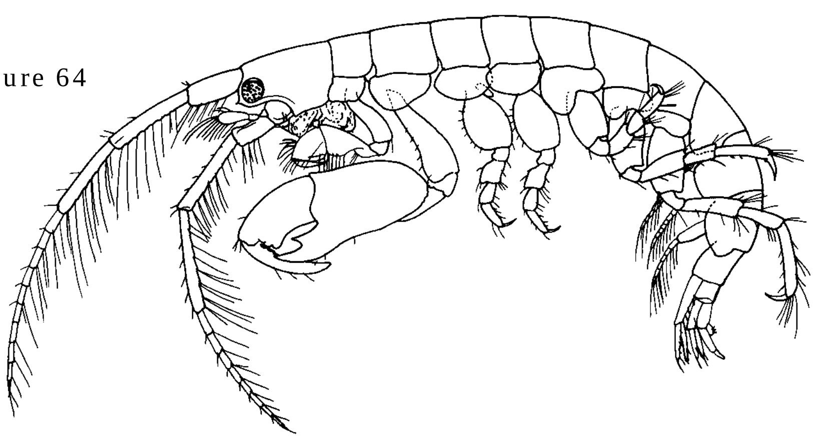
Ecology.--Prefers areas of strong current flow. *C. cudjoe* can swim with its tube by beating of the antennae. Populations of *C. cudjoe* reach prolific proportions in back country channels in the Florida Keys where it is found attached to algae, hydroids, and octocorals. The banded parchment tube and the dark bands on the peduncles of antennae 1 and 2 of *C. cudjoe* are distinctive.

Remarks:--Periodically abundant from mid-summer to late fall.

Erichthonius brasiliensis (Dana) 1852
Figures 61, 64

-*Pyctilus brasiliensis* **Dana, 1852:976, pl. 67, fig. 5a-h.**
-*Erichthonius brasiliensis*. **Bousfield, 1973:195, pl. LIX.2; Myers, 1984:382- 385, fig. 1.**

Figure 64



Distribution.--Cosmopolitan in tropical and warm-temperate seas; to 200m.

Ecology.--The tubes of *E. brasiliensis* are common on macroalgae, ilings, and in areas of high current and wave activity, 1-10m.

Remarks.--*E. brasiliensis* is distinguished from its congener *E. rubricornis* (Stimpson, 1853), by the presence of a mid-palmar carpal tooth on male gnathopod 2.

Family Leucothoidae

Diagnosis.--Accessory flagellum vestigial; mandible lacking molar; gnathopod 1 small, carpochelate; gnathopod 2 large, subchelate; uropod 3 elongate; telson entire.

The leucothoids are a widespread family throughout tropical and warm-temperate seas. They are usually found as commensals in sponges and tunicates. Only the genus *Leucothoe* is reported from the Atlantic Ocean.

Remarks.--The taxonomic validity of the constituent genera in the Leucothoidae are uncertain. The "*Leucothoe spinicarpa* complex" of species serves as a dumping ground for numerous similar species due to outdated criteria for specific determinations. Until this family is revised, the 3-4 species from the Florida Keys that fall into the complex will be referred to simply as the *L. spinicarpa* group.

Key to species of *Leucothoe*

1. --Gnathopod 1 with short, stubby dactyl (Figure 65a); gnathopod 2, article 6 with
medial process (Figure 65b)..*Leucothoe* sp. 1 Thomas

Figure 65a

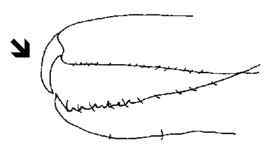
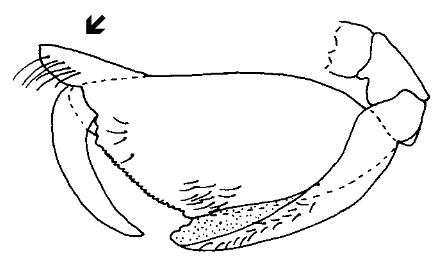
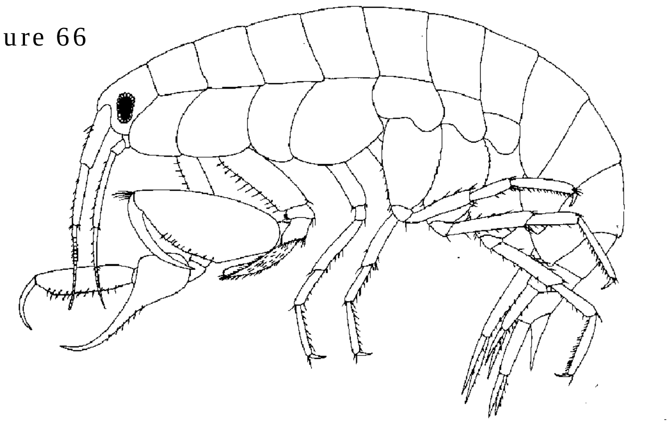


Figure 65b



--Gnathopod 1 with elongate, recurved dactyl; gnathopod 2, article 6 lacking process
near insertion of dactyl (Figure 66) ....*Leucothoe spinicarpa* "complex"

Figure 66



Leucothoe sp. 1

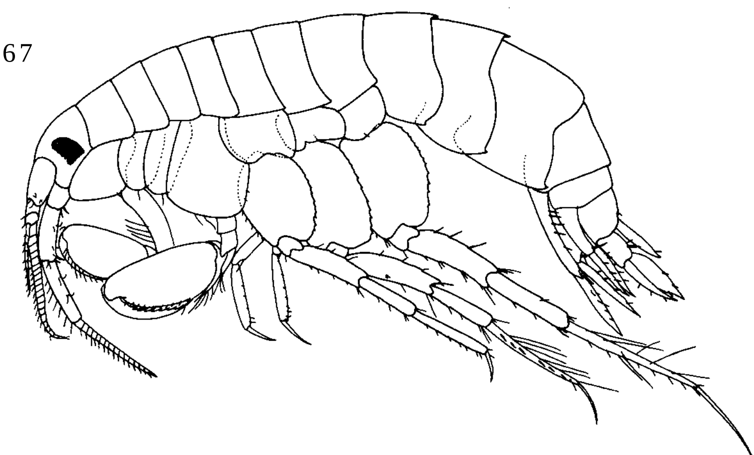
Distribution.--Atlantic Ocean: North Carolina to Biscayne Bay and the Florida Keys. Caribbean sea: Belize; 2-10m.

Ecology.--Forereef, coral rubble with attached sponges and tunicates, 2-20m.

Remarks.--This species appears closely related to *L. euryonyx* Walker, 1901, which has a similar medial process on gnathopod 2. The stout gnathopod 1, with a stubby dactyl; medial process and nearly transverse palm on gnathopod 2, make this species easy to recognize.

Family Liljeborgiidae

Figure 67



Diagnosis.--Accessory flagellum 2 or more articulate; mandibular molar poorly developed, non-triturative; telson deeply cleft; rami of uropod 3 lanceolate. Gnathopod 1 more than 80 percent as large as gnathopod 2 in both sexes; gnathopods in both sexes large.

Remarks.--Liljeborgiids are common in the shallow areas of coral reefs. They are easily confused with eusirids, but lack the distinctive blunt spines on the palm of gnathopod 2 characteristic of eusirids.

Key to genera and species

1. --Article 5 of gnathopods 1 and 2, lobate, produced to near palmar margin of article 6; gnathopod 2, inner margin of dactyl serrate (Figure 68a); outer ramus of uropod 3, 1-art

Figure 68a

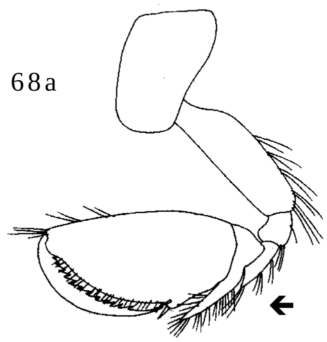
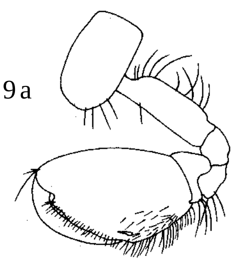


Figure 68b

--Article 5 of gnathopod 1 and 2, not lobate, not produced; gnathopod 2, inner margin not serrate (Figure 69a); outer ramus of uropod 3, 2-articulate (Figure 69b) ....*Listriella barnardi*

Figure 69a



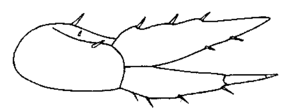


Figure 69b

Liljeborgia bousfieldi McKinney, 1979

-*Liljeborgia bousfieldi* **McKinney, 1979:141-144, figs. 1-2.**

Distribution.--Atlantic Ocean: Biscayne Bay to Florida Keys, Caribbean Sea: Belize, Yucatan, Mexico; 0.5-3.0m.

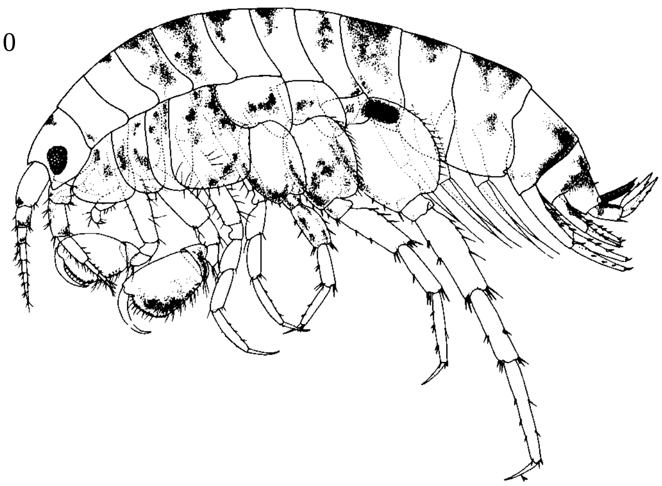
Ecology.--Among algae-covered rubble in backreef and shallow forereef areas, 1-3m.

Remarks.--See McKinney, 1979, for discussion and keys to the Liljeborgiidae.

Listriella barnardi Wigley, 1966
Figure 70

-*Listriella barnardi* **Wigley 1966:267-270, figs. 5-8; Bousfield. 1973:71-72, pl. XII.2.**

Figure 70



Distribution.--Atlantic Ocean: Cape Cod to Florida Keys. Gulf of Mexico: North Texas coast, Belize; 0.5-5m.

Ecology.--Forereef and backreef zones, 1-3m.

Remarks.--This species has been reported as a commensal in the tubes of marine polychaetes. Color in fresh material is distinctive: posterior margin of coxa 3 and anterior margin of coxa 4 covered with lateral purple blotch.

Family Lysianassidae

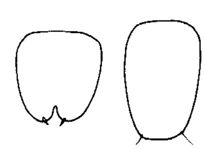
Diagnosis.--Accessory flagellum usually present and multiarticulate; article 3 of gnathopod 2 elongate; article 6 with fuzz or scales; peduncle of antennae short, stout; uropod 3 rami lanceolate, outer often 2-articulate.

Remarks.--The second gnathopod is characteristic of the family Lysainassidae, one of the largest and taxonomically complex of the Amphipoda. Generic diagnoses are based primarily on mouthparts, but as this guidebook is intended for use by the non-specialist, dissection of mouthparts is avoided. Therefore, alternative characteristics, and color patterns, are used. Lysianassids are primarily benthic scavengers, and are found from shallow coastal waters to the deepest depths of the world's oceans. Barnard and Karamann, 1991 provide an extensive treatment of the Lysianassidae.

Key to genera and species

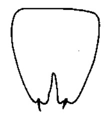
1. --Telson entire, emarginate, or minutely cleft (figure 71); surface of body smooth; uropod 3, outer ramus 1-articulate 2

Figure 71



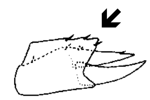
--Telson cleft one-third to base (figure 72); body covered with short hairs; uropod 3, outer ramus 2-articulate .... *Concarnes concavus*

Figure 72



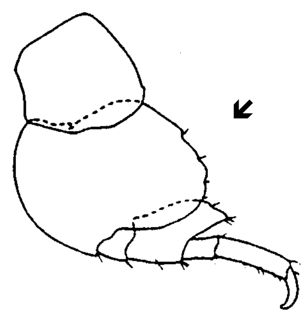
2. --Gathopod 2, article 3 less than one-half of article 2; uropod 3 peduncle with dorsal process (Figure 73); pereopod 7, article 2 quadrate .... *Shoemakerella cubensis*

Figure 73



--Gnathopod 2, article 3 longer than one-half of article 2; peduncle of uropod 3 lacking dorsal process; pereopod 7, article 2 circular (Figure 74) .... *Lysianassa* sp 1

Figure 74



Concarnes concavus (Shoemaker, 1933a)

-*Socarnes concavus* Shoemaker 1933a:247-248, fig. 1.
-*Concarnes concavus* Barnard and Karaman, 1991: 477.

Distribution.--Atlantic Ocean: Florida Keys. Caribbean Sea: Belize. Gulf of Mexico: Tortugas, Florida; to 80m.

Ecology.--Common in shallow, rocky areas of the rubble zone and forereef, 1-2m.

Remarks.--In fresh material a prominent reddish-orange coloration on the anterior portion of the pereon (pereonite segments 2-4) is diagnostic. The incised inner ramus of uropod 2, and the 2-articulate outer ramus of uropod 3 are also distinguishing characters (See Shoemaker, 1933a for discussion).

Lysianassa sp. 1
Figure 74

Distribution.--Looe Key Reef, Florida Keys; 1-2m.

Ecology.--Uncommon in shallow backreef areas in coral rubble, sand and *Thalassia*.

Remarks.--The large, circular article 2 of pereopod 7 characterizes this species.

Shoemakerella cubensis (Stebbing, 1897)
Figure 72

-*Lysianax cubensis* **Stebbing, 1897:29-30, pl. 7b.**
-*Lysianassa cubensis*. **Shoemaker, 1935:232-234, fig. 1.**

Distribution.--Atlantic Ocean: Florida to Key West; Barbados. Gulf of Mexico: Mississippi Delta east to Cedar Keys, Florida.

Ecology.--A common species, 1-6m.

Remarks.--This species was placed in the genus *Shoemakerella* by Barnard and Karaman (1991: 530. Species can be recognized by the dorsal process on the peduncle of uropod 3, the ratio of articles 2 and 3 of gnathopod 2, and the shape of article 2, pereopod 7. *L. cubensis* is distinguished from *Lysianopsis alba* (Holmes, 1903), in the ratios of articles 2 and 3 of gnathopod 2.

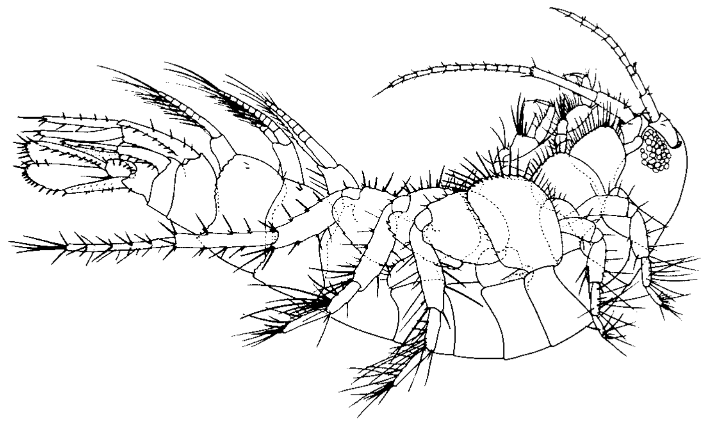
Family Melphidippidae

Diagnosis.--Accessory flagellum present; uropod 3 not greatly extended beyond uropods 1 and 2, but rami of uropod 3 generally large, uniarticulate; pleonites and urosomites usually dorsally denticulate and transversely spinose; gnathopods feeble.

Remarks.--The family Melphidippidae is used in a restricted sense to include the genera *Megaluropus* and *Metaceradocus*. This classification follows that of Barnard and Barnard (1983:593) for the Cheirocratids. Members of both of these groups had previously been placed in the Gammaridae, a large, polyphyletic family that is currently undergoing substantial revision. Since familial status was not imparted to the Cheirocratids, the family Melphidippidae is applied in the interim. This decision is out of necessity to place these closely related genera within a workable family framework until final resolution of the Melphidippidae/Cheirocratid problem is forthcoming.

Members of this family are "upside down" feeders, lying in an inverted position in a cradle formed by the pereopods (Figure 75).

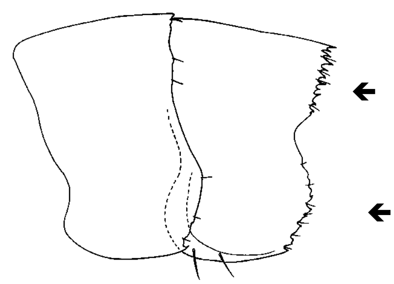
Figure 75



Key to genera and species

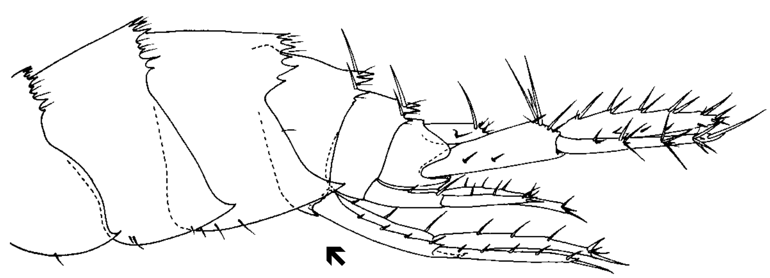
1. --Coxa 3 significantly shortened; coxa 4 tongue-shaped; uropod 3, rami broadly
rounded; pleonites smooth dorsally; epimera 3 finely serrate (Figure 76)
....*Gibberosus myersi*

Figure 76



--Coxa 3 and 4 normal; uropod 3, rami thin, truncate; pleonites grossly serrate dorsally; epimera 3 with posteroventral hook (Figure 77), not serrate
....*Metaceradocus tequestae*

Figure 77



Gibberosus myersi (McKinney), 1980
Figure 76

-*Megaluropus myersi* **McKinney, 1980:93-98, figs. 5-7.**
-*Gibberosus myersi.* **Thomas and Barnard, 1986a:464-469, figs. 6 and 12.**

Distribution.--Atlantic Ocean: Florida, from Ft. Pierce to the Florida Keys. Caribbean Sea: Cozumel Island; Quintana Roo; Yucatan; Mexico; 1-29m.

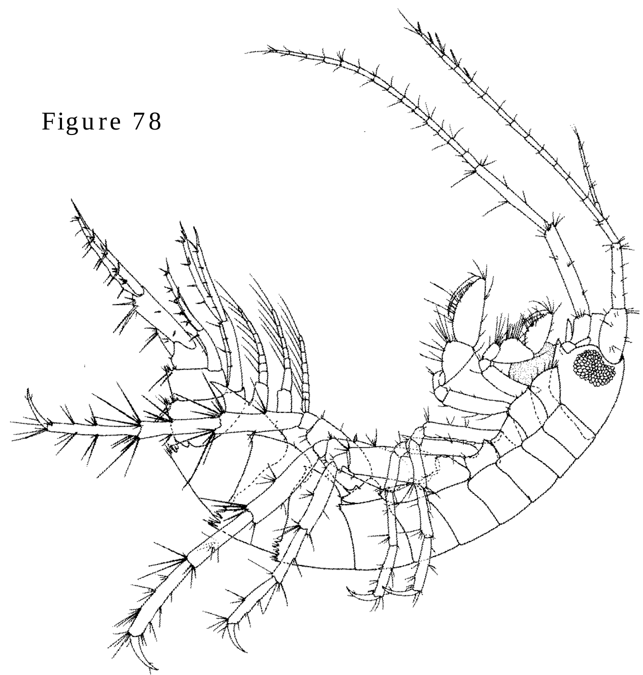
Ecology.--Found in medium to silt sized sediments in backreef areas, especially in large pockets of sediment among *Thalassia* beds, 2-5m. This species has been observed to remain partially buried on its back on a cradle of recurved pereopods. The urosome is flexed ventrally and the large, flabellate rami of the third uropods are spread laterally. This condition effectively places the large rami near the head region where they probably act to direct current flow over the mouthpart field where suspended food particles are trapped.

Remarks.--The shape of uropod 3 is diagnostic, but care should be exercised during collecting and sorting as it is easily lost. Thomas and Barnard (1983a) revised the genus *Megaluropus*, describing two new genera, *Gibberosus* and *Resupinus*, to include all new and previously described species from American Seas.

Hornellia (Metaceradocus) tequestae Thomas and Barnard, 1986b
Figures 77, 78

-*Hornellia* (*Metaceradocus) tequestae* **Thomas and Barnard, 1986b:478-483, figs. 1-3.**

Figure 78



Distribution.--Atlantic Ocean: Florida Keys; 3-45m.

Ecology.--Forereef, among coral rubble and undersides of coral overhangs, 3-45m.

Remarks.--A common species in the forereef environment, *M. tequestae* is distinguished from the other melphidippid, *G. myersi*, by the normal coxa 3, dorsally serrate pleonites and urosomites, and the lanceolate uropod 3.

Family Nuuanidae

Diagnosis.--Eyes weak, ommatidia scattered; accessory flagellum present; inner lobes of lower lip absent; ventral margin on article 2, pereopods 5-7 bluntly serrate; article 2 of pereopod 7 circular or shield-shaped; uropod 3 short, inner ramus scale-like, outer ramus with 2 articles.

Remarks.--Placement of this genus at family level has been problematic. The family Gammarellidae was suggested by Barnard and Barnard, 1983. Members of the genus *Tabatzius* are distinguished by the serrate article 2 of pereopods 5- 7, the styliform maxilla 1, and dispersed ommatidia.

Key to genera and species

1. --Maxilla 1 styliform (Figure 79) ....*Tabatzius muelleri*

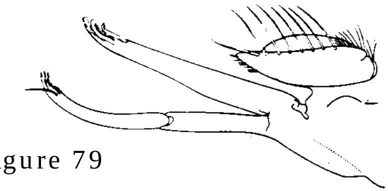


Figure 79

Tabatzius muelleri (Ortiz) 1976
Figure 79

-*Nuuanu muelleri* **Ortiz, 1976, figs, 1-3.**
-*Tabatzius copillius* **McKinney and Barnard, 1977:161-171, figs. 1-3.**

Distribution.--Atlantic Ocean: Florida Keys. Caribbean Sea: Yucatan, Belize; 0.5-2.0m.

Ecology.--Reef flat, Taken just behind the forereef, under coral rubble in 1-2 m. *T. muelleri* prefers rocky algal turf substrate in shallow, turbulent areas of the reef.

Remarks.--The color of this species is a uniform white, eyes in fresh material yellow. The proper family designation for this group has changed a number of times. Nuuanidae is used for convenience, but it has also been placed in the Gammaridae (Barnard, 1971) and the Gammarellidae (Barnard and Barnard, 1983).

Family Ochlesidae

Diagnosis.--Accessory flagellum absent; mouthparts projecting conically; coxae 3 and 4 elongate; body extremely flattened laterally, compressed, pereonites with sharp dorsal carina; maxilliped palp absent or uniarticulate; uropod 3, rami lanceolate, sparsely armed.

Remarks.--The general body shape resembles that of the Acanthonotozomatidae to which ochlesids are closely related. Only the genus *Curidia* is reported from the Atlantic Ocean. Species are small and cryptic, and thus easily overlooked in collections. The large, conical shape of the mouthpart field, and the styliform nature of the mouthparts suggest a parasitic mode of existence. Barnard and Karaman, (1991) relegated ochlesids to a subfamily of the Iphimediidae, a geographically widespread and taxonomicallly diverse group. The family status of ochelsids is maintained here for convenience. See Iphimediidae elsewhere in this manual.

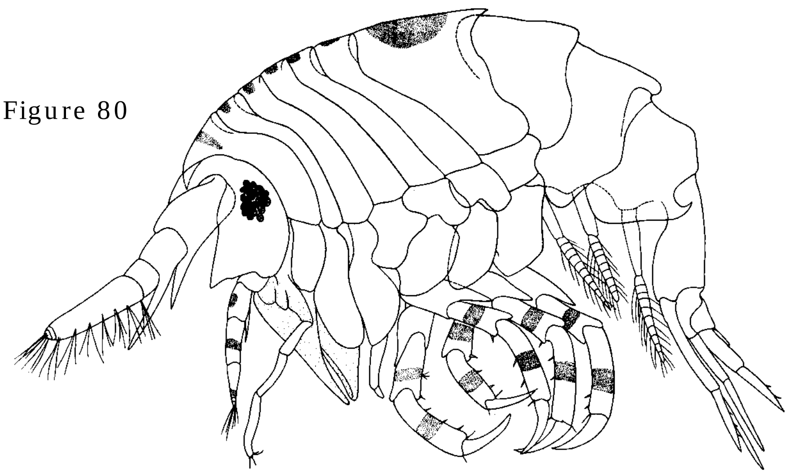
Key to genera and species

1. --Articles 1 and 2 of antenna 1 with ventral cusp; head with acute anterior process
....*Curidia debrogania*

Curidia debrogania Thomas, 1983
Figure 8, 80

-*Curidia debrogania* **Thomas 1983:127-133, figs. 1-3.**

Figure 80



Distribution.--Atlantic Ocean: Florida Keys to Biscayne Bay. Caribbean Sea: Belize; 2-20m.

Ecology.--Found in all reef areas subject to wave surge or current flow, usually on rocky substrates with attached algae.

Remarks.--This species, though infrequently collected, is probably more abundant than represented in collections. Color in fresh material is mottled white and light tan. This color pattern blends well with the typical substrate inhabited by *C. debrogania*. The extremely compressed body with sharp dorsal carina and distinct color pattern allow easy identification of this species despite its small size.

Family Oedicerotidae

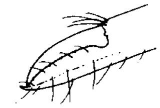
Diagnosis.--Accessory flagellum absent or vestigial; eyes, when present, usually coalesced dorsally; pereopod 7 much longer than 6; rami of uropod 3 scarcely longer than elongate peduncle.

Remarks.--Members of this family are common in bottom sediments. Three shallow water genera are found in the Florida Keys: *Synchelidium*, *Monoculodes*, and *Periculodes*.

Key to genera and species

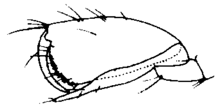
1. --Gnathopod 2 slender, chelate (Figure 81) .... *Synchelidium americanum*

Figure 81



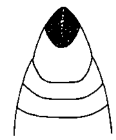
--Gnathopod 2 subchelate (Figure 82) 2

Figure 82



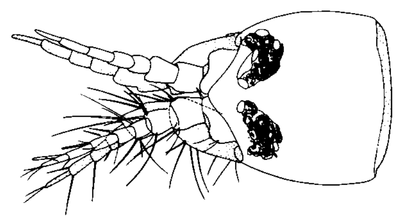
2. --Eyes large, coalesced dorsally (Figure 83) ....*Monoculodes nyei*

Figure 83



--Eyes consisting of 2 small red crescents (Figure 84) ....*Perioculodes cerasinus*

Figure 84



Monoculodes nyei Shoemaker, 1933b
Figure 85a-c

-*Monoculodes nyei* **Shoemaker, 1933b:9-10, fig. 5; J.L. Barnard. 1962d:367, fig. 9.**

Figure 85a

Figure 85b

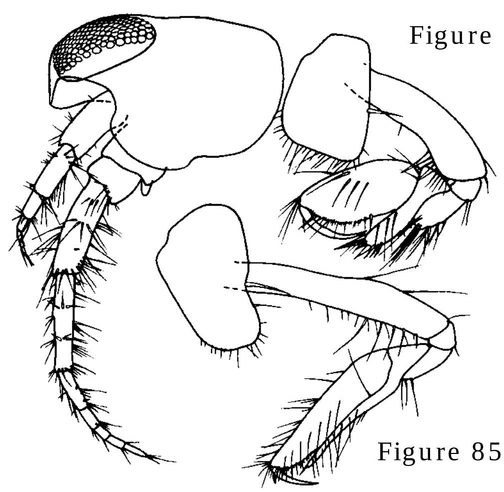


Figure 85c

Distribution.--Atlantic Ocean: Brazil; Florida Keys and Biscayne Bay. Caribbean Sea: Belize. Gulf of Mexico, south Texas.

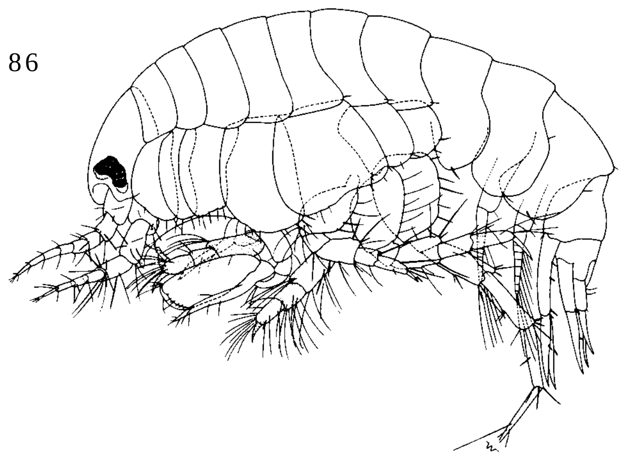
Ecology.--Backreef, lagoon, fine sediments, 2-5m.

Remarks.--The dorsally coalesced eye (figure 85a), subchelate gnathopod 1 (figure 85b), and the elongate article 6 and distal lobe of article 5 of gnathopod 2 (Figure 85c), distinguish this species from all other *Monoculodes*. See Barnard (1962d) for a general key to oedicerotid species.

Perioculodes cerasinus Thomas and Barnard, 1985b
Figures 84, 86

-*Perioculodes cerasinus* **Thomas and Barnard, 1985b:98-106, figs. 1-3.**

Figure 86



Distribution.--Atlantic Ocean: Biscayne Bay to Florida Keys. Caribbean Sea: Belize; 1-8.2m.

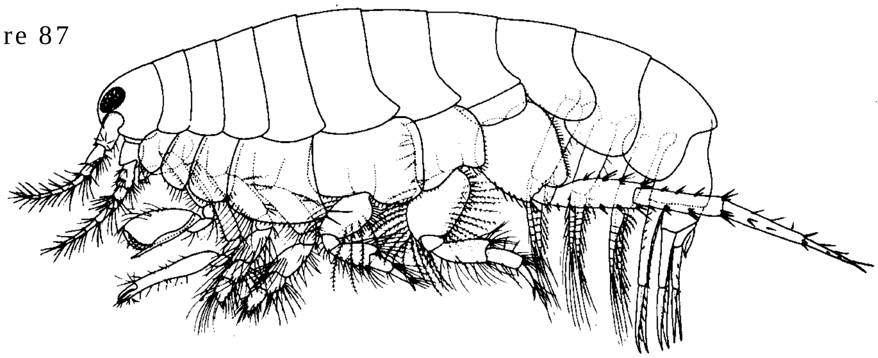
Ecology.--A cryptic infaunal species, possibly inhabiting pockets of fine sediment in rocky substrates.

Remarks.--The cherry-red eye crescents are distinctive, the color persisting in preservative.

Synchelidium americanum Bousfield, 1973
Figures 81, 87

-*Synchelidium americanum* **Bousfield, 1973:98-99, pl. XX.1.**

Figure 87



Distribution.--Atlantic Ocean: Central Maine to Cape Cod, southward to Florida, Florida Keys. Gulf of Mexico. Caribbean Sea: Belize; 1-7m.

Ecology.--Common in sediments from forereef, lagoon, and rubble zone habitats.

Remarks.--This species is common in Florida Keys Waters, preferring medium to coarse well sorted sediments.

Family Phliantidae

Diagnosis.--Accessory flagellum lacking; body dorsally depressed, at least anterior coxae spread laterally; mandible lacking palp, molar degraded; gnathopods feeble; uropod 3 lacking inner ramus, often lacking both rami.

Remarks.--Among the most unusual of amphipod families, the phliantids are distinguished by their dorsoventrally flattened profile. The genus *Pariphinotus* is reported from the Atlantic and Caribbean. Barnard and Karaman, 1991:583; reassigned *Heterophlia* to *Pariphinotus*.

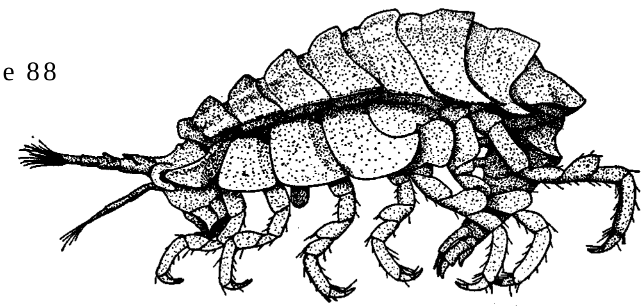
Key to genera and species

1. --Inner ramus of pleopod 3 half as long as outer; uropod 3 lacking rami; gnathopods simple .... *P. seclusus*

Pariphinotus seclusus (Shoemaker) 1933a
Figures 7, 88

-*Heterophlias seclusus* **Shoemaker, 1933a:250-252, figs. 4-5; J.L. Barnard, 1962b:79-80, fig. 5; 1969:406, fig. 145a-b; 1979:131, fig. 40; Wakabara and Leite, 1977:90-96, figs. 1-4**

Figure 88



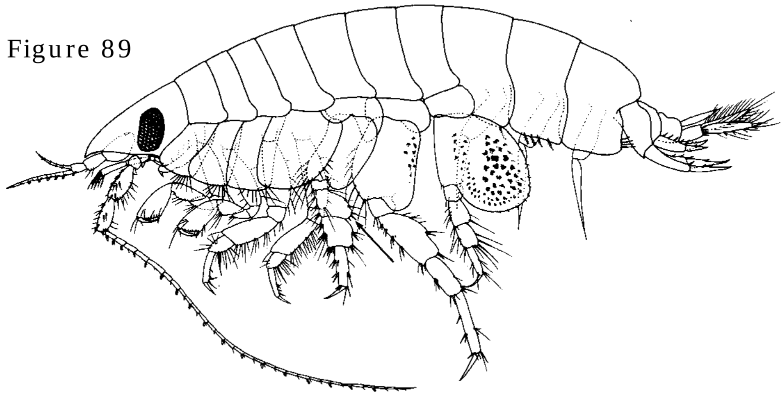
Distribution.--Atlantic Ocean: Cape Hatteras to Florida Keys, Brazil. Caribbean Sea: Belize; to 20m.

Ecology.--Forereef, under rubble in sand, 4-12m.

Remarks.--This species is frequently found in cavities on the underside of rocks and coral rubble in shallow water. Color in life and in freshly preserved material ranges from crimson red to dull brown. Brilliant red specimens are often collected from rubble with numerous growths of the tuberculate benthic foraminiferan, *Homotrema*, which is bright red to maroon in color.

Family Phoxocephalidae

Figure 89



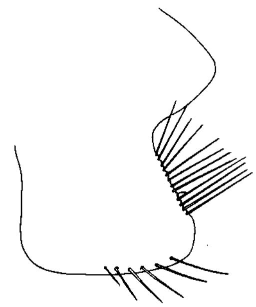
Diagnosis.--Accessory flagellum well developed and multiarticulate; head elongate with overhanging rostrum; pereopod 7 shorter and of different form than pereopod 6; pereopods strongly setose and spinose (fossorial); uropod 3 biramous.

Remarks.--The phoxocephalids and haustoriids represent the most widespread infaunal amphipods in sandy substrates. Another related family, Platyischnopidae, are sporadically abundant in tropical coastal areas. (A single genus, *Metharpinia*, was common in the reef complex, but other genera and species of phoxocephalids will undoubtedly be reported in the future. Male phoxocephalids are attracted to lights and a night collection can yield swarms of specimens.

Key to genera and species

1. --Rostrum constricted in front of eyes; rami of uropods 1 and 2 bearing accessory apical spines; setae on article 2 of antenna 1 confined to apex; epimeron 3 with 11-12 posterior setae, and 6 ventral setae (Figure 90) .... *Metharpinia floridana*

Figure 90



Metharpinia floridana (Shoemaker) 1933b
Figure 90

-*Pontharpinia floridana* **Shoemaker, 1933b:5-8, figs. 3-4.**
-*Paraphoxus floridanus*. **J.L. Barnard, 1960:226-230, pl. 21.**
-*Metharpinia floridana*. **J.L. Barnard, 1980:124-128, fig. 5.**

Distribution.--Atlantic Ocean: South Carolina to Cuba; 0-6m.

Ecology.--Lagoon, forereef, rubble zone, in carbonate sands, 1.5-6.0m.

Remarks.--Species are separated with difficulty in the phoxocephalids and it is beyond the scope of this guidebook to provide an exhaustive account of the family. For further discussion of this group, consult Barnard, 1982; Barnard and Drummond, 1978; and Barnard and Barnard, 1981, 1982.

Family Platyischnopidae

Diagnosis: Anterior end of body tapering, shark-like; rostrum strong, cylindrical; coxa 4 dominant and posteriorly excavate; uropod 3, inner ramus small, scale-like, outer ramus elongate, 2-segmented.

Remarks.--Platyischniopids are abundant from inshore sediments, but can be sporadically numerous in reef sediments. They are fast swimmers and rapid burrowers, and are effective predators in the benthic environment (Thomas and Barnard, 1983a). The genus *Eudevanopus* is represented in the Florida Keys by a single species.

Key to genera and species

1. --Inner and outer rami of uropod 2 with 2 dorsal spines each, article 2 of uropod 3 with 3 x 2 spines .... *Eudevanopus honduranus*

Eudevanopus honduranus Thomas and Barnard, 1983a
Figure 91

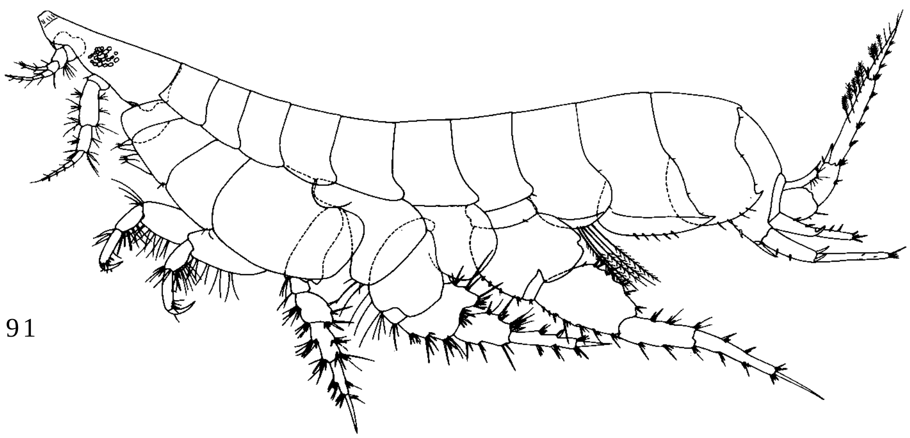


Figure 91

-*Eudevanopus honduranus* Thomas and Barnard, 1983a:12-19, figs. 3-6.

Distribution.--Atlantic Ocean: South Carolina to Venezuela. Caribbean Sea: Belize; 1-10m.

Ecology.--Fine to coarse wave-washed sediments.

Remarks.--Reproductive males are occasionally abundant in the water column. The general body and head shape of *E. honduranus* are distinctive.

Family Podoceridae

Diagnosis.--Accessory flagellum variable, often absent; urosome depressed, segment 1 more than twice as long as segment 2; uropod 3 generally vestigial or abnormal; telson entire.

Remarks.--The podocerids resemble corophiids but are distinguished by their elongate urosomite 1. They are common fouling organisms in areas of wave activity and currents.

Key to genera and species

1. --Coxa 1, ventral margin straight, pleonites 6-7 and urosomite 1 smooth dorsally 2

--Coxa 1, ventral margin with notch; pleonites 6-7 and urosomite 1 with dorsal projection .... *Podocerus kleidus*

2. --Palm of gnathopod 2 straight, densely setose.................... *Podocerus brasiliensis*

--Palm of gnathopod 2 slightly convex, with 2 notches, sparsely setose .... *Podocerus chelonophilus*

Podocerus brasiliensis (Dana) 1853
Figure 92

-*Platophium brasiliense* **Dana, 1853:838, fig. 9a-l.**
-*Podocerus brasiliensis* **Stebbing, 1899:239; Culpepper and Pequegnat, 1969:43-45; Barnard, 1970:237-240, fig. 156-157; Barnard, Thomas, and Sandved, 1988:241-242, fig 1d.**

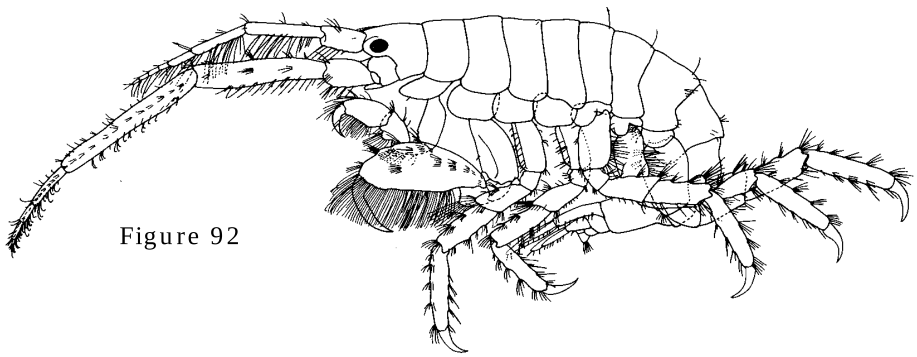


Figure 92

Distribution.--Cosmopolitan in warm temperate seas.

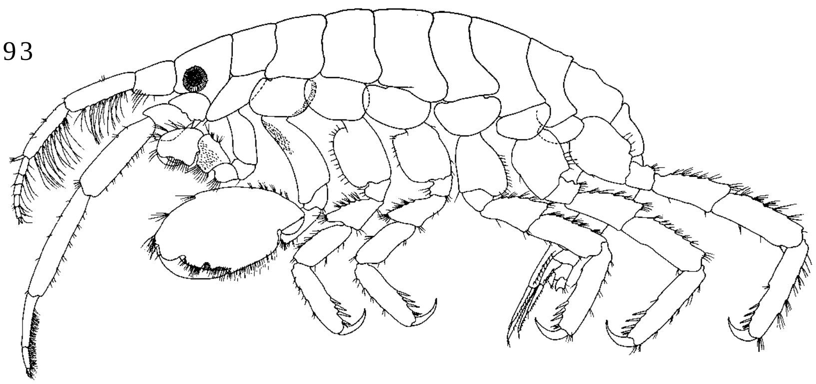
Ecology.--Found primarily on flotsam, pilings, and wave washed rocks in the rubble zone.

Remarks.--This species has been widely distributed by ships and by rafting on floating substrates. Color in life and fresh material, brownish, with light beige chevrons on the dorsum of the pereon. See Barnard, Thomas and Sandved (1988) for details on the behavior of *P. brasiliensis*.

Podocerus chelonophilus (Chevreux and de Guerne, 1888)
Figure 93

Cyptophium chelonophilum **Chevreux and deGuerne, 1888:1-4.**
-Podocerus chelonophilus **Thomas and Barnard, 1992a:309-314, figs. 1-3.**

Figure 93



Distribution.--Algeria; Azores; South Carolina; Florida and Florida Keys; on carapace of the loggerhead turtle *Caretta caretta*.

Ecology.--Reported only from the carapace of loggerhead turtles.

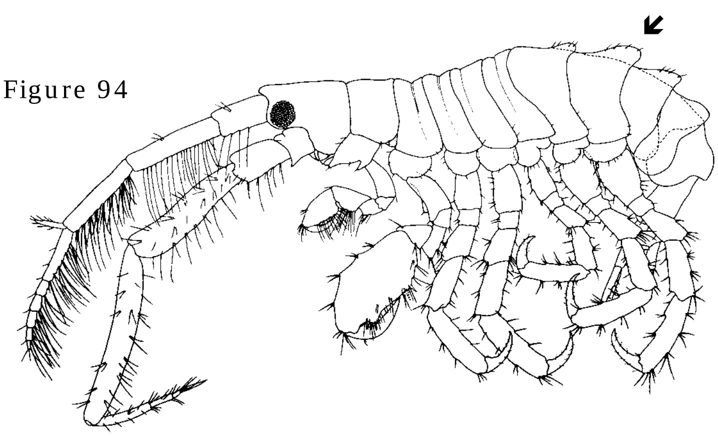
Remarks.--This species is common on the underside of the carapace of loggerhead turtles, and may be more widespread than the few published records would indicate.

Podocerus kleidus Thomas and Barnard, 1992b
Figure 94

-Podocerus kleidus **Thomas and Barnard, 1992b:309-314, figs. 1-3.**

Distribution.--Atlantic Ocean: Florida Keys; to 6.5m.

Figure 94

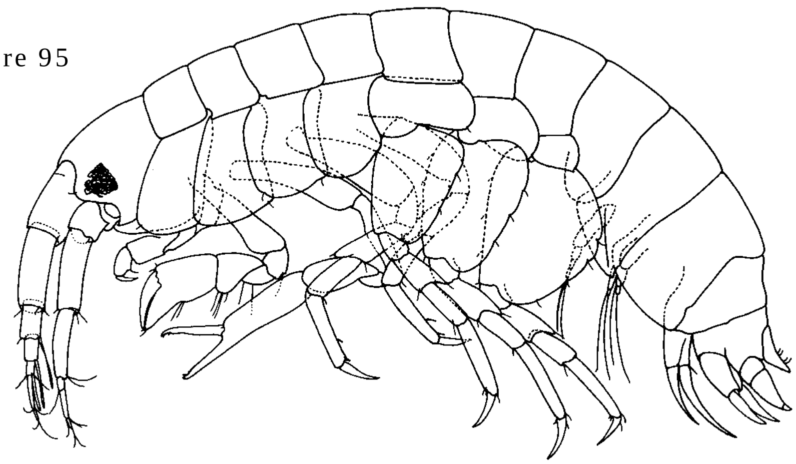


Ecology.--In tubes, attached to erect substrates (algae, gorgonians in areas of current flow and wave action. Also observed by the author to leave its tube and wander about the substrate.

Remarks.--The ventral notch on coxa 1 and the dorsal processes on the pleonites and urosomites identify the species.

Family **Sebidae**

Figure 95



Diagnosis.--Accessory flagellum 2-articulate, elongate; antenna 1 peduncle elongate; gnathopods 1 and 2 chelate, gnathopod 1 larger than 2; uropod 3 uniramous; urosomites 2-3 fused; telson entire.

Remarks.--Members of this family resemble colomastigids but are distinguished by the chelate gnathopods. Sebids are cryptic, found inside small cavities in limestone rocks and rubble. The family is represented in the Florida Keys by a single marine genus, *Seba*.

Key to genera and species

1. **--**Epimeral plates with spinose ventral margins ....*Seba tropica*

Seba tropica McKinney, 1980
Figures 10, 95

-*Seba tropica* **McKinney, 1980:99-102, fig. 8-9.**

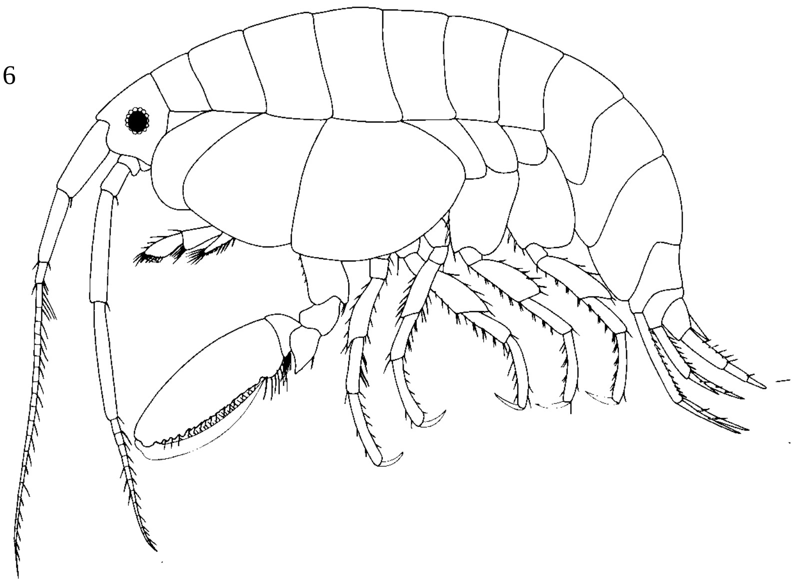
Distribution.--Atlantic Ocean: Florida Keys to Biscayne Bay, Gulf of Mexico; Caribbean Sea: Belize.

Ecology.--This species is found inside pieces of coral rubble, 3-12m.

Remarks.--Eyes in fresh material exhibit a few scattered yellow ommatidia. Color in life and fresh material ivory.

Family Stenothoidae

Figure 96



Diagnosis.--Accessory flagellum absent or composed of 1-2 vestigial articles; coxa 1 small, always partially covered by following coxae; coxa 4 large, shield-shaped, not excavate posteriorly; uropod 3 uniramous, ramus 2-articulate.

Remarks.--The unusual condition of uropod 3 and the morphology of coxae 1-4 distinguish the members of this family. Stenothoids are usually associated with hydroids or bryozoans.

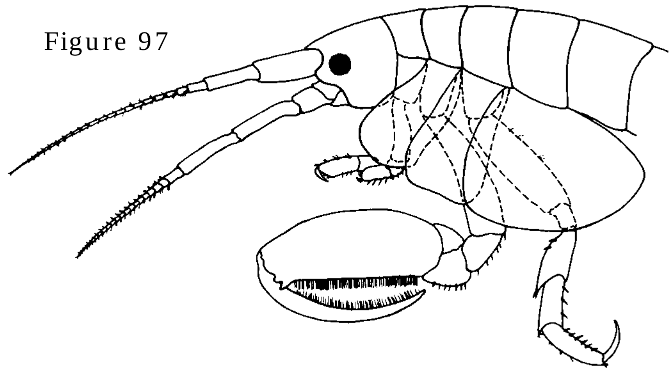
Key to genera and species

1. --Pereopods 6 and 7, article 2 expanded; accessory flagellum absent; mandibular
palp absent ....*Stenothoe gallensis*

Stenothoe gallensis Walker, 1904
Figure 97

-*Stenothoe gallensis* Walker, 1904:261-262, plate 3, fig 19.
-*Stenothoe gallensis* Culpepper and Pequegnat, 1969:45-54, figs. 8-9.

Figure 97



Distribution.--Cosmopolitan in warm temperate and tropical seas.

Ecology.--Associated with growths of hydroids and bryozoans on the undersides of coral overhangs in the spur and groove, forereef.

Remarks.--Another genus, *Parametopella,* is reported from the Gulf of Mexico but members of this genus have a linear article 2 on pereopods 6-7 and were not collected during this study.

Family Synopiidae

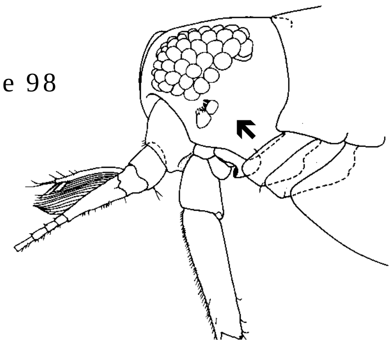
Diagnosis.--Accessory flagellum multiarticulate; head usually massive; gnathopods feeble, scarcely subchelate or simple; telson elongate.

Remarks.--The Synopiidae were revised by J.L. Barnard, 1972, to include the family Tironidae. Little is known of the taxonomy and ecology of Caribbean synopiids. Recent papers by Just, 1981, and Goeke, 1982, have described new taxa and provided interesting ecological observations on this group. Two synopiid genera, *Synopia* and *Metatiron*, are found in Florida Keys waters and are also widespread in the tropics. They occur as infaunal components in daylight, or swarming in the water column at night where they are frequently attracted to underwater lights.

Key to genera and species

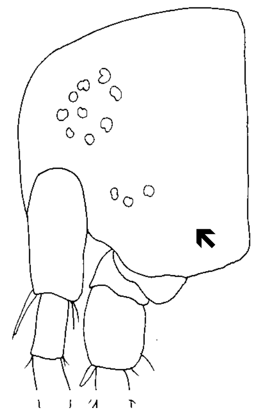
1. --Primary eye with numerous (40+) compact ommatidia; accessory eye with 2 ommatidia (Figure 98); mandibular palp extremely stout; pleonites 4-6 lacking dorsal processes ....*Synopia ultramarina*

Figure 98



--Primary eye composed of few (7-9) scattered ommatidia; accessory eye with 3 ommatidia (Figure 99); mandibular palp lacking; pleonites 4-6 each with 1 dorsal tooth .... *Metatiron triocellatus*

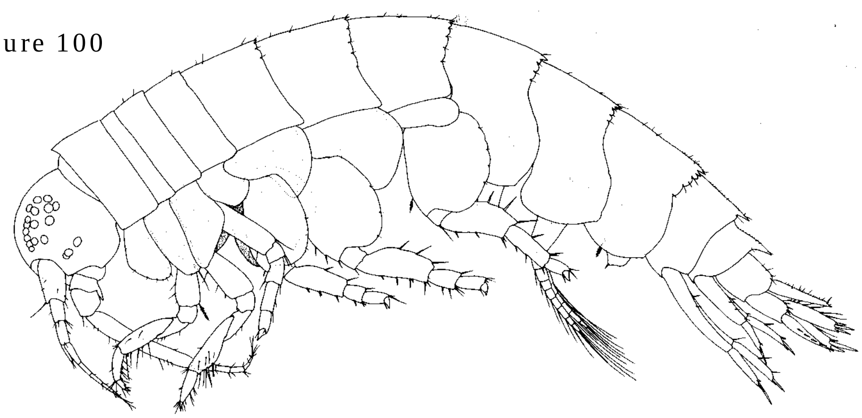
Figure 99



Metatiron triocellatus (Goeke) 1982
Figures 99-100

-*Tiron triocellatus*, Goeke, 1982:148-153, figs. 1-2.
-(?)*Tiron bellairsi* Just, 1981:260-263, figs 1-4.

Figure 100



Distribution:--Western Atlantic Ocean; North Carolina, Florida Keys; Gulf of Mexico; to 15m.

Ecology.--Observed by the author to swim in a circular motion in the water column, and to burrow and cover itself with sediment grains in similar fashion to *S. ultramarina*.

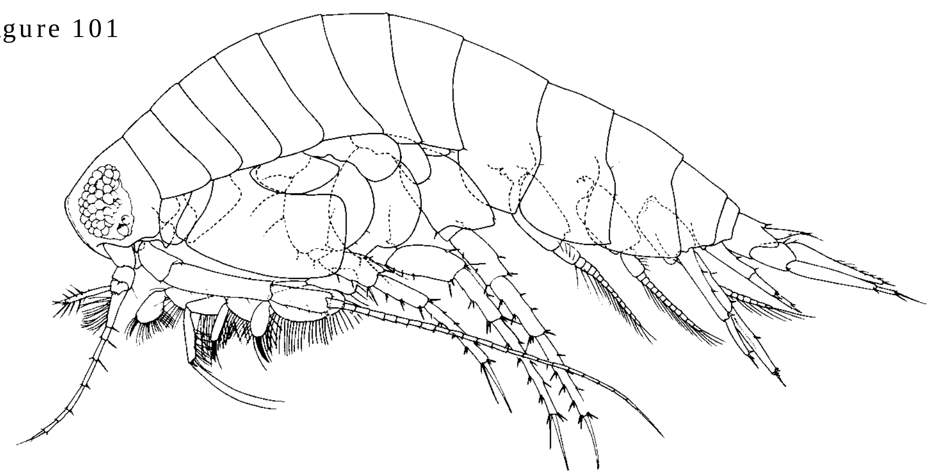
Remarks.--Another synopiid, *M. bellairsi* Just, 1981 has been reported from reef sediments in Barbados. The relationship of *M. bellairsi* Just, 1981 to *M. triocellatus* is uncertain at present. These taxa were described simultaneously, neither author aware of the other's material. They are closely related, if not the same species. *M. bellairsi* has approximately 20 scattered ommatidia in the primary eye, versus nine in *M. triocellatus*. The accessory eye of *M. triocellatus* is composed of the three distinctly separated ommatidia, while in *M. bellairsi* two of the ommatidia are closely appressed.

Rabindrinath (1972) originally described the genus *Metatiron*, based on the absence of a mandibular palp and the presence of dorsal teeth on pleonites 4-6. Just (1981) discussed the application of *Metatiron* to his Barbados material but rejected its use. Barnard and Karaman's diagnosis of *Metatiron* (1991:714) did not reassign relevant species of *Tiron* to *Metatiron*. Resolution of this problem will require a complete literature review and observation of specimens to check for the condition of the mandibular palp and the presence of dorsal teeth on the pereon. To avoid further confusion, species from Florida Keys reefs are assigned to *Metatiron* until the situation can be clarified. In all probability, *Metatiron* will take priority for these and other species currently in *Tiron*.

Synopia ultramarina Dana, 1853
Figures 98, 101

-*Synopia ultramarina* **Shoemaker, 1945:195, text fig. 8; Barnard and Thomas, 1989a: 363-368, figs. 1-4, part.**

Figure 101



Distribution.--Tropical Atlantic; Caribbean Sea; Florida Keys; neritic and epipelagic.

Ecology.--Coarse carbonate sands in the forereef zone, 6-15m. Rare in daylight hours, swarming in large numbers at night. *In situ* observations of live material in the water column show that *S. ultramarina* swims in a rapid, spiraling motion toward the bottom where they plunge headlong into the sediment and turn sideways, covering themselves with a thin layer of sediment grains held in place over the body by the dactyls of pereopods 3-7.

Remarks.--A number of undescribed species undoubtedly remain in both *Tiron* and *Synopia*. Unfortunately, the only reliable means to separate these two genera is to dissect and mount the mandible and note the presence or absence of the mandibular palp. Readers are referred to the above references for further discussion of this group.

GLOSSARY

ACUMINATE. Tapering to a sharp point.

APICAL. The end of a process or appendage.

BIRAMOUS. Having two branches, or rami.

CARINATE. Having a sharp middorsal ridge, or carina.

CARPOCHELATE. Immovable finger of gnathopod occurring on the 5th article, or carpus.

CHELATE. Article 6 of a gnathopod protruding as an immovable finger.

CRYPTOFAUNAL. Living in a cryptic, or hidden, habitat. many reef-dwelling amphipods are in this category.

DEMERSAL. Living on or near the bottom, but having the ability for active swimming.

DENTICULATE. Bearing small sharp, or tooth-like, structures.

EMARGINATE. Margin broken by notch, projection, or indentation.

FLABELLATE. Flattened, usually rounded apically.

FOSSORIAL. Adapted for digging or burrowing, appendages usually heavily setose or spinose.

LANCEOLATE. Flattened, tapering to a point.

MEDIAL. The inner surface.

OMMATIDIA. Individual facets of the compound eye.

RAMUS, RAMI. Elements of the uropod(s).

SERRATE. A series of regular teeth or notches.

SOMITE. Body segment.

SPINOSE. Having numerous spines.

STYLIFORM. Rounded, tapering to a fine point.

SUBCHELATE. Article 6 of a gnathopod bearing a palm against which article 7 closes; in this condition the palm is not produced to form an immovable finger.

TRITURATIVE. The rasp-like surface of the mandibular molar.

TUBERCULATE. Having numerous small, rounded projections.

UNIRAMOUS. Having a single ramus, or branch.

UROSOMITE. A segment of the urosome.

VERMIFORM. Long and cylindrical, worm-like.

LITERATURE CITED

Audouin, V. 1826. Explication sommaire des planches de crustaces de l' Egypte et de la Syrie, publiees par Jules-Cesar Savigny, membre de l'Institut; offrant un expose des caracteres naturels des genres, avec la distinction des especes. *Description de l'Egypte, Histoire Naturelle,* 1:77-98.

Barnard, J.L. 1960. The amphipod family Phoxocephalidae in the eastern Pacific Ocean, with analyses of other species and notes for a revision of the family. *Allan Hancock Pacific Expeditions*, 18(3):175-386, 75 plates.

_____ 1962a. Benthic Marine Amphipoda of southern California: Families Aoridae, Photidae, Ischyroceridae, Corophiidae, Podoceridae. *Pacific Naturalist*,3 (1):3-72, figures 1-32

_____ 1962b. Benthic Marine Amphipoda of southern California: Families Tironidae to Gammaridae. *Ibid*, 3 (2):73-115, figures 1-23.

_____ 1962c. Benthic Marine Amphipoda of southern California: Families Amphilochidae, Leucothoidae, Stenothoidae, Argissidae, Hyalidae. *Ibid*, 3 (3):116-163, figures 1-23.

_____ 1962d. Benthic marine Amphipoda of southern California: Family Oedicerotidae. *Ibid*, 3(12):349-371, figures. 1-10.

_____ 1965a. Marine Amphipoda of the family Ampithoidae from southern California. *Proceedings of the U.S.National Museum*, 118:1-46, figures 1-28.

_____ 1965b. Marine Amphipoda of atolls in Micronesia. *Ibid*, 117:459-552, figures 1-35.

_____ 1969. The families and genera of marine Gammaridean Amphipoda. *Bulletin of the U.S. National Museum*, 271: 535 pages, 173 figures.

_____ 1970. Sublittoral Gammaridea (Amphipoda) of the Hawaiian Islands. *Smithsonian Contributions to Zoology,* 34:286 pages, 180 figures.

_____ 1971. Keys to the Hawaiian marine Gammaridea, 0-30m. *Ibid*, 58: 135 pages, 68 figures.

_____ 1972a. Gammaridean Amphipoda of Australia Part I. *Ibid*, 103: 333 pages, 194 figures.

_____ 1972b. A review of the family Synopiidae (=Tironidae), mainly distributed in the deep sea (Crustacea: Amphipoda). *Ibid*, 124: 94 pages, figures 1-46.

_____ 1973. Revision of the Corophiidae and related families (Amphipoda). *Ibid*, 151: 27 pages, 1 figure.

_____ 1979. Littoral gammaridean Amphipoda from the Gulf of California and the Galapagos islands. *Ibid*, 271: 49 pages, 74 figures.

_____ 1980. Revision of Metharpinia and Microphoxus (Marine Phoxocephalid Amphipoda from the Americas). Proceedings of the Biological Society of Washington, 93:104-135, figures. 1-5.

Barnard, J.L. and C.M. Barnard. 1981. The amphipod genera *Eobrolgus* and *Eyakia* (Crustacea:Phoxocephalidae) in the Pacific Ocean. *Ibid*, 94(1):295-313, figure 1.

______ 1982. Revision of *Foxiphalus* and *Eobrolgus* (Crustacea:Amphipoda:Phoxocephalidae) from American Oceans. *Smithsonian Contributions to Zoology*, 372:325 pages, 5 figures.

______ 1983. *Freshwater Amphipoda of the World, I and II.* Hayfield Associates, 830 pages, 50 figures.

Barnard, J.L. and M.M. Drummond. 1978. Gammaridean Amphipoda of Australia, Part III: The Phoxocephalidae. *Smithsonian Contributions to Zoology*, 245: 551 pages, 269 figures.

Barnard, J.L. and G.S. Karaman, 1991. The families and genera of marine gammaridean Amphipoda (except marine Gammaroids). *Records of the Australian Museum,* Supplement 13 (parts 1, 2). 866 pages, 133 pls.

Barnard, J.L. and J.D. Thomas. 1983. A new species of *Amphilochus* from the gorgonian *Pterogorgia anceps* in the Caribbean Sea. *In* P.A. John, editor, *Selected Papers on Crustacea*:179-187, figures 1-3. Trivandrum: The Aquarium.

______ 1987a. New species of *Neomegamphopus* from Tropical America (Crustacea: Marine Amphipoda). *Proceedings of the Biological Society of Washington,* 100:147-163, figures 1-6.

______ 1987b. A New Species of *Chevalia* from the Caribbean Sea (Crustacea: Amphipoda). *Ibid*, 100: 532-542, 6 figures.

______ 1989a. Four species of Synopiidae from the Caribbean region (Crustacea: Amphipoda). *Ibid*, 102: 362-374, 6 figures.

______ 1989b. A new species, *Ampelisca burkei* (Crustacea, Amphipoda) from Florida. *Ibid*, 102: 375-384, figures 1-5.

Barnard, J.L., J.D. Thomas.and K. Sandved. 1988. Behavior of Gammaridean Amphipoda (Crustacea): *Corophium, Grandidierella, Podocerus,* and *Gibberosus* (American *Megaluropus*, in Florida. *Crustaceana,* Supplement 13: 234-244, 1 figure.

Bate, C.S. 1862. *Catalogue of the Specimens of Amphipodous Crustacea in the Collection of the British Museum,* iv and 399 pages, plates 1, 1a, 2-58. London:British Museum of Natural History.

Bousfield, E.L. 1973. *Shallow-water Gammaridean Amphipoda of New England.* Ithaca and London: Cornell University Press, 312 pages, 69 plates.

Bynum, K.H., and R.S. Fox . 1977. New and noteworthy amphipod crustaceans from North Carolina, U.S.A. *Chesapeake Science,* 18:1-33, figures 1-18.

Chevreux, E. and J. de Guerne. 1888. Sur un amphipode nouveau (*Cyrtophium chelonophilum),* commensal de *Thalassocaretta* L. *Comptes Rendus Academie des Sciences,* Paris, 88:4 pages

Chevreux, E., and L. Fage. 1925. Amphipodes. *Faune de France,* 9:488 pages, 438 figures.

Culpepper, T.J., and W.E. Pequegnat. 1969. A Taxonomic and Ecological Study of Selected Benthic Gammarid Crustaceans from the Northeastern Gulf of Mexico. *Texas A&M University, Department of Oceanography, A&M Project 286-6*:102 pages (mimeograph).

Dana, J.D. 1853. Crustacea. Part II. *United States Exploring Expedition,* 14:689-1618, atlas of 96 plates.

Della-Valle, A. 1893. Gammarini del Golfo di Napoli. *Fauna und Flora des Golfes von Neapel und der angrenzenden Meeres- Abschnitte.* Monographie, 20:xi and 948 pages, atlas (Atlante) of 61 plates.

Fox, R.S. 1973. *Ceradocus shoemakeri* and *Eriopisa schoenerae,* New Amphipods (Crustacea:Gammaridae) from the Bahama Islands. *Journal of the Elisha Mitchell Scientific Society,* 89:147-159, figures 1-8.

Goeke, G.D. 1982. *Tiron triocellatus,* a new species of Amphipod (Gammaridea: Synopiidae) from the Western Atlantic and Gulf of Mexico. *Journal of Crustacean Biology*,2(1):148-153, figures 1-2.

Heard, R.W., and D.G. Perlmutter. 1977. Description of *Colomastix janiceae* n.sp., a commensal amphipod (Gammaridea:Colomastigidae) from the Florida Keys, USA. *Proceedings of the Biological Society of Washington,* 90:30-42, figures 1-4.

Holmes, S.J. 1903. Synopses of North-American invertebrates. *American Naturalist,* 37:267-292.

______ 1905. The Amphipoda of Southern New England. *Bulletin of the United States Bureau of Fisheries,* 24:459-529, numerous unnumbered figures, 13 plates.

______ 1908. The Amphipoda collected by the United States Bureau of Fisheries Steamer, *Albatross,* off the West Coast of North America, in 1903 and 1904, with descriptions of a new family and several new genera and species. *Proceedings of the United States National Museum,* 35:489-543, figures 1-46.

Just, Jean. 1981. *Tiron bellairsi* sp.n. (Amphipoda, Synopiidae) from Coral Sand in Barbados, with notes on behaviour. *Zoologica Scripta,* 10:259-263, figures 1-4.

Kaufman, L. 1977. The three spot damselfish: Effects on benthic biota of Caribbean coral reefs. *Proceedings, Third International Coral Reef Symposium, Miami,* I:559-564.

Kunkel, B.W. 1918. The Arthrostraca of Connecticut. *Connecticut Geological and Natural History Survey, Bulletin, Amphipoda*, 26(1):15-181, figures 1-55

Lowry, J.K. and H.E. Stoddart. 1986. Protandrous hermaphrodites among the Lysianassoid Amphipoda. *Journal of Crustacean Biology*, 6(4):742-748, 3 figures.

Lowry , J.K. and J.D. Thomas. 1991. A new species of *Cerapus* from Cudjoe Channel, Lower Florida Keys, USA, with notes on male behaviour (Crustacea: Amphipoda: Corophioidea). *Journal of Natural History*, 25:1461-1467, figures 1-4.

McKinney, L.D. 1978. Amphilochidae (Crustacea: Amphipoda) from the Western Gulf of Mexico and Caribbean Sea. *Gulf Research Reports*, 6:137-143, figures 1-4.

______ 1979. Liljeborgiid Amphipods from the Gulf of Mexico and Caribbean Sea. *Bulletin of Marine Science,* 29:140-154, figures 1-8.

______ 1980. Four New and Unusual Amphipods from the Gulf of Mexico and Caribbean Sea. *Proceedings of the Biological Society of Washington,* 93:83-103, figures 1-9.

McKinney, L.D., and J.L. Barnard. 1977. A New Marine Genus and Species of the *Nuuanu*-group (Crustacea, Amphipoda) from the Yucatan Peninsula. *Ibid,* 90(1):161-171, figures 1-3.

Myers, Alan A. 1977a. Studies on the Genus *Lembos* Bate. V. Atlantic Species: *L. smithi* (Holmes). *L. brunneomaculatus* sp.nov., *L. minimus* sp.nov., *L. unifasciatus* sp.nov. *Bollettino del Museo Civico di Storia Naturale, Verona,* 4:95-124, figures 112-132.

______ 1977b. Studies on the Genus *Lembos* Bate. VI. Atlantic Species: *L. dentischium* sp.nov., *L. kunkelae* sp. nov., *L. rectangulatus* sp.nov., *L. unicornis* Bynum & Fox. *Bollettino del Museo Civico di Storia Naturale, Verona,* 4:125-154, figures 133-152.

______. 1979a. Studies on the Genus *Lembos* Bate VIII. *Ibid*, 6:221-248, figures 171-186.

______ 1979b. Studies on the Genus *Lembos* Bate IX. *Ibid*, 6:249-275, figures 187-202.

______ 1981. Amphipod Crustacea. I. Family Aoridae. *Memoirs of the Hourglass Cruises,* 5(5):1-75, figures 1-34b, plate 1, tables 1-7.

______ 1982. Family Aoridae. *In* Sandro Ruffo, editor, The Amphipoda of the Mediterranean. *Memoires de l'Institut Oceanographique,* 13: 111-158 , figures 75-105

______ 1988. A cladistic and biogeographic analyses of the Aorinae subfamily nov. *Crustaceana,* Supplement 13:167-192.

______ and D. McGrath. 1984. A Revision of the North-East Atlantic species of *Erichthonius* (Crustacea: Amphipoda). *Journal of the Marine Biological Association of the United Kingdom,* 64:379-400

Ortiz, M. 1976. Un nuevo anfipodo de aguas cubanas (Amphipoda, Gammaridea, Phliantidae). *Investigaciones Marinas Ciencias*, (8)25:21-35, figures 1-3..

Pallas, P.S. 1776. Reise durch versehiedene Provinzen des Russischen Reichs, St. Petersburg, *Kaiserlichen Academie der Wissenschaften*, 3:709 [not seen, from Stebbing 1888].

Pearse, A.S. 1912. Notes on Certain Amphipods from the Gulf of Mexico, with Descriptions of New Genera and New Species. *Proceedings of the United States National Museum*, 43(1936):369-379, figures 1-8.

Pirlot, J.M. 1936 Les amphipodes de l'expedition du Siboga. Deuxieme partie. littoraux. 1. Lysianassidae.Gammaridae. *Siboga-Expeditie*, 33e:237-328, figures 102-146.

Rabindranath, P. 1972. Three species of Gammaridean Amphipoda (Crustacea) from the Trivandrum Coast, India. *Zoologischer Anzeiger*, 188:84-97, figures 1-5.

Savigny, J.-D. 1816. Observations generales sur la bouche des arachnides, des crustaces et des entomostraces. Second Memorie. *Memories sur les Animaux sans Vertebres*, Premiere partie: 39-117, plates 1-8. Paris: Deterville.

Say, T. 1818. An Account of the Crustacea of the United States. *Journal of the Academy of Natural Sciences of Philadelphia*, 1:374-401.

Schellenberg, A. 1938. Litorale Amphipoden des Tropischen Pazifiks. *Kunglia Svenska Vetenskapsakademiens Handlingar*, (3)16(6):105 pages, 48 figures.

Shoemaker, C. R. 1926. Amphipods of the family Bateidae in the collection of the United States National Museum. *Proceedings of the United States National Museum*, 68(2626):26 pages, 16 figures.

______ 1931. A New Species of Amphipod Crustacean (Acanthonotozomatidae) from California, and Notes on *Eurystheus tenuicornis*. *Ibid*, 78(2861):8 pages, 1-4 figures.

______ 1933a. Two new genera and six new species of Amphipoda from Tortugas. *Papers from the Tortugas Laboratory*, 28(15):245-256, figures 1-8.

______ 1933b. Amphipoda from Florida and the West Indies. *American Museum Novitates*, 598:24 pages, figures 1-13.

______ 1934. Three new amphipods. Reports on the collections obtained by the first Johnson-Smithsonian deep-sea expedition to the Puerto Rican Deep. *Smithsonian Miscellaneous Collections*, 91(12): 6 pages, 3 figures.

______ 1935. The amphipods of Porto [*sic*] Rico and the Virgin Islands. *New York Academy of Sciences*, 15(2):229-253, figures 1-5.

______ 1943. A new amphipod of the genus *Corophium* from Florida. *Charleston Museum Leaflet*, 18: 6 pages, 1 figure

______ 1945. The Amphipoda of the Bermuda Oceanographic Expeditions, 1929-1931. *Zoologica, Scientific Contributions to the New York Zoological Society*, 30:185-266, 48 figures.

______ 1948. The Amphipoda of the Smithsonian-Roebling Expedition to Cuba in 1937. *Smithsonian Miscellaneous Collections*, 110(3):15 pages, 3 figures.

______ 1956. A new genus and two new species of amphipods from Dry Tortugas, Florida. *Journal of the Washington Academy of Sciences*, 46(2):61-64.

Smith, S.I. 1873. Crustacea, ex. Isopoda. *In* A.E. Verrill, editor, Report upon the Invertebrate Animals of Vineyard . . . *U.S. Commission of Fish and Fisheries. Pt. 1. Report on the Condition of the Sea Fisheries of the South Coast of New England in 1871 and 1872:*295-778, 4 figures, 38 plates.

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. Challenger during the Years 1873-1876, Zoology*, 29:xxiv and 1737 pages, 210 plates. London:Eyre and Spottiswoodie.

______ 1897. Amphipoda from the Copenhagen Museum and other Sources. *Transactions of the Linnean Society of London*, (2, Zoology) 7:25-45, plates 6-14.

______ 1899. On the true *Podocerus* and some new genera of amphipods. *Annals and Magazine of Natural History*, series 7, 3:237-241.

______ 1906. Amphipoda I. Gammaridea. *Das Tierreich*, 21:806 pages, 127 figures.

Stimpson, W. 1853. Synopsis of the marine invertebrata of Grand Manan:or the region about the mouth of the Bay of Fundy, New Brunswick. *Smithsonian Contributions to Knowledge*, 6:i-iv, 5-66, 3 plates.

Thomas, J.D. 1979. Occurrence of the amphipod *Leucothoides pottsi* Shoemaker in the tunicate *Ecteinascidia turbinata* Herdman from Big Pine Key, Florida. *Crustaceana*, 37(1):107-109.

______ 1983. *Curidia debrogania*, a new genus and species of amphipod (Crustacea: Ochlesidae) from the Barrier Reefs of Belize, Central America. *Proceedings of the Biological Society of Washington*, 96(1):127-133, figures 1-3.

______ In press. Systematics and ecology of the Anamixidae (Crustacea: Amphipoda). *Records of the Australian Museum*.

Thomas, J.D. and J.L. Barnard. 1983a. The Platyischnopidae of America (Crustacea: Amphipoda). *Smithsonian Contributions to Zoology*, 375:33 pages, 12 figures.

______ 1983b. Transformation of the *Leucothoides* morph to the *Anamixis* morph (Crustacea:Amphipoda). *Journal of Crustacean Biology*, 3: 154-157.

______ 1984. *Acanthohaustorius pansus*, a new species of sand-burrowing amphipod from Looe Key Reef, Florida Keys, with redescription and distribution data of

Acanthohaustorius bousfieldi Frame, 1980 (Amphipoda: Haustoriidae). *Proceedings of the Biological Society of Washington,* 97(4):909-926, figures 1-9.

______ 1985a. Two new species of two new gammaridan genera (Crustacea:Amphipoda) from the Florida Keys. *Ibid,* 98(1):191-203, figures 1-7.

______ 1985b. *Perioculodes cerasinus* n. sp., the first record of the genus from the Caribbean Sea (Amphipoda:Oedicerotidae). *Ibid,* 98(1):98-106, figures 1-3.

______ 1986a. New Genera and Species of the *Megaluropus* Group (Amphipoda, Megaluropidae) from American Seas. *Bulletin of Marine Science,* 38: 442-476, figures 15.

______ 1986b. Two species of *Hornellia* (subgenus *Metaceradocus*) from the Florida Keys and Belize (Amphipoda: Melphidippoidea). *Ibid,* 38:477-487, figures 1-6

______ 1988. *Elasmopus balkomanus,* a new species from the Florida Keys (Crustacea, Amphipoda). *Proceedings of the Biological Society of Washington,* 101(4):838-842, figures 1-3.

______ 1991a. A review of the *Iphimedia* (Crustacea: Amphipoda) with descriptions of three new species from Australia, Papua New Guinea and Florida. *Invertebrate Taxon,* 5: 469-485, figures 1-9.

______ 1991b. Two new species of *Netamelita* from the Caribbean Sea (Crustacea: Amphipoda: Gammaridea). *Proceedings of the Biological Society of Washington,* 104(3):583-592, figures 1-5.

______ 1992a. *Podocerus chelonophilus*, a testudinous amphipod newly recorded from the Western Atlantic Ocean. *Bulletin of Marine Science,* 50(1):108-116, figures 1-3.

______ 1992b. *Podocerus kleidus,* new species from the Florida Keys (Crustacea, Amphipoda, Dulichiidae). *Ibid,* 51(3):309-314, figures 1-2.

Thomas, J.D. and G.W. Taylor. 1981. Mouthpart morphology and feeding strategies of the commensal amphipod *Anamixis hanseni* Stebbing. *Ibid,* , 31(1):462-467, figures 1-5.

Wakabara, Y., and F.P. Pereira Leite. 1977. *Heterophlias seclusus* Shoemaker, 1933 (Amphipoda, Philiantidae) from the Brazilian Coast. *Crustaceana,* 33:90-96, figures 1-5.

Walker, A.O. 1901. Contributions to the Malacostracan Fauna of the Mediterranean. *Journal of the Linnean Society of London,* 28 Zoology:290-307, plate 27.

______ 1904. Report on the Amphipoda Collected by Professor Herdman, at Ceylon, in 1902. *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar, Supplementary Report,* 17:229-300, 8 plates.

Wigley R.L. 1966. Two New Marine Amphipods from Massachusetts, U.S.A. *Crustaceana*, 10:259-270, figures 1-8.

Zimmerman, Roger J. and J.L. Barnard 1977: A new genus of primitive marine hadziid (Amphipoda) from Bimini and Puerto Rico. *Proceedings of the Biological Society of Washington*, 89: 565-580, figures. 1-5. 1977.